Instructor's Manual

for General Chemistry

Advanced Customer Solutions

ALEKS Corporation

ALEKS Instructor's Manual for General Chemistry, Version 3.18.

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Prepared by Advanced Customer Solutions, ALEKS Corporation.

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Preface

Welcome to ALEKS, one of the most powerful educational tools available for learning chemistry. ALEKS combines advanced learning technology with the flexibility of the Internet, and provides an interactive tutoring system with unmatched features and capabilities.

The innovative features of ALEKS open new horizons for educators and learners alike in any educational context. The ALEKS class management system enables instructors to efficiently monitor student progress and provide focused instruction. With its unprecedented use of Artificial Intelligence, ALEKS determines quickly and precisely what your students know and what they need to learn, guiding them down individualized learning paths to mastery. The syllabi used are customizable, letting you conveniently add or subtract topics. As ALEKS is accessed on the Internet, no complicated technical preparation is needed—and your students can work at any time, from home, from work, or from the classroom! ALEKS can also be integrated with a variety of textbooks.

The benefits of using ALEKS are dramatic. Students work in a dynamic, interactive learning environment on precisely those materials that they are individually ready to learn, building momentum toward mastery. Students can access their ALEKS account around their own schedules and work on what they are ready to learn now. It is the personalized, "just-in-time" learning system.

ALEKS may be used in a variety of classroom situations—whether in a traditional classroom, or in a self-directed or distance-learning environment.

ALEKS is sold to the student as a subscription. The student purchases a User's Guide with Student Access Code. Using the Student Access Code along with the Course Code provided by the instructor, the student registers on the ALEKS website.

This Instructor's Manual is intended to provide complete information on the functioning of ALEKS. A description of its contents can be found in Chapter 1.

Please also take time to explore the ALEKS website; it is a valuable source of information (http://www.aleks.com, Fig. 3.2). The website includes tours, overviews of ALEKS course products, troubleshooting and support information, training resources, and user guides. It also contains information on the theory and research behind ALEKS, forums for the exchange of ideas with other educators, and brief, recorded on-line training segments. To find the resources specific to the educational field you are in, click on the appropriate link on the ALEKS home page.

Chapter 1

Introduction

1.1 What is ALEKS?

The ALEKS system is the product of years of cutting-edge research into the mathematical modeling of human knowledge (Chap. 9). The creators of ALEKS are cognitive scientists, software engineers, and university professors. In designing ALEKS, their goal was to achieve the utmost simplicity of use without compromising the depth, rigor, or richness of instruction at its inspirational best. ALEKS is a tool to empower both instructors and learners. It opens doors into the assessment and representation of knowledge, and it breaks down barriers to success by recognizing the vast diversity of paths that lead to mastery. The ALEKS system can make a radical difference in how learning is experienced.

ALEKS is an online system for the assessment and individualized teaching of a variety of subjects. It can be accessed on the Internet from virtually any computer and is designed to allow the monitoring and management of students and classes at the instructor, college, and system levels.

The core of the system is an efficient, adaptive assessment engine that determines quickly and precisely what an individual student knows. Based on assessment data, the system is able to offer material that the student is ready to learn.

The ALEKS Learning Mode includes explanations and algorithmically generated practice problems, ongoing assessment of student knowledge, an online ALEKSpedia, and facilities for review and collaborative help. It can be used on an independent basis or as a supplement to classroom instruction.

1.2 The ALEKS Instructor's Manual

The purpose of the ALEKS Instructor's Manual is to provide instructors with complete information on the operation of the system. Even though ALEKS is not complex, our

goal is to offer instructors a clear idea of everything ALEKS does, how it works, and where to find answers to questions.

ALEKS is user-friendly, and may be used without help from the Instructor's Manual. Feel free to use the system now. If questions arise, or if you want to learn more about ALEKS, this Instructor's Manual is intended as a convenient and comprehensive reference.

NOTE. For a brief, comprehensive overview of ALEKS, please turn directly to the "Frequently Asked Questions" in Chapter 10.

- The first chapters are those most likely to be used by instructors new to ALEKS. Chapter 2, "Quick Start," contains a concise checklist for those new to ALEKS. Chapter 3, "Setup Guide for Instructors," provides all of the information necessary for preparing to use ALEKS with one or more classes. This ranges from technical and installation requirements through the students' first ALEKS session (which typically involves registration, tutorial, the Initial Assessment, and entry into the Learning Mode). Much of the information here is the same as that in Appendix A.
- Chapters 4 through 7 contain descriptions of the principal parts of the ALEKS system: Assessment Mode, Learning Mode, and the Instructor Module.
- The Instructor Module is discussed in two chapters: Chapter 6 presents the Instructor Module generally; Chapter 7 covers the Advanced Instructor Module.
- Chapter 8 is a brief guide to teaching with ALEKS, describing a range of scenarios and the ALEKS features that support them.
- Chapters 9 through 11 provide additional information that may be necessary or of interest to instructors using ALEKS. Chapter 9, "Knowledge Spaces and the Theory Behind ALEKS," explains the history of Knowledge Space theory and its fundamental concepts, along with the evolution of ALEKS itself. Also included is a bibliography for those seeking to understand the theory behind ALEKS in greater depth. Chapter 10 provides answers to frequently asked questions about ALEKS. Chapter 11 gives the information necessary for obtaining technical and other support.
- The ALEKS User's Guide is available to all students from the ALEKS website. The User's Guide is reproduced here in Appendix A. Unlike the other chapters of the ALEKS Instructor's Manual, Appendix A is addressed to student users of the system. It covers technical requirements, installation, registration, the Tutorial, and ordinary use of the system, as well as guidelines for effective use and troubleshooting tips. Appendix A can be used by instructors to obtain a brief but complete picture of how the system is used. Appendix B contains content summaries for ALEKS course products.

Chapter 2

Quick Start

The purpose of this chapter is to provide a summary of the steps involved in starting a class with ALEKS.

2.1 Obtaining a Class Code

In order to use ALEKS with your class, you will need to have at least one Class Code. This code should be given to students to use in registration, together with their Student Access Code (below). When they register, they will receive a Login Name and Password. Students should not use the Student Access Code and Class Code to register a second time, as they will not be able to create a new account this way.

You can have as many classes and sections as you need or want in ALEKS. For each class or section, there is one unique Class Code. Students who register using this code will be enrolled in the corresponding class. Students who accidentally enroll in the wrong class can easily be moved to the right one at any time. (Please note that moving a student from one class to another in ALEKS may trigger a new assessment.) **To obtain the Class Code for any class, log on to your instructor account, click on "Administrator Center" (upper right), and click on "View all your classes and Class Codes"** (Sec. 6.6.12). In the Advanced Instructor Module, simply select the name of the class and click "Edit Course," under the Home tab (Fig. 7.5). The Class Code will appear in the right-hand part of the screen.

You will normally be provided with an instructor Login Name and Password by ALEKS Corporation; otherwise, a colleague at your college with Administrator privileges in ALEKS can also create an instructor account for you. Once you are logged on to ALEKS as an instructor, you can create one or more classes through "Add a Class" (upper right).

2.2 Registering Students

Students should use the following steps to register.

1. Go to the ALEKS website.

   http://www.aleks.com

2. Click on the link for "SIGN UP NOW!" to the left of the page, under the space for Registered Users. (This is the only time they will click on that button.)
3. On the page that follows, enter the Class Code in the spaces provided for "Using ALEKS with a Class?" (to the left of the window). **Do not use the button on the right-hand side.**
4. Confirm enrollment information.
5. Indicate whether you are a new or an existing ALEKS user.
6. Enter the Student Access Code.
7. Enter other information as prompted and choose a password.
8. Record the Login Name provided by the system.
9. Begin using ALEKS by taking the student tutorial and an Initial Assessment.

Students will subsequently use their Login Name and Password to enter their accounts.

Chapter 3

Setup Guide for Instructors

3.1 Instructor Preparation

ALEKS has been designed to be user-friendly and intuitive. However, taking the time to study all materials provided to you, including the Instructor's Manual, and trying out the system, can provide valuable insight into the system's functioning and underlying ideas. The administrator for ALEKS can contact ALEKS Customer Support for assistance at any time (Chap. 11).

3.2 System Requirements

The following table presents the system requirements for ALEKS in summary form.

	PC	Macintosh
Operating System	Windows	MacOS 10.4+
Processor	Any	Any
RAM Memory	64+ MB	64+ MB
Browser	Explorer 7.0+, Firefox 3+, Chrome 4+	Safari 4+, Firefox 3+
Screen Resolution	1024x768	1024x768

Figure 3.1: System Requirements

NOTE. Any kind of Internet connection (cable, ISDN, DSL, or wireless) usually available in a computer lab is adequate for use with ALEKS. If your computer lab has security safeguards in place, you will need the cooperation of your LAN administrator, system administrator, or lab technician to install the ALEKS plug-in.

3.3 Installation

Figure 3.2: The ALEKS Website

Installation of the ALEKS plug-in takes place from the ALEKS website (Fig. 3.2):

http://www.aleks.com

NOTE. You must use this URL to access ALEKS. You may wish to mark this website in your browser with a "Bookmark" or "Favorite" or by creating a shortcut of some kind.

Close all applications other than your web browser before beginning installation.

Installation of the ALEKS plug-in is automatic. If you attempt to use the system directly by clicking on "Free Trial" or on "SIGN UP NOW!," the system will automatically check to see whether your computer has a recent plug-in installed. If no plug-in is detected, the system will ask for your permission to install one.

When you grant permission, the plug-in will be installed. Following installation you must close and reopen your browser application. Installation is also automatic for registered users.

If you need to download and install the plug-in and this does not occur automatically, click on "DOWNLOADS" (upper right), then on the green ">>Download" button.

NOTE. This is not a high-risk operation for your computer. The ALEKS plug-in is a small library of Java classes which are used by your browser when you are logged on to ALEKS. They are inactive at other times and do not do anything except provide functionality for ALEKS. They can easily be removed from the computer with no other

effect except that ALEKS ceases to be usable on that computer. ALEKS Corporation Customer Support will be happy to answer any questions about the plug-in.

There is also a "streaming" plug-in which can be used in situations where it is not possible to download or install a plug-in on the local computer. To utilize the streaming plug-in, go to the following website:

http://www.aleks.com/plugin

The ALEKS home page will appear. Log on to ALEKS as you normally would. On the screen you will see text that reads "Downloading ALEKS Streaming Plug-in." After a few moments, depending on your internet connection, the plug-in will finish loading into memory and you will be able to use ALEKS.

NOTE. If the browser window being used to navigate ALEKS is closed, the streaming plug-in will need to be downloaded again by returning to www.aleks.com/plugin before signing into ALEKS again.

Important: The "streaming" plug-in should **NOT** be used in a school or college computer lab, or any other location where more than one person is using ALEKS at the same time. In any educational lab setting, the regular ALEKS plug-in **MUST** be installed. If the "streaming" plug-in is used in a lab setting, it may disrupt the functioning of the network.

3.4 Instructor Module

To enter the ALEKS Instructor Module, log on to ALEKS with your Instructor Login Name and Password. The Instructor Module lets you monitor and manage your ALEKS classes. The Instructor Module is designed for ease of use; it guides users through the steps needed to accomplish tasks in such a way that no separate training is needed and mistakes or confusion are unlikely. See Chapter 6 for a complete description of the Instructor Module.

After you are familiar with the features of the Basic Instructor Module, you may wish to try the Advanced Instructor Module, which is somewhat more complex than the standard interface but offers greater efficiency and convenience for some operations (Chap. 7).

3.5 Lab Check

To ensure the best possible experience of ALEKS for your students, we recommend that you check the computer lab in which ALEKS will be used before the first session. This means installing and testing the plug-in on some or (preferably) all of the computers in the lab. If security measures are in effect, you will need the cooperation of the lab

administrator to install the plug-in. For instructions on how to install and test ALEKS, see Sec. 3.3.

If the ALEKS plug-in is not pre-installed and tested in this way, it will be installed when your students first access the system. This will take away a certain amount of time from their use of the system. Also, if there is some problem in the lab that makes installation difficult, it is better to resolve it before the students arrive.

3.6 Student Orientation

It is strongly recommended that the first ALEKS session be conducted under supervision, perhaps with another instructor on hand to help your students get started. It is not generally necessary to schedule a separate orientation meeting before the students begin using the system. Students can access the **ALEKS User's Guide** from the ALEKS website. Encourage students to familiarize themselves with this brief guide. You should remind your students to bring their Student Access Code to the first session of class. It is also advisable for students to have pencil and paper for assessments in ALEKS. A calculator is included in ALEKS when needed. Remind your students that help is not permitted during the assessment, because this will impair the accuracy of the results, and consequently hinder that student's progress in the Learning Mode.

If possible, the students' first session with ALEKS should allow them to complete their assessments and begin work in the Learning Mode. If the students are unable to finish their assessments during this time, ALEKS will automatically keep their place. The next time the students log on to ALEKS they may continue without any loss of work.

3.7 Registration

Students register with ALEKS by going to the ALEKS website and clicking on "SIGN UP NOW!" This will be expedited if the browsers used by the students have "Bookmarks" or "Favorites" pointing to the website (Sec. 3.3).

NOTE. In order to register, all students must have both their Student Access Code and the Class Code for the class that you are teaching. The Class Code will either be sent to you by ALEKS Corporation or be obtained when you create the class (Sec. 6.3). You are responsible for giving this code to the students at the time of the first session (Sec. 2.1).

The student registration process is described in detail in the User's Guide (Appendix A). There are complete online instructions for every step of this simple procedure. Among other information, students can supply their Student ID number (if you wish to have this in the system). Special care should be taken in entering the latter, as the system cannot detect mistyping. The Student ID is optional information.

Near the conclusion of Registration students receive a Login Name and choose a Password. These should be noted carefully, as they will be essential for all further work with ALEKS. Students should choose a password they will remember easily but that will be hard for others to guess. Login Name and Password can be typed with upper or lower-case letters. Neither may contain spaces or punctuation. The Password must contain at least 6 characters.

3.8 Tutorial

Following Registration, the students enter a brief tutorial on the use of ALEKS input tools, also called the **Answer Editor Tutorial** (Sec. 4.5). There are separate tutorials for different subjects, since the specific tools for them differ somewhat. The ALEKS Tutorial provides ample feedback to ensure that students complete it successfully.

NOTE. The Tutorial is not intended to teach chemical knowledge, but rather to train students in using the system tools. If students need a "refresher" on the use of the system tools, it is always possible to click on the "Help" button, which gives access to the sections of the Tutorial (Sec. 5.2.14).

3.9 First Assessment

Immediately after the Tutorial, students proceed to their Initial Assessment (Chap. 4). To reiterate, no help of any kind should be given to students being assessed, not even rephrasing a problem. It is also advisable for students to have pencil and paper for assessments in ALEKS. A calculator is included in ALEKS when needed.

The ALEKS assessment is adaptive and variable in length. Consistency of effort and concentration may influence the length of an assessment.

NOTE. All students will be assessed on their first use of the system. This will provide you with a baseline picture of your class and of each individual student.

3.10 Report Tutorial

At the conclusion of the Initial Assessment, the student is given a brief Tutorial on how to interpret the Assessment Report. This will be in the form of a color-coded pie chart, with accompanying textual information (Sec. 4.6).

Explain to students that subsequent assessments will produce only the pie chart. The pie chart also appears in the Learning Mode each time a new concept is mastered and "added to the pie." If the student wishes to choose a new topic, the pie can always be accessed by clicking the "MyPie" button.

3.11 Beginning the Learning Mode

Students enter the Learning Mode by clicking on one of the topics contained in their pie chart (topics they are "ready to learn"). If at all possible, the students should be given sufficient time in their first ALEKS session to use the Learning Mode and begin to "add concepts to their pie." If they have this experience, their interest in using ALEKS will be more favorable. You should also be present to answer questions regarding the Learning Mode and to help your students familiarize themselves with its varied features. This is particularly important for when they will have to use ALEKS unsupervised.

Chapter 4

Assessment Mode

The Assessment Mode is the heart of the ALEKS system. The program quickly and accurately determines a student's knowledge, in order to deliver individualized instruction on the exact topics the student is ready to learn. In ALEKS, learning is powered and optimized by assessment.

4.1 Assessments in ALEKS

The ALEKS assessment uses open-ended problems (no multiple-choice questions). The assessment uses adaptive questioning, so that problem types are selected based on all the previous answers the student has given. It is impossible to predict which types of problems will appear, or in what order. Moreover, the problems themselves are generated algorithmically, with randomly-selected values (as is the case also in the Learning Mode). Consequently, students cannot "learn the assessment," teachers are unable to "teach to the assessment," and some types of cheating are impossible. In the unlikely event that two students sitting next to one another were given the same problem-type at the same time, the problem parameters and values would be different, and so would the correct answer. Certain assessments should be supervised, however, such as the first, midterm, and final assessments in a class. Without supervision, students could use a textbook, receive systematic help, or have someone else take the assessment in their place. (There is no reason for a student who has begun using ALEKS to cheat on a "progress" assessment, as this will simply cause the system to suggest problems that are too difficult, and thus hinder the student's own work.)

The student will be given an Initial Assessment immediately following completion of the ALEKS Tutorial (Sec. 3.9). The student is clearly informed that the assessment is beginning. Next, a series of problems is posed to the student. The student provides the solution to each problem using the Answer Editor (or clicks "I don't know"). In Assessment Mode, the system does not inform the student whether their answer is correct or incorrect. The assessment continues until the system has determined the

student's precise knowledge of the class materials, at which time the assessment ends and a report is presented to the student. The number of questions asked cannot be known in advance, although consistent effort and attention may contribute to shorter assessments.

4.2 Guidelines for Assessments

ALEKS assessments are an important part of the ALEKS program. It is essential that assessments be conducted according to certain guidelines. If there is an atmosphere permitting disturbances or distractions, students may not do their best. If assessment results are inaccurate, the system will give the student inappropriate problems and progress will initially be impaired. The system will recover and find the right level, but the student may still experience a degree of frustration. In order to avoid this, it is strongly recommended that the first assessment be taken under the instructor's supervision (Sec. 3.9).

All students being assessed need paper and pencil. A basic calculator is part of ALEKS, and will be available when appropriate. It is important that no assistance be given to the student. Explaining or rephrasing a problem should be avoided; this is considered inappropriate help. Students should be instructed to use the "I don't know" button only when they are completely unfamiliar with the topic. It is not possible to return to previous assessment questions. **Students should not click their browser's "Back" or "Forward" buttons when using ALEKS.**

4.3 How Assessments are Triggered

All ALEKS assessments work in much the same way, though they are triggered for different reasons, as explained in the following sections.

4.3.1 Initial Assessment

The Initial Assessment takes place at the outset of student's use of ALEKS, immediately after Registration and the ALEKS Tutorial (Sec. 3.9). We strongly recommend that students take this Initial Assessment in a supervised computer lab setting, to ensure that they do not receive help or collaborate. In creating or editing a class account, the instructor can stipulate that the Initial Assessment be allowed only from school (Sec. 7.9.1). In order for this to take effect, the IP address must be entered in ALEKS (Sec. 7.20.1).

4.3.2 Automatic Assessments

Additional assessments after the Initial Assessment are triggered automatically by the system based on the student's rate of progress and on the amount of time the student has spent working in ALEKS. ALEKS triggers the following automatic assessments:

- **Progress Assessment**, when the student has mastered approximately 20 topics in the Learning Mode **and** spent at least 5 hours working in ALEKS since the last assessment.

  ALEKS will not trigger this assessment if the class is set up with ALEKS objectives.
- **Periodic Assessment**, when 30 days have passed since the last assessment.
- **Objective Completion Assessment**, when the student completes the material of an ALEKS objective, or when the due date of an objective passes (Sec. 6.3.3).
- **Goal Completion Assessment**, when the student has completed the final topic of the pie chart. If the assessment does not confirm the student's mastery of the class materials, the student will return to the Learning Mode. Consequently, more than one Goal Completion Assessment is possible, but ALEKS will not reassess the student if a only small number of topics need to be relearned.

  These are all "progress"-style assessments. Some modification of the parameters given above is possible; please contact ALEKS Corporation Customer Support for assistance if you would like to adjust them.

  Note that a Progress, or Periodic Assessment "resets the clock," so that assessments do not occur one on top of another. In general, ALEKS will avoid triggering unnecessary re-assessments.

Progress made by the student through the Learning Mode, or as the result of an assessment, periodically updates the list of available topics, displaying a new pie chart and new choices of concepts the student is "ready to learn." The automatic assessments check the students' retention of recently learned material, and may also include a few topics the student is ready to learn.

NOTE. Automatic assessments may be postponed due to a scheduled assignment. This occurs when the assignment has the "Prevent automatic assessments" box checked (Sec. 6.4.6).

4.3.3 Scheduled Assessments

Instructors can schedule assessments for the entire class or for specific students, using the "Add Assessment" option (in the Basic Module) or "New Scheduled Assessment" option (in the Advanced Module). For example, the instructor, department, or college may wish to have "midterm" assessments under supervision to guarantee reliable results. They have the option of selecting the style of assessment as progress or comprehensive.

Progress Assessments are slightly shorter and focus on the student's most recent learning history; Comprehensive Assessments are slightly longer and probe more deeply into the student's overall knowledge of the class content.

ALEKS allows the instructor to choose the availability of Scheduled Assessments by specifying a beginning and ending date and time and how students access that assessment when it becomes available. Also among the options for a Scheduled Assessment is one to prevent automatic assessments within a certain number of days prior to the Scheduled Assessment. Note that any assessment scheduled by the instructor "resets the clock" for automatic assessments, so that students will not be assessed too frequently.

For additional information about Scheduled Assessments, see Secs. 6.4.9 and 7.9.

4.3.4 Requested Assessments for a single student

As an instructor, you can also request an assessment for a single student using the "Request Assessment" option (in the Advanced Module). When a Requested Assessment is triggered, the assessment will take place immediately the next time the student logs in (compared to the Scheduled Assessment, where the student is only prompted to take the assessment after the date or time specified by the instructor). Like the Scheduled Assessment, a Requested Assessment for a single student "resets the clock" for automatic assessments. The results of this assessment will not be included in the Gradebook.

The style of a Requested Assessment can also be set to progress or comprehensive. Progress Assessments are slightly shorter and focus on the student's most recent learning history; Comprehensive Assessments are slightly longer and probe more deeply into the student's overall knowledge of the class content.

For additional information about Requested Assessments, see Sec. 7.17.1.

4.4 Buttons

The Assessment Mode (Fig. 4.1) has a reduced set of active menu buttons. The student being assessed is able to leave the system, by clicking on their name (top right) followed by "Log out," or get help on use of the Answer Editor by using the "Help" button. Other buttons appear, but they are disabled. All of the ALEKS menu buttons are enabled in the Learning Mode (Sec. 5.2).

The two aspects of the ALEKS interface relevant to work in the Assessment Mode are the Answer Editor and the Assessment Report (Sec. 4.6).

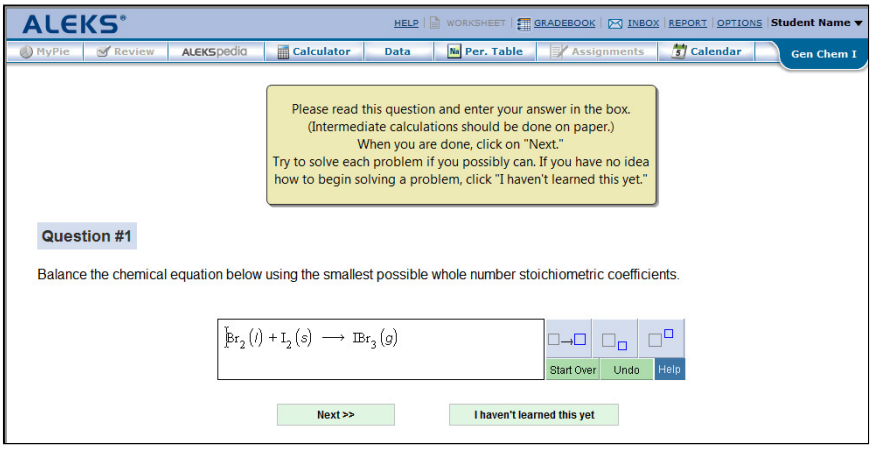


Figure 4.1: The Answer Editor for Chemistry (Assessment)

4.5 Answer Editor

Input to the ALEKS system is always in the form of proper expressions and constructions, never multiple choice. A critical reason for this is to check students' knowledge accurately.

The general term for the input tools used in ALEKS is the "Answer Editor." This encompasses a variety of actual modes for user input corresponding to numerous forms of chemical and mathematical representations. A student beginning to use ALEKS is trained in how to use the features of the Answer Editor that are relevant to the subject (Sec. 3.8).

In much of what follows in the tutorial, emphasis is on the "Answer Editor for Chemistry," including its specialized facilities for Chemical expressions and representations.

4.6 Assessment Report

At the conclusion of an assessment, the system presents the Assessment Report. The interpretation of this report is the same as for pie chart displays found in other places within ALEKS (such as in "MyPie"). The standard report format is used for all assessment reports (Fig. 4.2).

4.6.1 Interpreting the Pie Chart

A pie chart expresses the results of a given assessment. It contains the following types of information:

- The topics included in the syllabus.

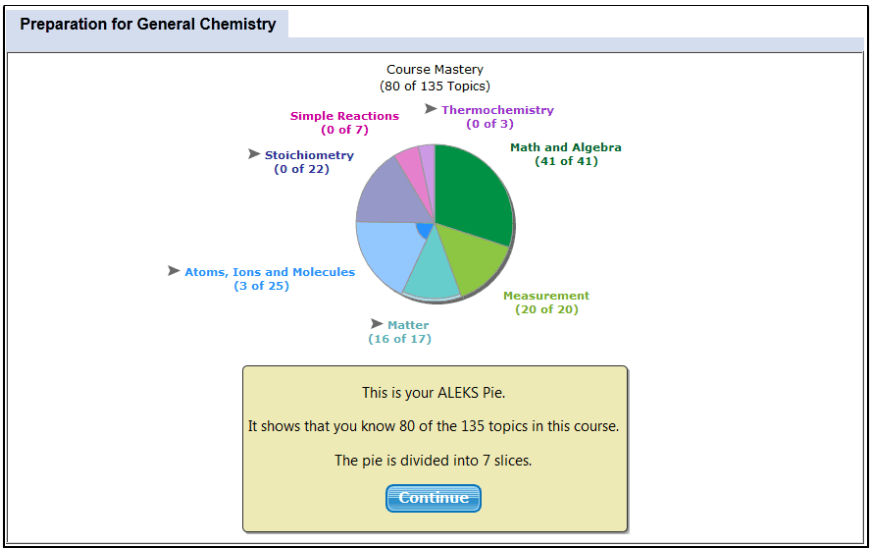


Figure 4.2: Assessment Report

- The relative size of the parts of the syllabus.
- To what extent the student has mastered each part of the syllabus, according to the assessment results.

Each color-coded slice of the pie chart refers to a particular part of the syllabus, such as "Atoms and Molecules" or "Chemical Reactions." The portion of the chart taken up by any one area (slice) reflects the size of that area relative to others in the given syllabus.

The degree to which each slice is filled by darker color shows the extent to which the student has mastered that area.

By placing the pointer over one of the slices of the pie chart, the slice expands out of the pie, displaying a list of concepts the student is currently ready to learn. Not every slice necessarily contains such a list, even if the slice has not yet been fully mastered. This is because a student may not be ready to learn a concept in a given slice before concepts in another slice have been mastered. Clicking on any one of these concepts takes the user into the Learning Mode to begin working on that concept.

4.7 Ready to Learn

The concepts given as most "ready to learn" do not represent a casual selection of concepts that the student has not yet mastered. By resuming study with one of these concepts, the student is following the most efficient path to mastery of the complete class (Chap. 9).

4.8 Progress Bars

Another graphic expression of the student's progress is given by the bar graphs at the bottom of the report ("History"). These represent the general extent of the student's mastery:

- The blue portion of each bar represents material that was learned as of the given assessment.
- The green portion represents material mastered in the Learning Mode since that assessment.
- The yellow portion represents material belonging to the curriculum for the given level that has yet to be learned.

When the bar is entirely blue, or a combination of blue and green, the student has completed the curriculum for that class.

Chapter 5

Learning Mode

5.1 The ALEKS Learning Mode

The purpose of the Learning Mode is to assist students in mastering chemical concepts. Students using ALEKS choose which concepts they wish to work on from the pool of available topics in the pie slices. This list of available topics is constantly being updated through progress made by the student in Learning Mode or as the result of an assessment. As students are only presented with material the system has determined they are most ready to learn, the benefit of their work is maximized.

In the Learning Mode students always work on one concept at a time. The Learning Mode provides students with a rich array of resources to help in mastering concepts. This includes explanations, references to a textbook if one has been integrated with ALEKS, links to supplemental tutorial material and interactive applications, practice problems, diagnostic feedback on problem solutions, and access to a student ALEKSpedia. Moreover, the Learning Mode is designed to monitor the progress made by students toward mastery of a given concept and advise them on continuing or changing concepts. A student is required to solve an appropriate number of practice problems correctly before the system will conclude that the concept has been mastered. (If the student makes mistakes, additional practice will be required.) Once the concept has been mastered, the student is encouraged to choose a new concept from the (updated) pie chart, but more practice is available if desired.

If the student has difficulty, the system may suggest that the student pay closer attention to the explanations or it may offer the name of a classmate who has recently mastered this concept (Sec. 5.7). A new selection may also be encouraged. The student continues to work in the Learning Mode until a new assessment is triggered, either by the instructor or automatically.

5.2 Interface Features

The student has a variety of interface features when using their account. These features allow the student to edit personal information related to their account, view reports and gradebook information, and access helpful tools such as the ALEKS Dictionary, Calculator, and Review.

Students also have the ability to print certain screens in ALEKS. The "Print" feature will be available when the student generates a worksheet, views their reports, or utilizes the "Explain" page in Learning Mode. More detailed explanations of these options can be found below.

5.2.1 Ending an ALEKS Session

Students can end a session with ALEKS in two ways: click on their name (top right), followed by "Log out," or simply close the browser window. Also, if no input is supplied to the system for 30 minutes, the session is terminated automatically. Whichever way you exit, the system will return you to the same place when you next log in to ALEKS.

5.2.2 Options

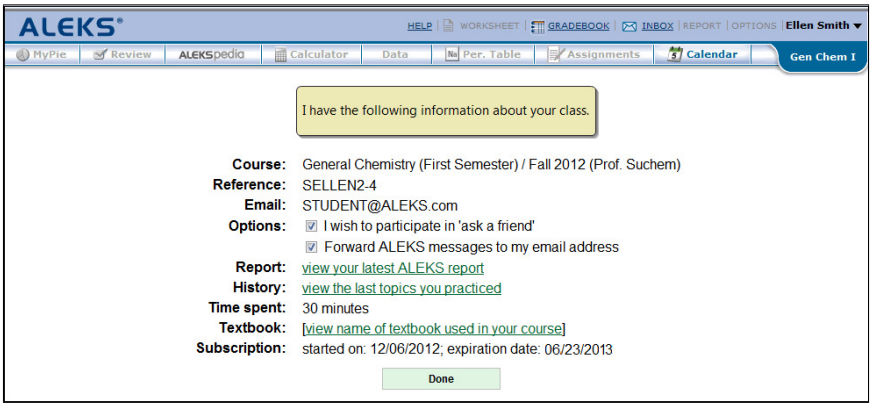
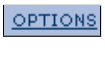


Figure 5.1: Options Page



The "Options" link in ALEKS contains user and class information specific to the student. A checkbox for joining "Ask a Friend" may be available, depending on the student's class (Sec. 5.7).

The "Report" link connects the student to a menu of all assessment reports (Sec. 5.2.3).

The "History" link displays a list of concepts the student has worked on recently, indicating the level of mastery achieved and providing the opportunity to return to that concept for further practice (see also Review, Sec. 5.2.8).

The "Options" page includes the time the student has currently spent in the ALEKS class. Subscription information is displayed, including the beginning and expiration dates of the account (Fig. 5.1). To return to Learning Mode, click on the "Done" button.

5.2.3 Report

Clicking on the "Report" link displays a drop-down menu of all past assessments and time(s) in Learning Mode. Any assessment or learning mode session can be selected (by date) from the menu. Click "OK" to see the results. The results will include a pie chart, a list of topics recently learned, a list of topics the student is ready to learn, and progress bar graphs (Sec. 4.8).

The student also has the Time and Topic Report available under their "Report" link. This report displays the amount of time spent each day in ALEKS as well as the topics the student has attempted and mastered each day. (The number of topics attempted does not include topics the student worked on in Review mode.) To return to Learning Mode, click on the "Done" button.

5.2.4 ALEKSpedia

The online ALEKSpedia provides scientific and mathematical terms and definitions used in the class. Clicking on the "ALEKSpedia" button produces a new browser window tab, with a list of section(s) correlated to the pie chart. Students can also access the ALEKSpedia by clicking on underlined words (hypertext links) anywhere in the Learning Mode. Click on any section(s) to access the definition of terms used in that section. ALEKSpedia definitions are designed to present concepts in their simplest form first, moving into greater depth as the definition proceeds (Fig. 5.2).

The ALEKSpedia screen also includes a text entry field to quickly search for key terms and a link to access the Complete Mathematics ALEKSpedia. Selecting the "Complete Mathematics ALEKSpedia" link gives access to an index of all the ALEKSpedia's headings and subheadings. Beneath the index is the ALEKSpedia entry, with links to other entries and graphic illustrations as appropriate. Close the ALEKSpedia window to return to the Learning Mode.

5.2.5 Calculator

The Calculator button is available for topics where ALEKS permits use of a calculator. Click on this button to use the online calculator.

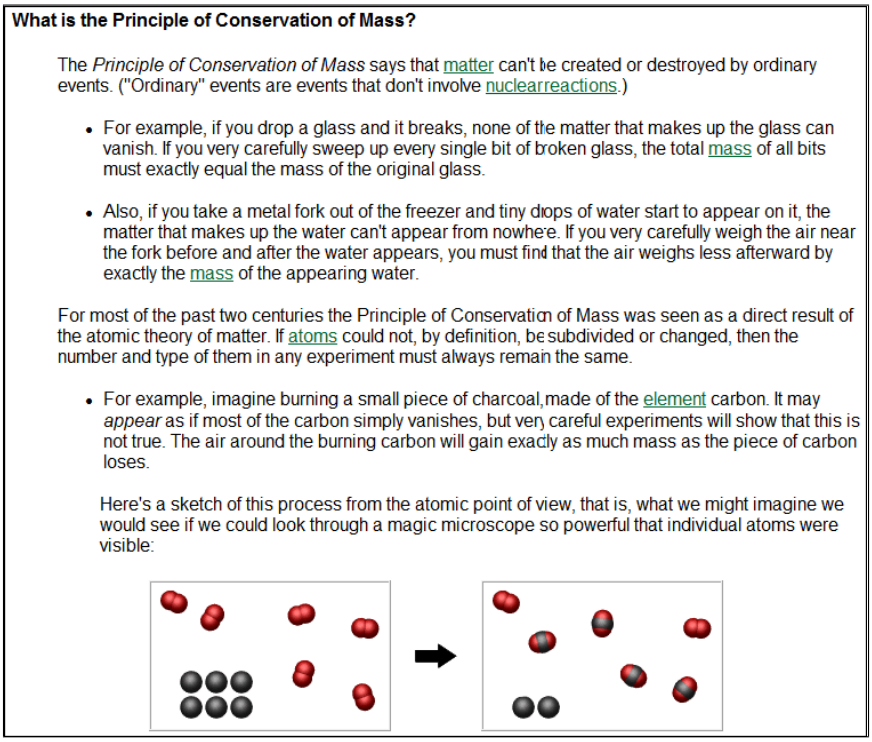


Figure 5.2: ALEKSpedia

5.2.6 Data

This button gives access to a brief reference page for useful chemistry information, including formulas, constants, and other data. Click on the plus sign ('[+]') preceding any category to see the information available under that category.

5.2.7 Periodic Table

This button opens a page with the complete Periodic Table of the Elements. Clicking on any element symbol opens a window with essential information about that element.

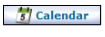
5.2.8 Review

The "Review" button gives a list of concepts the student has recently worked on in the Learning Mode. The link "Click here for more review" gives a comprehensive list of all topics mastered by the student. For more information see Sec. 5.5.

5.2.9 Gradebook

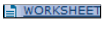
The student can access the Gradebook for the class by clicking on the "Gradebook" button. For more information see Sec. 6.5.

5.2.10 Calendar



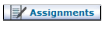
The student can access the Calendar for the class by clicking on the "Calendar" button. For more information see Sec. 6.4.13.

5.2.11 Worksheet



The student may obtain an individualized, printable homework sheet by clicking "Worksheet." The questions on the worksheet are based on the student's most recent work in ALEKS. For more information see Sec. 5.6.

5.2.12 Assignments



The student can complete an assignment (Homework, Quiz, Test, or Scheduled Assessment) assigned by the instructor or check the results of assignments by clicking on the "Assignments" button. If assignments are currently available, the student will see an orange burst on the "Assignments" button. If the assignment has been scheduled by the instructor, so that the student must begin the assignment as soon as it becomes available, the student will be "forced" into the assignment on login to ALEKS (Sec. 6.4.6).

5.2.13 Inbox

The Inbox allows the student to send messages to the instructor requesting assistance with a topic in ALEKS, help with a specific problem, or for other purposes. The student can compose a message by clicking on "Compose." It is possible to include mathematical notation and illustrations in the message as follows:

1. Click the "math" symbol at the right end of the tool bar. This will switch the user into the "Enhanced message editor," with its robust set of math input tools.
2. Included in the Math input tools are a "Chemical equation button" and "Advanced" tab with additional graphing features.

While working in the Learning Mode, the student can send a specific problem type they are working on to their instructor. This message will contain a link to a screenshot of the practice problem. With the practice problem on the screen, the specific problem may be attached to the email as follows:

1. Click on the "Inbox" link. This will take you into the ALEKS Message Center.
2. Click on the "Compose" button.
3. Below the body message section, check the box next to "Attach Page."
4. Click on the "Send" button to send the message.

It is possible to include attachments up to 2MB in size (Sec. 6.1.4). It is also possible to send messages directly to ALEKS Corporation. Click on "Done" to return to the Learning Mode.

5.2.14 Help

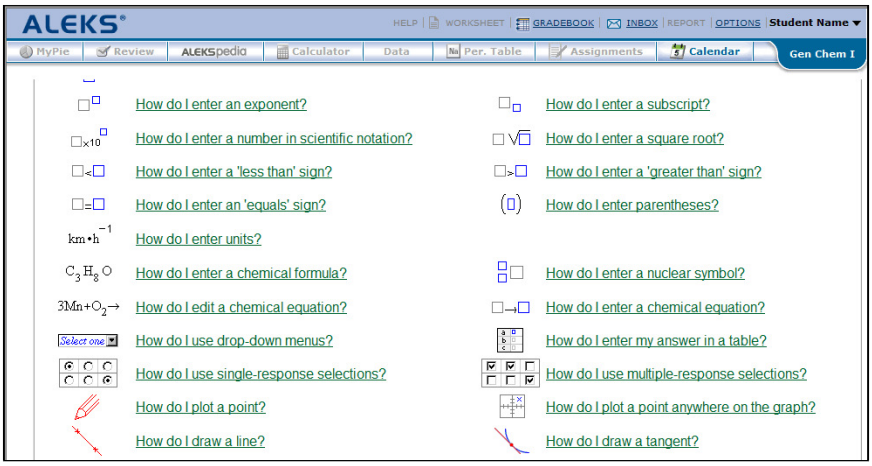


Figure 5.3: Help Menu

The "Help" button in the Assessment and Learning Modes provides detailed assistance with use of the Answer Editor (Fig. 5.3). The Help Menu contains a list of questions on how to use the various icons of the Answer Editor; clicking on one of the items will take you through a brief tutorial on the use of the icon.

5.2.15 MyPie

Clicking on "MyPie" produces a pie chart display reflecting the current state of the student's mastery in the Learning Mode (Sec. 4.6). The student can use this button to select a new concept to work on from among those currently most "ready to learn."

5.3 The Learning Mode Interface

The ALEKS Learning Mode allows students to practice topics they are ready to learn. When students successfully solve a series of problems of the same type, ALEKS will add this problem type or "topic" to the student's pie chart. If a student experiences difficulty with a topic, ALEKS will attempt to help the student in several ways. Different examples of how to solve the problems will be displayed on the "Explain" pages. The "Explain" pages link to definitions of terms, a comprehensive mathematics ALEKSpedia, and a "Help" option. Students receive immediate feedback on their answers.

5.3.1 Practice Page

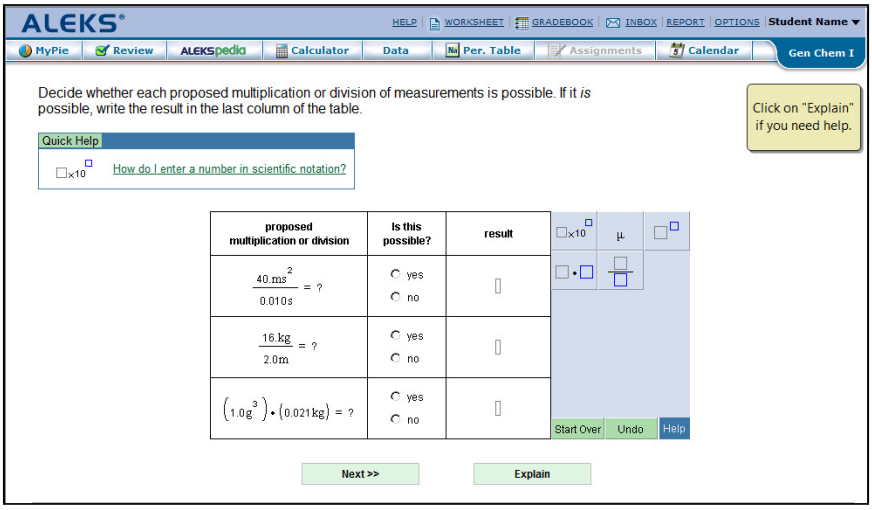


Figure 5.4: Practice Page

Clicking on the name of a topic from the student's pie chart will display a page containing an instance of the problem, followed by the Answer Editor. This is where a solution to the problem can be attempted (Fig. 5.4). All practice problems are generated by algorithms, with randomly selected parameters so that the variety of problem instances for any topic is very high.

Below the Answer Editor are buttons labeled "Next" and "Explain." Clicking on "Next" has the same effect as described for the Assessment Mode: it submits the answer. Here,

however, the user is given immediate feedback on their answer (Sec. 5.4). If correct, the student will receive a congratulatory message. Next, a new problem is presented. In the case where the topic is considered mastered, the student will receive two options; the student can choose to click "Done" to move on to a different topic, or they can click "More Practice" to practice the topic further.

When the student enters an incorrect answer, ALEKS will return the presentation of the original problem with feedback on the student's error. Students can then click on the "Explain" button.

5.3.2 Explanation Page

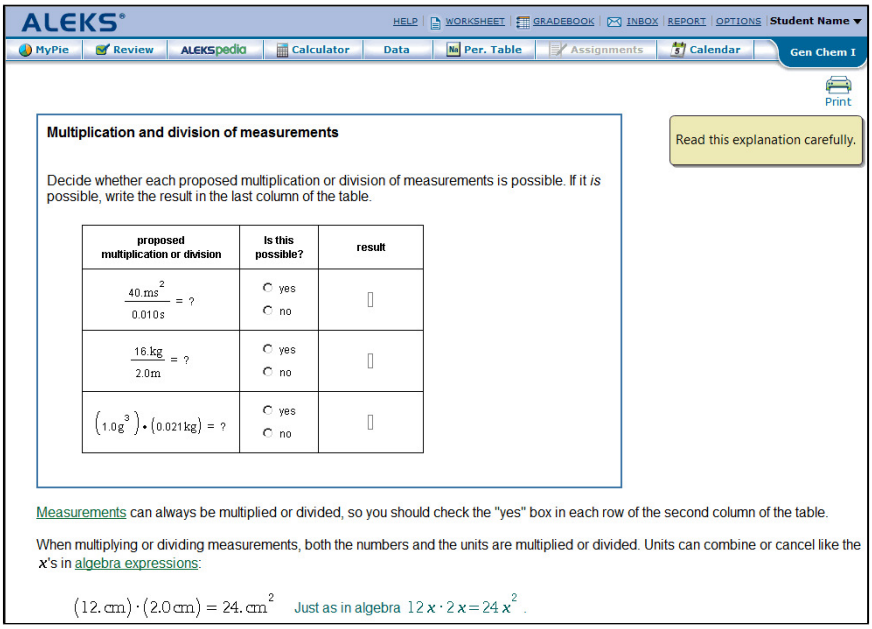


Figure 5.5: Explanation Page

The Explanation Page (Fig. 5.5) begins with the title of the current item and an instance of that item. The answer to the problem is given at the end of the explanation.

When ALEKS is used with textbook integration, a reference will appear at the bottom of the Explanation Page showing the chapter and section of the textbook where additional information about the concept may be found (Sec. 6.3.2). Additional tutorial material and interactive applications may also be found through links at the bottom of the Explanation Page.

Here again, chemical terms are linked to ALEKSpedia definitions. The system may suggest looking up certain key terms to help with the explanation (especially if the explanation has already been visited). At the bottom of the page is the "Practice"

button. Clicking on this button produces a new instance of the same problem-type. Sometimes there may also be a button for "Additional Explanation" or "Detailed Explanation." You can also return to the pie chart to choose a different topic by clicking on the "MyPie" icon.

5.3.3 Wrong Answer Page

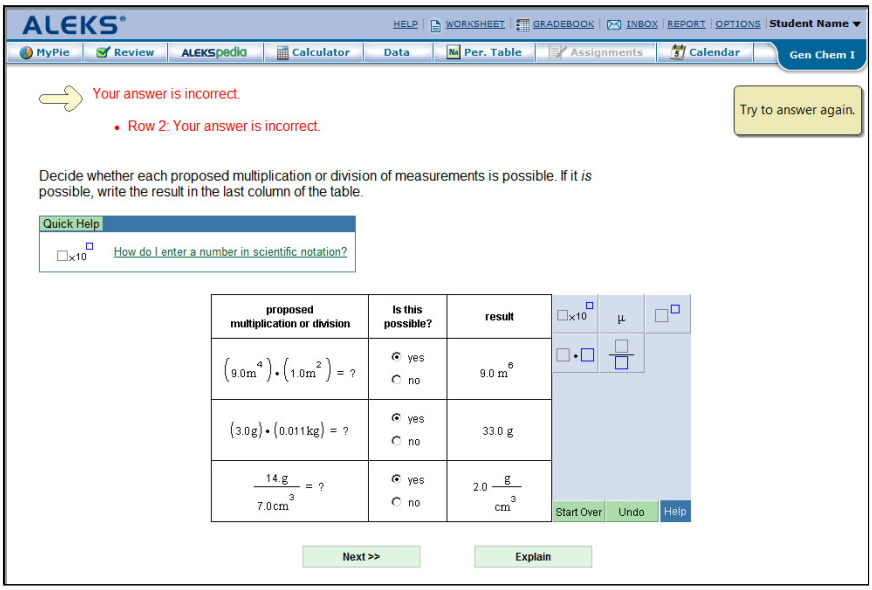


Figure 5.6: Wrong Answer Page

The Wrong Answer Page will appear only after an incorrect answer has been submitted on the practice page (Fig. 5.6). The system may explain why the answer is incorrect and offer advice on the error. Underlined words (hypertext links) may also appear on the screen for students to look up in the ALEKSpedia.

The old, incorrect answer appears in the Answer Editor, where it can be corrected and resubmitted. Again, clicking on "Explain" is an option that leads to an explanation of the problem. Please note that the system may also take the student directly to the "Explain" page if an item has been missed too many times.

5.3.4 Additional Resources

Additional resources to support the students' work are integrated with the Learning Module. In particular, there is an electronic version of the Periodic Table of the Elements; clicking on the symbol for any element gives a brief pop-up summary of that element's properties (Fig. 5.7). There is also a button for Data, which gives a rich and

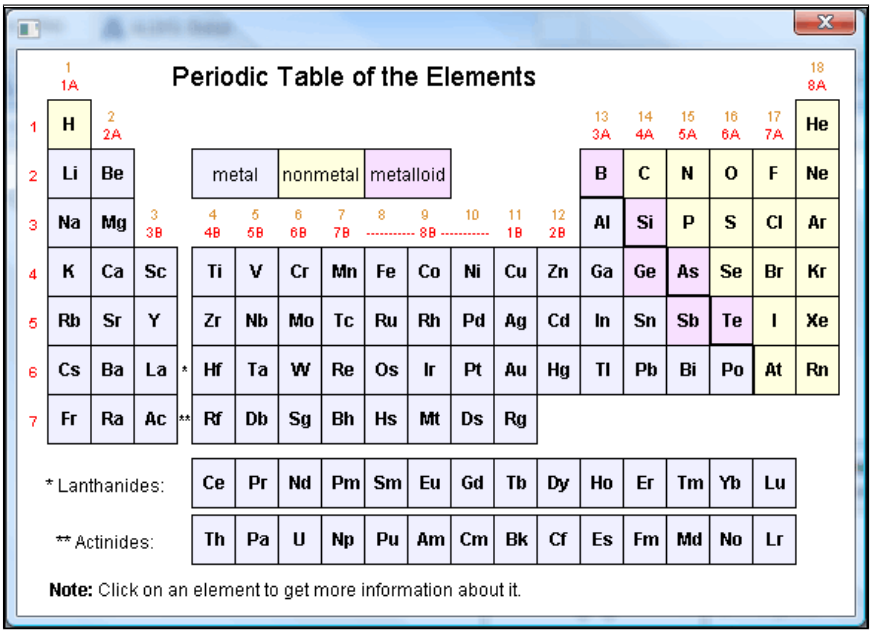


Figure 5.7: Periodic Table

easily-navigated guide to various kinds of data (constants, formulas, etc.) that may be needed by Chemistry students.

5.4 Feedback in Learning Mode

In the Learning Mode feedback is integrated into a sophisticated system of guidance for the student. Some errors prompt ALEKS to give specific hints and suggestions (Fig. 5.6). For example, it may say that a fractional answer needs to be reduced or that a list of expressions is incomplete. After a correct answer, the system will ask a limited number of questions for the same concept before judging that it has been mastered. If an item is missed too many times, however, a new topic will be suggested. If a concept has been left without mastery being attained, the system may suggest returning to it after one or two other topics have been covered.

5.5 Review

A student using ALEKS can review topics recently worked on in the Learning Mode by using the "Review" button (Fig. 5.8). Clicking on any of these topics provides the chance for additional practice; this is particularly useful when the student knows that a new assessment is imminent. "Click here for more review" gives a comprehensive list of topics mastered by the student. ALEKS will periodically offer a student the option

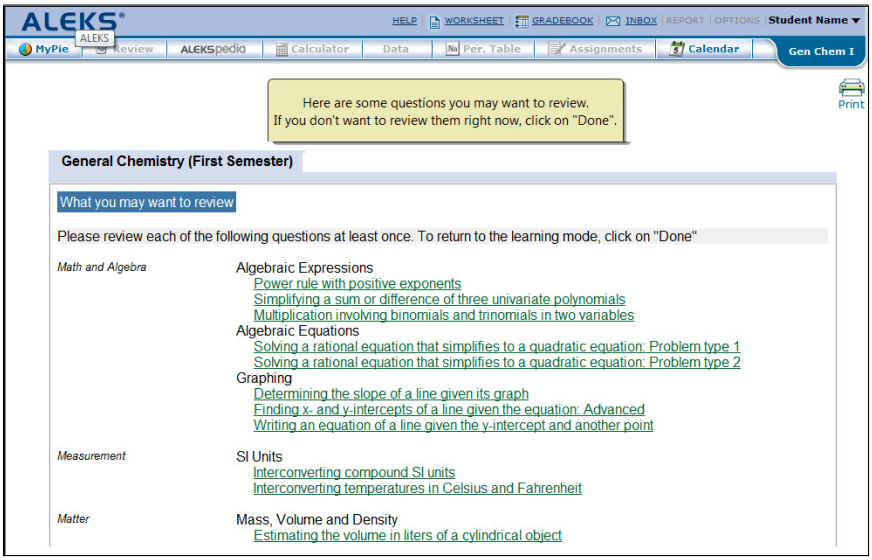


Figure 5.8: Review

of reviewing past material at the time of login. The student can select a topic to review from these recently mastered topics. Clicking on the "Done" button will return the student to the Learning Mode.

In Review, a student can sort class topics either by "Objectives View" or by "ALEKS View." "Objectives View" organizes topics based on the textbook integration or intermediate objectives set up by the instructor. "ALEKS View" organizes topics based on the pie slices.

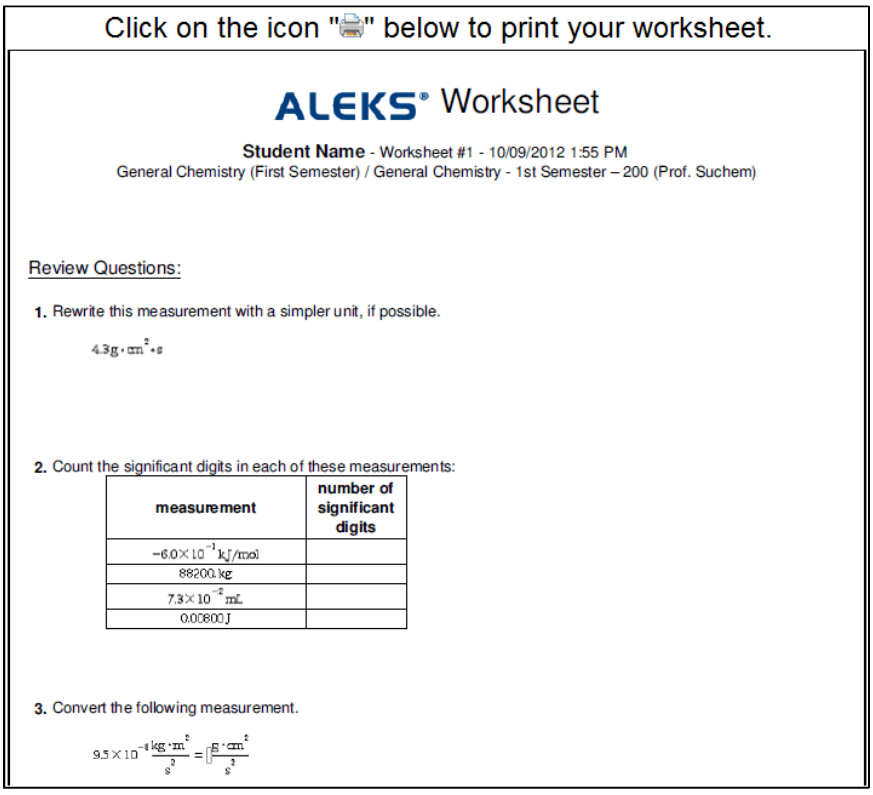
NOTE. Work done in Review mode does not affect the student's pie chart or progress records.

5.6 Worksheet

Clicking the "Worksheet" button generates an individualized, printable homework sheet (in PDF format) containing a number of questions based on the student's most recent work in ALEKS (Fig. 5.9). When the student does this, a sheet containing answers for this individual worksheet (labeled with the student's name and the date) is sent to the instructor via the ALEKS message system (Sec. 6.1.4). The instructor may permit students access to their worksheet answers (Sec. 6.4.12).

A record will be kept on the Worksheet page of all worksheets produced by the student. The student can click on the link for any past worksheet in order to obtain that worksheet again. If the instructor has permitted access to worksheet answers, there will also be links on this page to answer keys for each of the worksheets.

NOTE. In order to view or print documents in PDF format, such as the ALEKS work-


Click on the icon "" below to print your worksheet.

ALEKS® Worksheet

Student Name - Worksheet #1 - 10/09/2012 1:55 PM
General Chemistry (First Semester) / General Chemistry - 1st Semester – 200 (Prof. Suchem)

Review Questions:

1. Rewrite this measurement with a simpler unit, if possible.

$4.3\,g \cdot cm^2 \cdot s$

2. Count the significant digits in each of these measurements:

measurement	number of significant digits
$-6.0\times10^{-1}\,kJ/mol$	
88200. kg	
$7.3\times10^{-2}\,mL$	
0.00800 J	

3. Convert the following measurement.

$9.5\times10^{-4}\,\frac{kg\cdot m^2}{s^2} = \square\,\frac{g\cdot cm^2}{s^2}$

Figure 5.9: Worksheet

sheet, Adobe Acrobat or Adobe Acrobat Reader must be installed on your computer. Most computers have this software. If for any reason your computer does not, there is a link on the ALEKS Worksheet page to download it. Also, because the worksheet is opened in a new browser window, it may be necessary to disable your pop-up blocker temporarily in order to view or print the ALEKS worksheet.

5.7 Ask a Friend

The Ask a Friend feature, if enabled, allows students who are having trouble mastering a topic to know the name of a student in the class who has already mastered that particular topic. The student then has the option of asking the other student for assistance.

The student can choose to participate in this feature via the Options link. A button marked “Ask a Friend” will appear at the bottom of the page in the Learning Mode, if the following conditions are met:

- The student was unsuccessful in answering the concept.

- There is another student in the class who has successfully mastered the concept in an assessment and who has also chosen to participate in the "Ask a Friend" feature.

Chapter 6

Basic Instructor Module

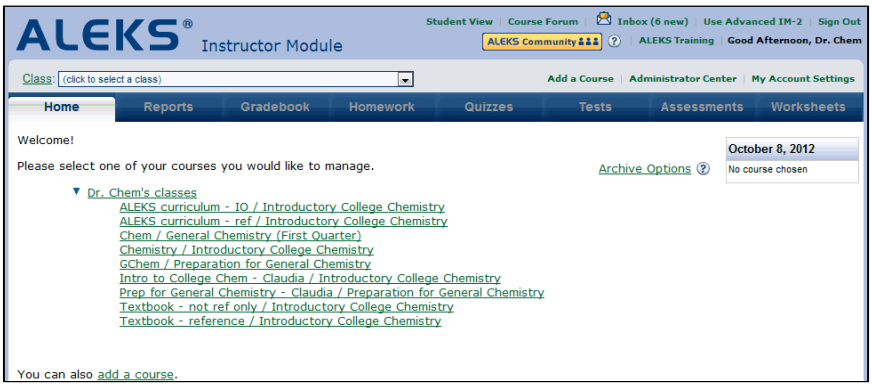


Figure 6.1: Class List

The ALEKS Instructor Module allows instructors to manage their classes and monitor student progress quickly and easily. It puts powerful and flexible tools for class customization in the instructor's hands, making possible a closer coordination between an ALEKS class and the range of integrated textbooks. Like earlier versions of the Instructor Module, it is based on the "Wizard" principle, meaning that all actions are broken into clear, logical steps for easy use even by those new to the system. For experienced users, there is an Advanced Instructor Module that uses the familiar Selector panel and object-based functionality (Chap. 7).

6.1 Instructor Account

When logging on to your ALEKS Instructor account, you will be prompted to create a class if there is none yet created. If there is only one class under your name, you will see the Home page for that class (Sec. 6.1.10). If there is more than one class, you will

see a list of your classes and be able to click on the name of a class to begin working with it (Fig. 6.1). Clicking on the name of a class brings you to the Home page for that class. The class can also be chosen from the "Class" drop-down menu at the upper left. A new class can be created by clicking "Add a Course" to upper right or lower left (Sec. 6.3).

For instructors with ALEKS Administrator accounts, this page will also provide access to the classes of other instructors at your college.

See Sec. 6.6 for information regarding the Administrator Center.

6.1.1 My Account Settings

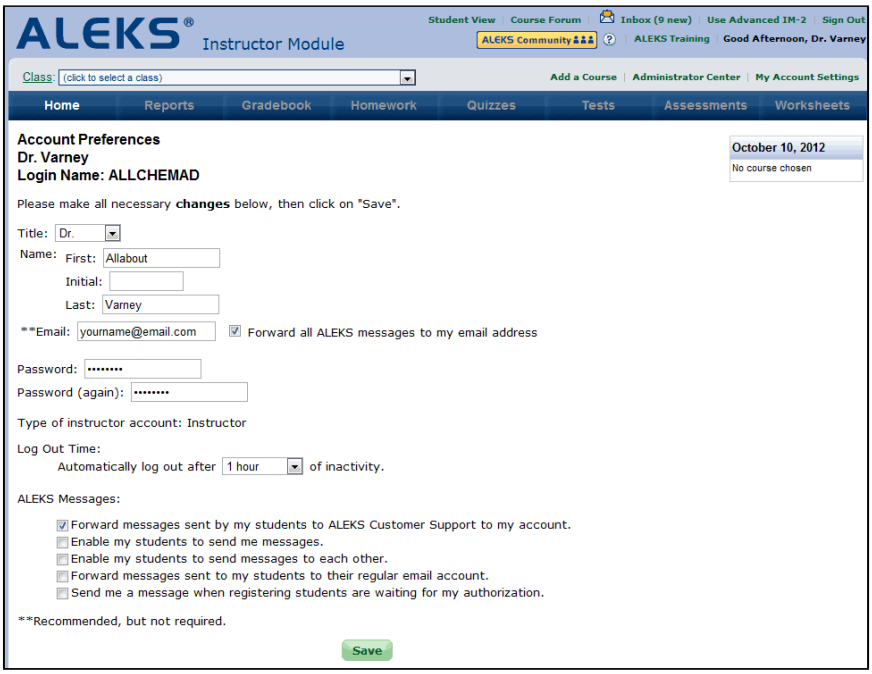


Figure 6.2: My Account Settings

Click on "My Account Settings" to check and modify your ALEKS Instructor account data: name, title, password, email, and automatic log out time (Fig. 6.2). You can also set options affecting the message system and the use of your email address (Sec. 6.1.4).

6.1.2 Student View

The Student View is a tool to allow instructors to see exactly what the student experiences in a particular class. Instructors can take the tutorial, take an ALEKS Assessment, view a pie chart, or complete an assignment. The Student View is not included on the

instructor's roster, and no scores from it will be reported in the Gradebook or reports. A Student View option is provided for each class under the instructor's account.

To access the Student View, select the class, then click on the link at the top of the screen that says "Student View." The next page will show a summary of the feature and how to use it.

To experience all ALEKS features from the Student View, instructors should already have set up Homework, Quizzes or Tests. Clicking on the "Reset the Student View" button will delete any previous work done in that Student View.

From the Welcome page, instructors can choose to fast-forward through the ALEKS tutorial and Initial Assessment by clicking on the ">>" button. To log out of the Student View, instructors should click on the "Exit" link in the upper right-hand corner of the window. Instructors returning to the Student View will be taken to the screen where they left off, unless they checked the "Reset the Student View" box on the summary page.

6.1.3 Course Forum

The Course Forum is a feature in ALEKS that allows the instructor to share ideas with their students, post the class syllabus, and maintain an open channel of discussion. Students can also use the Course Forum to post questions and ideas.

The Course Forum is specific to a particular class and must be authorized by the instructor for each class where it is to be used. To authorize the Course Forum, select the class, then click on Course Forum (upper right) and select "Authorize This Course Forum."

Postings in the Forum can be displayed either by topic or by date. The instructor can monitor the postings and selectively hide messages. The Course Forum can be deactivated by the instructor at any time in the Advanced Instructor Module. To deactivate the Course Forum, select the class and then click on the Home tab. Next, click on the Course Options link, and then the Access Options link. Here you can uncheck "Allow access to this Course Forum."

6.1.4 Inbox

The ALEKS system contains a full-featured internal message system (Sec. 5.2.13). Instructors access the message system through the "Inbox" icon in the upper part of the Instructor interface. After clicking this icon, you will see your Inbox with all current messages. The messages can be viewed and managed using the features of the message system, which resemble those of a standard email client. To compose a message, click "Compose."

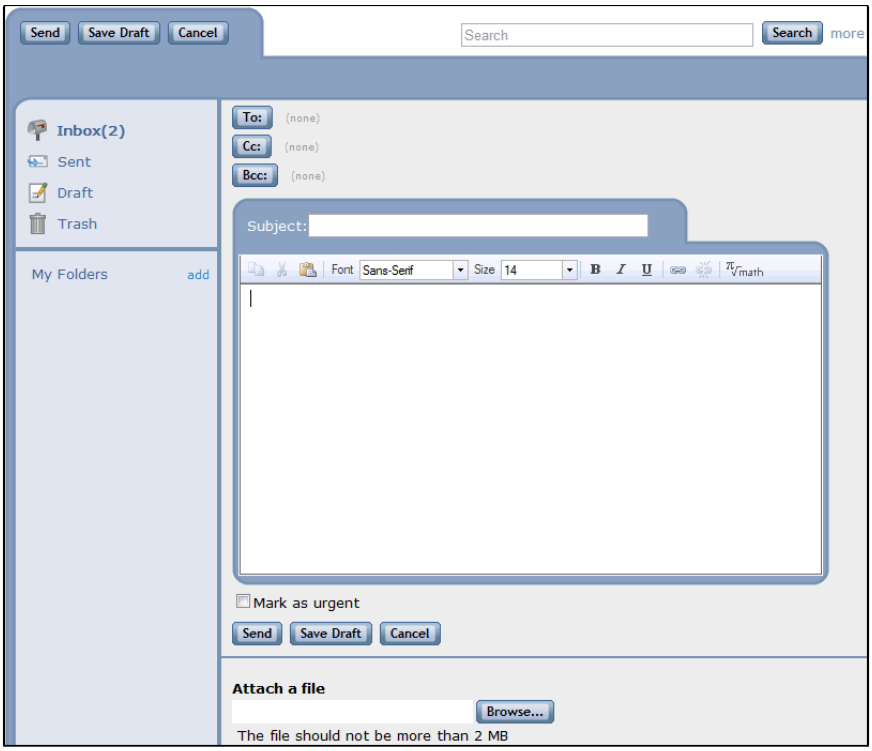


Figure 6.3: Compose Message

The features of the message editor page also resemble those of standard email programs. To include mathematical and chemical notation and illustrations in your messages, click the symbols available at the right end of the tool bar. The Message Editor, has a robust set of input tools available to the instructor, that vary based on the active ALEKS class. (Fig. 6.3).

After composing the message, the instructor can check the box next to "Mark as urgent" if desired. When students receive a message marked as urgent, they will see "URGENT Message" displayed above their ALEKS INBOX icon.

You also have the option to include attachments in your messages. The attachments can be up to 2MB in size. By default, messages sent to you through the ALEKS message system will be copied to your email address (if provided). This option and others affecting the message system can be changed under "My Account Settings" (Sec. 6.1.1).

6.1.5 ALEKS Community

The ALEKS Community is a discussion forum for instructors to share ideas, discuss best practices, and ask questions. All ALEKS instructors are members of the ALEKS Community and are encouraged to post new topics or comment on existing discussion threads.

You can join the discussion by clicking on the ALEKS Community button in your ALEKS account, or from the ALEKS website under Instructor Resources. When instructors join the ALEKS Community, they will receive a daily email summary of the approved messages discussed in the forum.

NOTE. The ALEKS Community forum is for ALEKS instructors only. Students do not have access to this forum. This forum should not be confused with the ALEKS Course Forum for students (Secs. 6.1.3, 6.6.5).

6.1.6 ALEKS Training

The ALEKS Training link connects you to the online Instructor Training Center, where you can learn more about ALEKS features and how to use them. The website includes pre-recorded videos and printable tutorials with step-by-step instuctions for commonly-used features in ALEKS.

6.1.7 Archiving Classes and Instructors

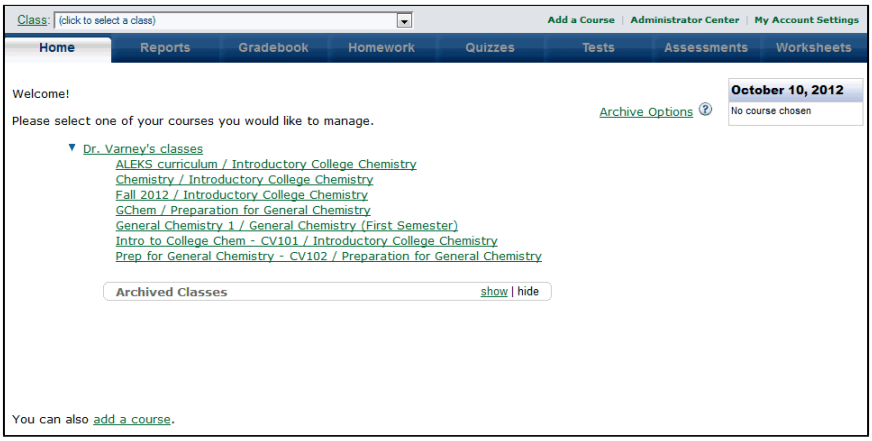


Figure 6.4: Class List

Instructors can archive their own classes to simplify their Instructor Module display so that only current and recent classes appear. Administrators can archive other instructors' classes and accounts. This feature is especially helpful for instructors and administrators who manage a large set of classes and instructors.

Archiving does NOT delete or deactivate classes, shared class access, or instructor accounts. Archived classes and instructor accounts are simply moved to archived folders to aid organization, but are still accessible to administrators, instructors, and students.

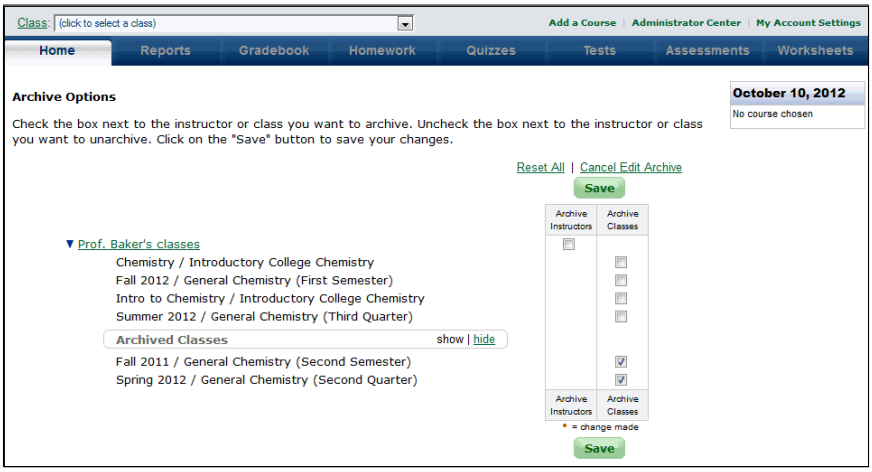


Figure 6.5: Archiving Options

Options. After logging into your ALEKS account, click on the "Archive Options" link (Fig. 6.4). Alternatively, you can access the feature by first clicking on the "Class" link located to the left of the class selection drop-down menu. Once on the Archive Options screen, each class is listed in a separate row with a checkbox under the column heading "Archive Instructors" or "Archive Classes" (Fig. 6.5). As you scroll through the list, each row appears highlighted in the color yellow to indicate the checkbox applicable to the class.

On the Archive Options screen, you can do the following:

1. **To archive**, check the box next to the desired class (or instructor).
   OR
   To unarchive, uncheck the box next to the desired class (or instructor).
2. Click "Save" to save your changes.

Once you have archived classes, you will see a section called "Archived Classes" at the bottom of your class list. Administrators will see other archived instructors on that list.

The class drop-down menu does not contain any archived classes by default. However, if you view an archived class after selecting it from the "Archived Classes" folder, the class will then be shown in the class drop-down menu, and "(Archived)" will be displayed next to the class name. Once you select another class in the drop-down menu, the archived class will no longer be displayed.

NOTE. If administrators archive other instructors' classes, this **will** affect the Instructor Module display for those instructors. Instructors will see an "Archived Classes" section at the bottom of their class list after logging into their ALEKS account. If administrators archive an instructor this will archive the instructor account and all of their classes.

Automatic Archiving. When creating a new class, instructors can check the box next to "Automatically archive this class after the end date" to automatically archive the class following the selected end date (Fig. 6.23). Instructors who wish to keep only active classes in their class list should check this box each time they create a new class.

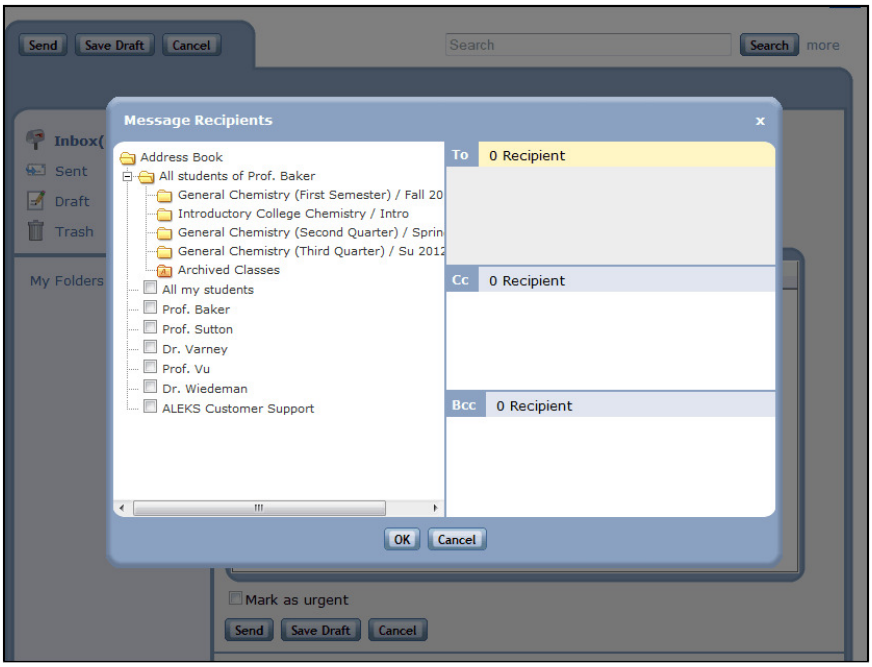


Figure 6.6: Messaging Archive Classes

Messaging. Through the ALEKS "Inbox" Instructors (or administrators) can still send messages to students (or instructors) when their classes have been archived.

When the instructor has at least one archived class, an "Archived Classes" folder will appear. Clicking on the "+" sign next to the "Archived Classes" folder will expand the archived classes list and display the list of students in the archived class.

If at least one instructor has been archived, administrators will see an "Archived Instructors" folder at the bottom of the instructor list. Clicking on the "+" sign will expand the "Archived Instructors" folder.

6.1.8 Use Advanced Instructor Module

To switch to the Advanced Instructor Module, click on "Use Advanced IM-2" at upper right. The Advanced Instructor Module has much the same functionality as the Basic Instructor Module, but the interface is simplified to provide more efficiency for users who are familiar with the system. See Chapter 7 for complete information.

6.1.9 Sign Out

To exit your Instructor account, click on "Sign Out" at upper right. You can also just close the browser window to end the session. It is a good idea to close the session when done, to avoid accidentally exposing student data.

6.1.10 Class Home Page

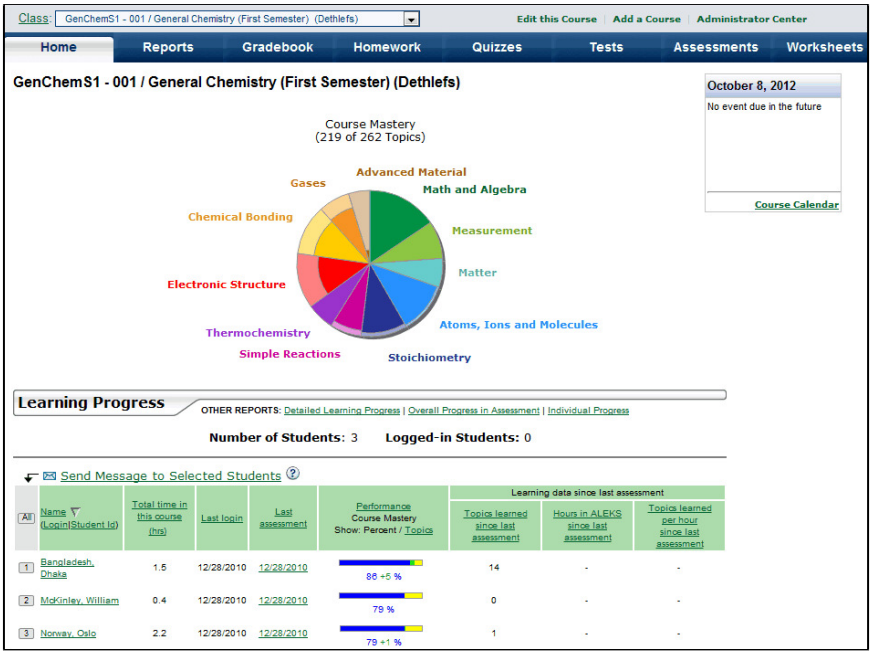


Figure 6.7: Class Home Page

Once a class has been selected, all features of the Instructor Module become available (Fig. 6.7). In particular, the tabs "Reports, Gradebook, Homework, Quizzes," etc., become active. Also, in the right-hand margin, there is a box showing upcoming due dates for assignments in this class; at the bottom of the box is a link to the Course Calendar (Sec. 6.4.13).

The Home page for a class displays a pie chart for the average progress of students in the class (similar to "ALEKS Pie Average Report," Sec. 6.2.6), and a list of the students with their current individual progress (similar to "Learning progress since latest assessment," Sec. 6.2.9). Other frequently-used reporting options are also available directly from this page; in order to access all reporting options, click "Reports" (Sec. 6.2).

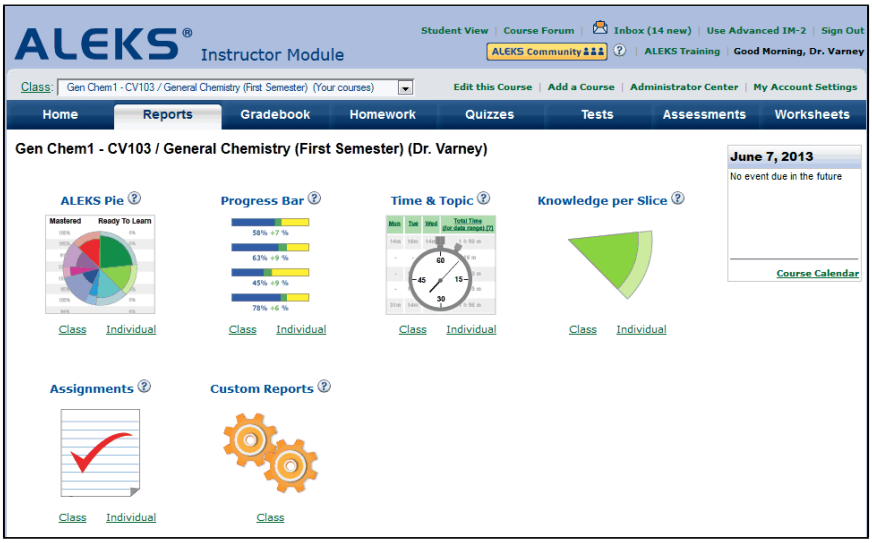


Figure 6.8: Reports

6.2 Reports

The Reports page displays the ALEKS reports that are available for the current class. Each report is represented by an icon and includes a "Class" link and an "Individual" link just below the icon (Fig. 6.8). Instructors can access the Reports page by selecting a class and clicking on the "Reports" tab.

6.2.1 Available Reports

ALEKS offers a wide range of dynamic reports that display individual student and class data in a variety of ways. Instructors can use these reports to track usage, progress, grading, and attendance.

Although individual student data is also available through the class reports, the individual link should be used when looking at reports in the presence of a third party (such as a student), to avoid violating the privacy of other students who would also appear in the class reports.

The reports are organized by the following report types:

- ALEKS Pie
- Progress Bar
- Time and Topic
- Knowledge Per Slice
- Assignments

- Custom Reports

NOTE. The report icons will not appear on the Reports page when they are not applicable to the class. Also, when there are no students in the class, the report icons will appear on the page but will not be active.

Beside each report type is a "?" icon. Instructors can click on this icon to see a description of the report type. To run a class report, click on the "Class" link below the report icon. To run an individual student report, first click on the "Individual" link below the report icon, and then click on the name of the student. Alternatively, students can be viewed by Login Name or Student ID, using the toggles below the list of names.

6.2.2 Download Report Data

Reporting data can be printed or downloaded from any of the report styles. Use the ALEKS Print icon to print, or the link marked "Download Excel Spreadsheet" at upper right to download in Excel format.

6.2.3 Send Message to Selected Students

Instructors can send messages to selected students from most class reports and from the Gradebook. To select students, click on the numbered icons next to the students' names. The icons will change from grey to yellow to indicate which students are selected. By clicking on "All," instructors can select all students in the report. To deselect a student, instructors click on the associated yellow icon (which turns the icon back to grey).

After selecting the students, click on "Send Message to Selected Students." This opens a message in the ALEKS Inbox; the students' names will automatically appear in the "Bcc" field of the email message. (Since "Bcc" is used, students who receive the message will not know the names of other students to whom it was sent.) After composing the message, the instructor can check the box next to "Mark as urgent," if the message is urgent. When students receive a message marked as urgent, they will see "URGENT Message" displayed above their ALEKS INBOX icon.

NOTE. Instructors can quickly select all the students from one number to another by using the "Shift" key. For example, to select all the students from 1 to 4, they can do the following:

1. Click on number 1.
2. Hold down the "Shift" key while clicking on number 4.

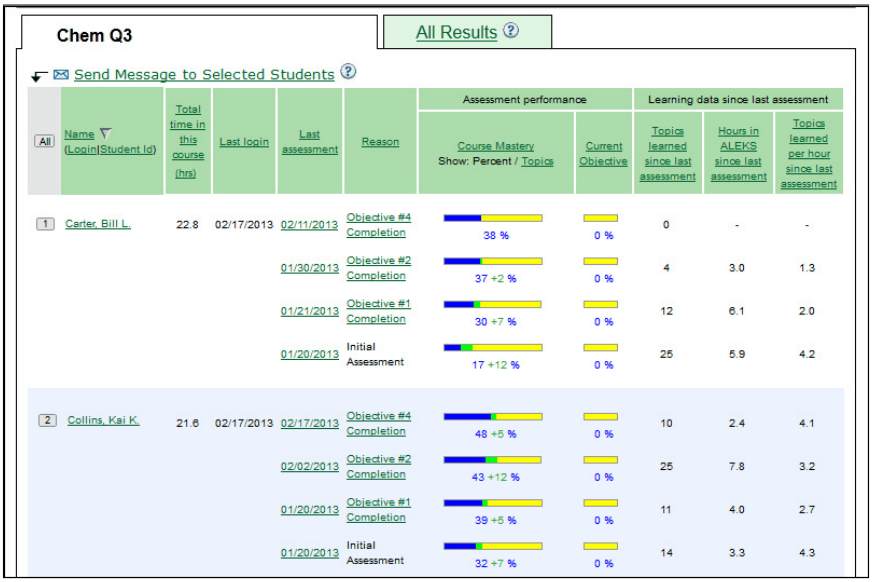


Figure 6.9: Student History

6.2.4 Viewing Student History across Multiple ALEKS Classes

This feature allows administrators and instructors to view student history across multiple ALEKS classes. This comprehensive view can be used to identify easily each student's progress history and preserve a record of their work after they have been moved to a new ALEKS class. This feature can be found in the following reports:

- ALEKS Pie for an individual student (Sec. 6.2.7).
- Progress Bar for the class (Full progress)(Sec. 6.2.11)
- Progress Bar for an individual student (Sec. 6.2.12)

To see student historical data, click on the "All Results" tab in the report. Moving the cursor over the "i" next to the class name will display the number of topics and instructor name for that class (Fig. 6.9). The "All Results" tab will not be active if students were not in a prior ALEKS class.

NOTE. Depending on the options selected by the ALEKS Administrator at the school, instructors are able to see report history only for the classes they have taught or report history for all classes taken by the student (Sec. 7.20.1). Administrators can see all report history for all students. This feature will display student history from August 1, 2012 through the present; performance prior to this date may appear as a grey bar.

6.2.5 Interpreting Bar Graphs

Bar graphs are used in several of the ALEKS report styles. The meaning of the bar graphs varies by report style, but there are some common features.

Bar Graph Colors

The colors used to fill the bar indicate the level of mastery of the class contents at a particular time. The bar is filled from left to right.

- **Blue** means that mastery was shown on assessment.
- **Green** that tentative mastery was achieved in Learning Mode.
- **Yellow** means the part of the class material not mastered.
- **Blank (white)** indicates that an assessment is in progress.
- **Grey** means the student was moved from a different course product; any assessments from the earlier course product will appear greyed out in the new class. Student performance prior to August 1, 2012 may also appear as a grey bar in report histories.
- **Aquamarine** shows progress made between the first and latest assessment.
- An **asterisk** by a greyed-out bar graph or any other color, in some reports, indicates that a new assessment is underway.

Values underneath Bar Graphs

Underneath the bar are percentages corresponding to the like-colored portion of the bar graph; for example, a "25%" in dark blue under the bar graph indicates that the dark blue portion of the bar is 25% of its total length. Instead of percentages, you can view student progress by the number of topics. Click on the "Percent" or "Topics" link in the Course Mastery column to toggle between the two views.

Multiple Bar Graphs

Where there is more than one bar graph per student, the bar graphs represent different points in the student's learning history, generally associated with assessments taken by the student. **Bar graphs showing a segment of the student's learning history are stacked, with the earliest on the bottom and the most recent at the top.**

More Features

There are several ways of accessing student data using reports:

- The list of students in a bar-graph report can be sorted on any of the report columns by clicking on the text in the header for that column. Clicking on the text in the header section of the column will bring up an ascending or descending arrow, which can then be used to sort the column.
- You can navigate to other kinds of reports by clicking on hyperlinked names or dates. Clicking on a student's name takes you to the detailed learning history for that student (Sec. 6.2.12).
- Clicking on the date for an assessment takes you to a detailed (pie chart) report for that assessment (Sec. 6.2.7).

NOTE. On some reports, if a student has been in a different ALEKS class previously, it is possible to toggle between viewing their total time in ALEKS and their total time in the current class. This toggle will appear below the report. For students who have only been in one ALEKS class, the displayed time will be the total time in the current class.

6.2.6 ALEKS Pie (Average Report)

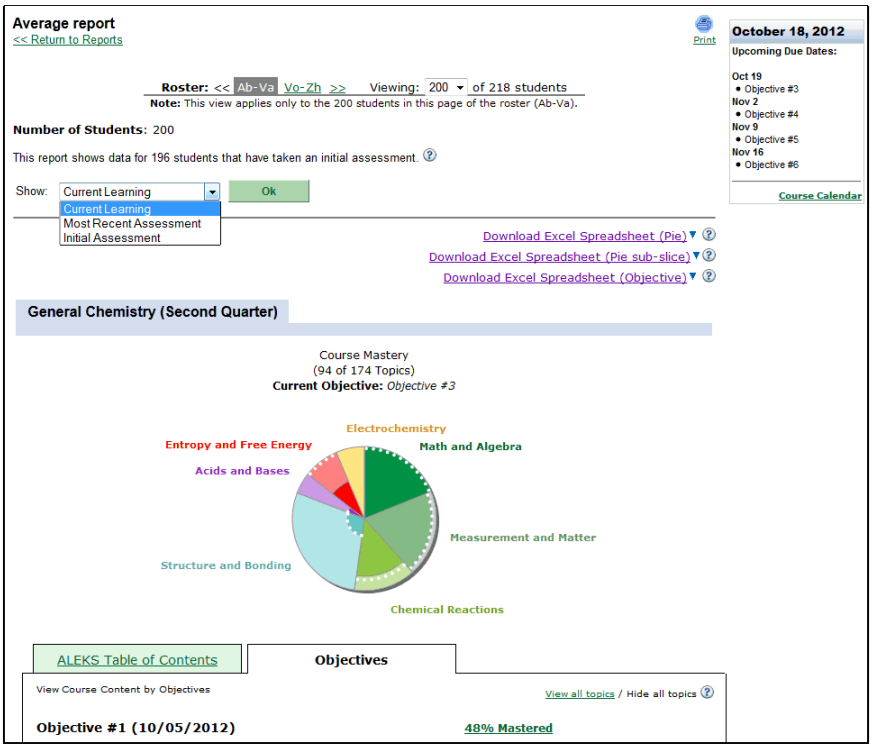


Figure 6.10: ALEKS Pie (Average Report)

The ALEKS Pie Report features a color-keyed pie chart showing the breakdown of student learning for the average of all students in the class, letting instructors see at a glance how well students are meeting the class goals. This report allows instructors to group students easily based on their prerequisite knowledge and to direct instruction according to what students are ready to learn (Fig. 6.10).

You can use the "Show" drop-down box to filter the report by "Current Learning," "Most Recent Assessment," or "Initial Assessment." The "Current Objective" title and the dotted lines on the pie chart are displayed only when "Current Learning" is selected and the class is set up with Intermediate/Chapter Objectives. Complete details on

which topics students have mastered, not mastered, and are ready to learn in the class are available in the section below the pie chart and can be viewed by Objectives (if you are using Textbook Integration, Objectives, or Modules in the class) or by ALEKS Table of Contents (Sec. 6.3.2).

In either the ALEKS Table of Contents tab or the Objectives tab (when present), you can toggle between viewing and hiding topics. To preview a sample problem of a topic, click on the topic name. ALEKS generates a new instance of the problem each time you click on a topic name.

If you click on a percent link for a topic you will see a breakdown of student mastery for that topic. You can send a message to students directly from this report, and view additional topics that a group of students is ready to learn. The topics with the highest numbers of students "Ready To Learn" are the ones ripest for classroom presentation; trying to teach topics with low numbers in this display is more likely to produce boredom and frustration, because most students either have learned them already or are not yet ready for them (Sec. 8.5).

NOTE. Students who have not taken an Initial Assessment will not be shown in this report, but they will be shown in the Excel spreadsheet downloads. The Excel spreadsheet (sub-slice) download shows the number of topics each student has mastered and the number of topics they are ready to learn for each sub-slice of the ALEKS Pie. If Objectives or Modules are used in the class, a third download link will be available to "Download Excel Spreadsheet (Objective)."

6.2.7 ALEKS Pie Report (Individual)

The pie chart report for a particular student shows the student's current progress toward mastery of the curriculum (Fig. 6.11). There is also a menu giving access to earlier points in the student's progress; the menu choices are dates with the notations "Assessment" (meaning the pie chart represents the student's knowledge immediately after the assessment on the given date) or "Learning" (meaning the pie chart represents the student's knowledge just before the next assessment).

Beneath the pie chart is a list of concepts the student has recently mastered ("What *student's name* can do") and another list of concepts the student is currently (as of the given assessment) ready to begin learning ("What *student's name* is ready to learn next"). To see a complete list of topics mastered by the student, click on the link "and many other more elementary concepts."

Show me what the student sees. This link will be available for a student who has completed the current Objective in a class where Objectives with end dates are in use. By default, the report uses the current textbook chapter or Objective for the class as a frame of reference, that is, the last chapter or Objective whose due date has not passed. To switch to the frame of reference for a student working ahead of the current Objective, click on "Show me what the student sees."

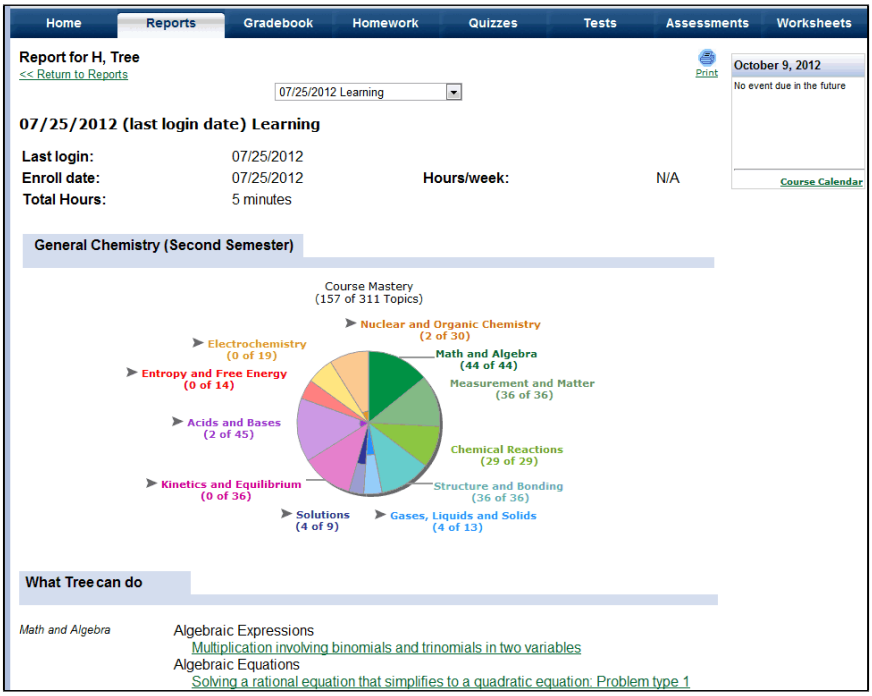


Figure 6.11: Report for a single student in this class (pie chart)

At the bottom of the page there will be a "History" section that contains the student's progress for the current class (Fig. 6.12). The assessment currently being viewed is indicated with an orange dot. To view the student's progress in other classes, the instructor can click on the "View" link under "Previous Results" (if applicable). Clicking on the date for any listed assessment will show the student's pie chart and progress as it was at that point in time. (Sec. 6.2.4).

6.2.8 Progress Bar Reports

Using the Progress Bar reports, instructors can view student progress on assessments and in Learning Mode at various time intervals. Instructors can change the report view by making a selection in the "View" drop-down menu and then clicking on the "Show" button (Fig. 6.13). A description of the selected report will be displayed below the drop-down menu.

NOTE. If you navigate away from a Progress Bar report and return at a later time, the report that was last selected will remain in effect.

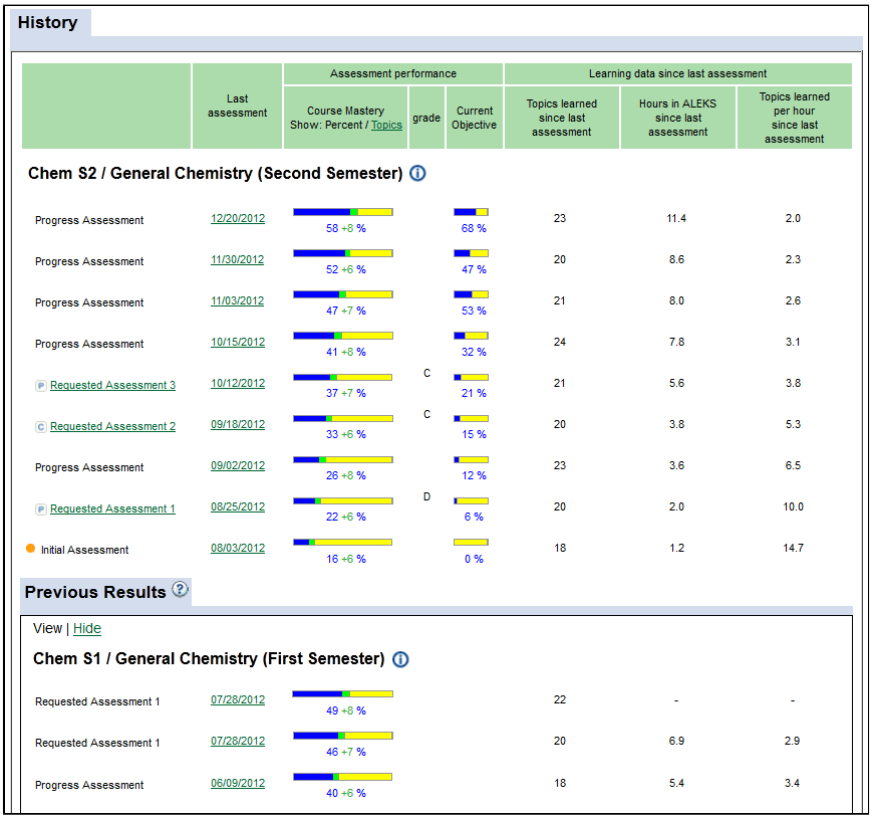


Figure 6.12: Individual Pie Chart Report

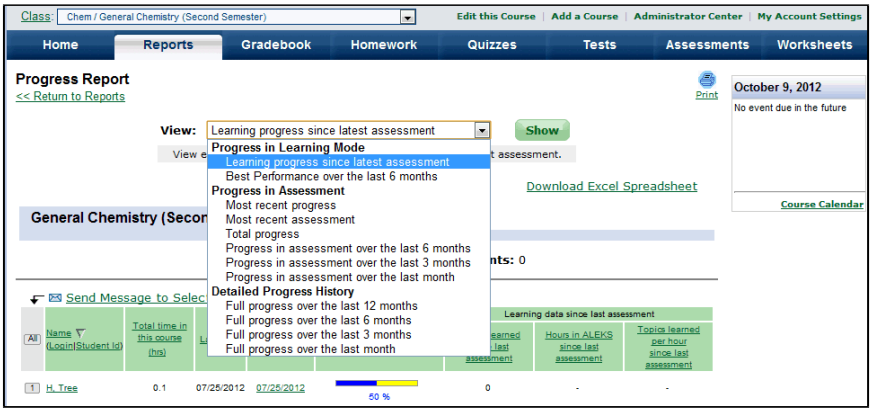


Figure 6.13: Progress Bar Reports

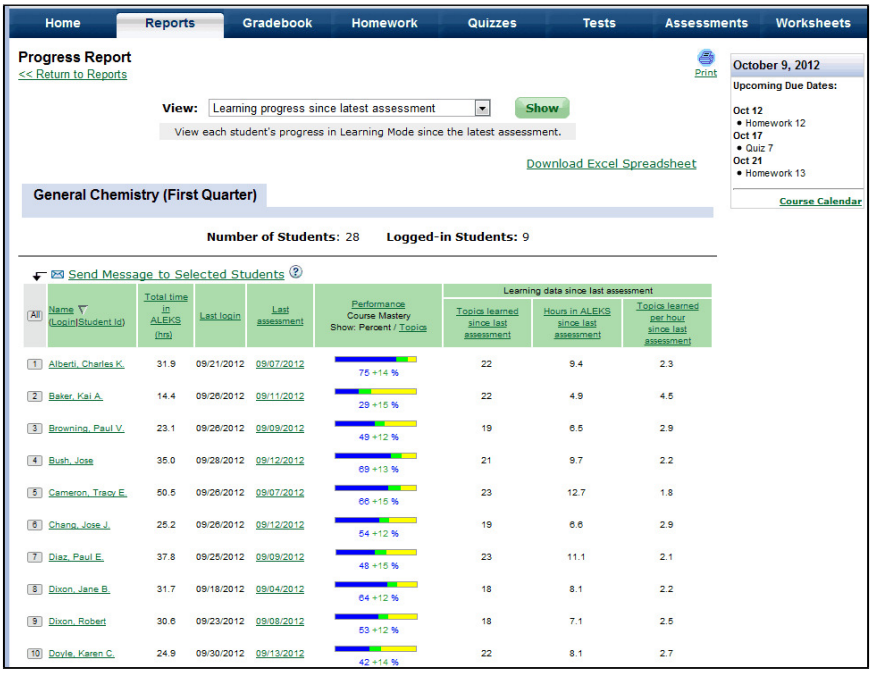


Figure 6.14: Learning progress since latest assessment

6.2.9 Learning progress since latest assessment

This report shows each student's progress in Learning Mode since the most recent assessment. Students are listed with their total hours spent in ALEKS, the date of their last login, the date of their last assessment, and a bar graph indicating their current level of mastery of all class materials (Fig. 6.14). If Textbook Integration or Objectives (Sec. 6.3.2) are used, the column to the right of the bar graphs will show the percentage of the material the student has completed in the current chapter or Objective.

If the "Learning Rates" feature is used, there may be a "grade" column displayed on the report (Sec. 7.4.4). Additional columns to the right may contain other statistical information; links at the top of the columns permit the user to choose among types of statistics ("Topics learned since last assessment," etc.). For additional information regarding the interpretation of the bar graphs, see Sec. 6.2.5.

6.2.10 Total progress (Overall progress)

Here is another variant on the bar-graph style of report, intended to show the overall gain made by students in a class, as confirmed by assessment (Fig. 6.15). There is one bar graph per student; the blue portion shows the level of mastery shown on the student's Initial Assessment, the aquamarine portion shows the level of mastery shown

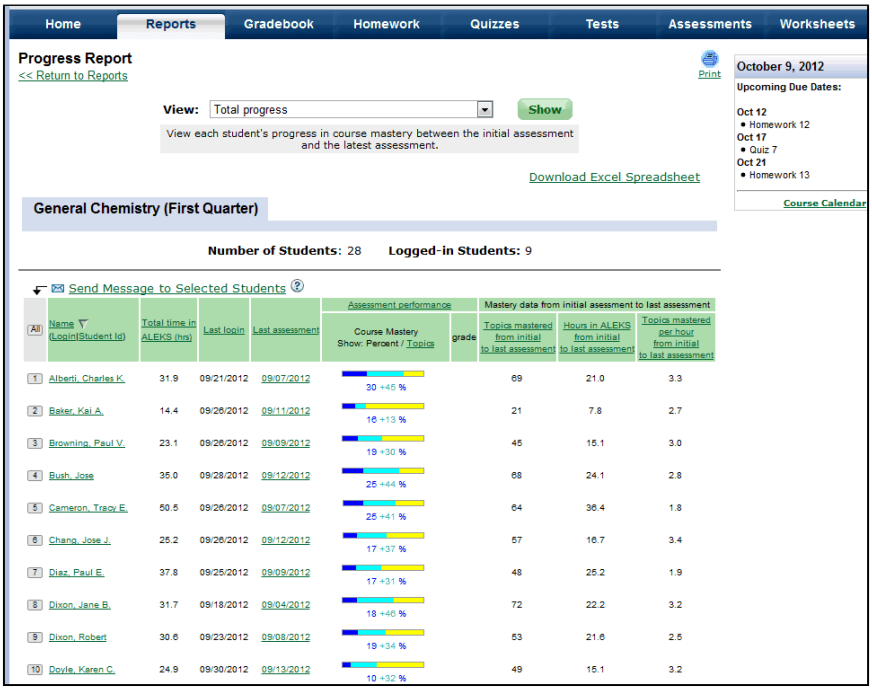


Figure 6.15: Overall progress in assessments

on the student's most recent assessment. Note that any progress made by the student in Learning Mode **since the most recent assessment** is not shown on this report.

6.2.11 Detailed progress history

"Detailed progress history" is an expanded version of "Learning progress since latest assessment" (Fig. 6.16). It shows the student's learning history, with one bar graph for each assessment taken by a student. The bar graphs are stacked, the earliest on the bottom and the most recent at the top. To the left of each bar, there is the date of the assessment and a notation indicating the reason for the assessment (see Sec. 4.3).

In other parts of ALEKS, this style of report may be called "Full progress." Above the report is a menu from which you can select the period of time for which the report should be compiled (that is, how far back in time the report should go).

Clicking on the "All Results" tab will display all students' current and previous class progress results (if applicable) (Sec. 6.2.4). The current class can be distinguished by the "(Current Class)" label. Clicking on a student's name will take the instructor to the individual progress report for the student (Sec. 6.2.12). Clicking on an assessment date link will take the instructor to the individual student's pie report, displaying their progress at that point in time (Sec. 6.2.7).

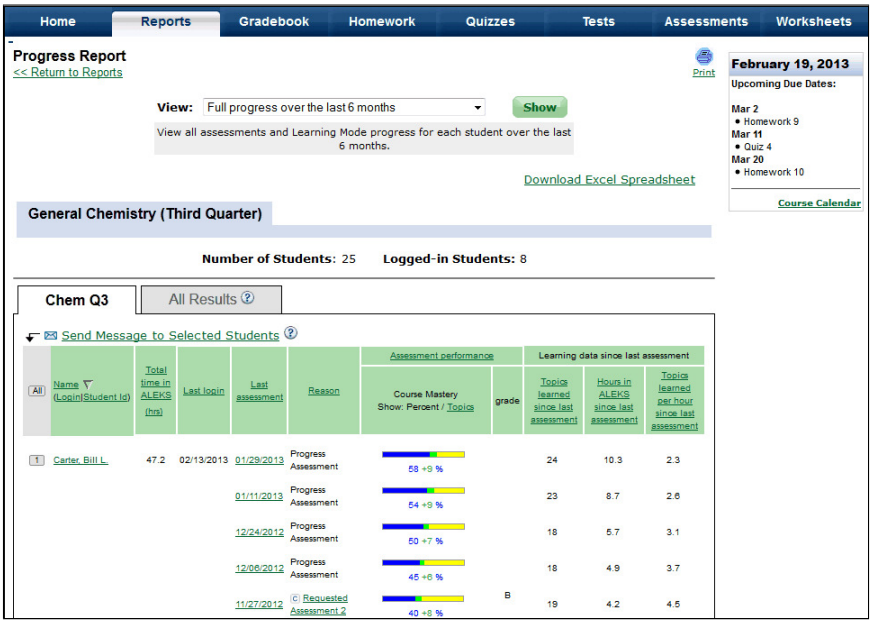


Figure 6.16: Detailed progress history

6.2.12 Progress report for a single student in this class

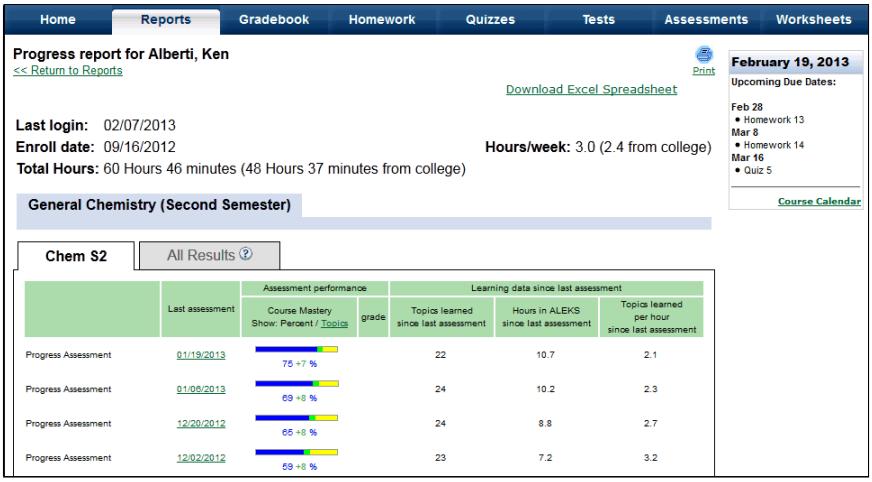


Figure 6.17: Progress report for a single student in this class

This report shows bar graphs for each of the assessments taken by the student (Fig. 6.17); for interpretation of the bar graph display, see Sec. 6.2.5. Also displayed are the student's enrollment date, last login date, and total hours spent working in ALEKS.

Clicking on the "All Results" tab will display the student's current and previous class progress results (if applicable) (Sec. 6.2.4). Clicking on an assessment date link will

take the instructor to the individual student's pie report, displaying their progress at that point in time (Sec. 6.2.7).

6.2.13 Time and Topic Report

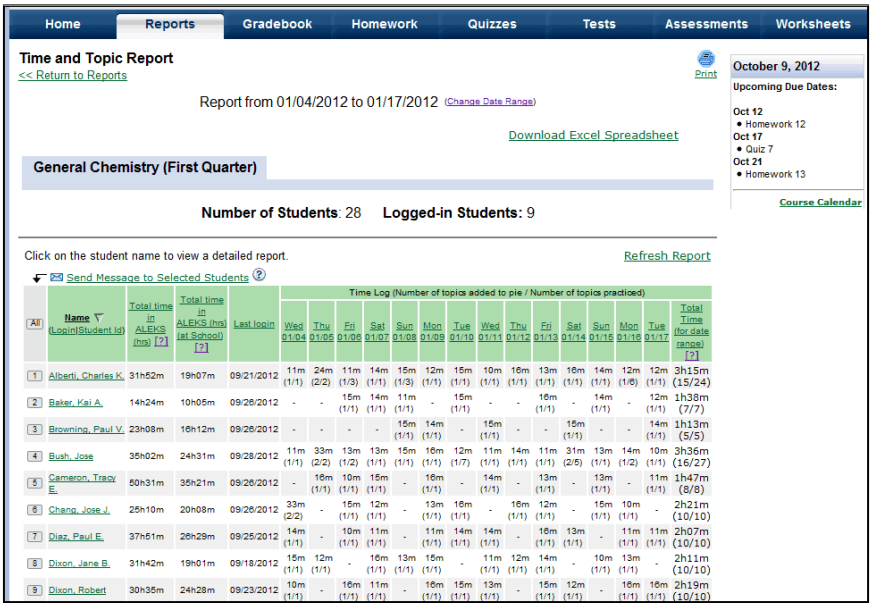


Figure 6.18: Time and Topic Report

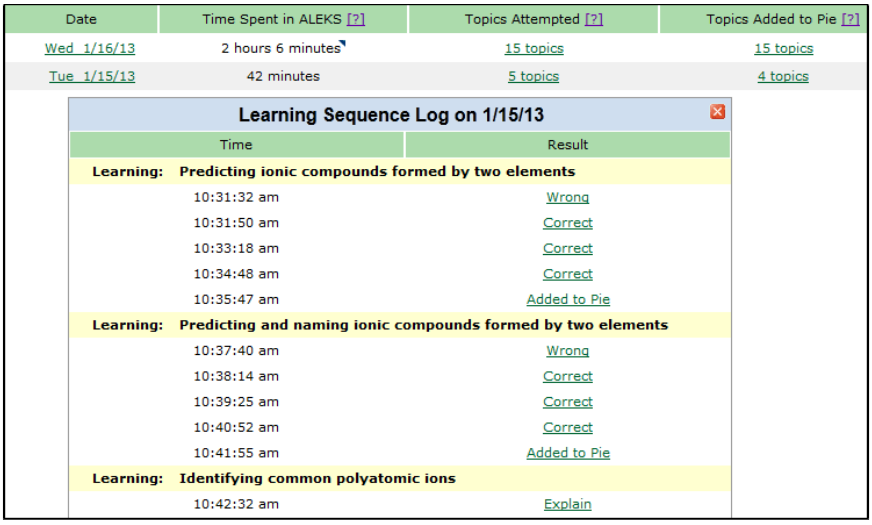


Figure 6.19: Time and Topic Learning Log

The Time and Topic Report allows instructors to view quickly the amount of time spent by each student in ALEKS as well as the topics the student attempted and mastered. (The number of topics attempted does not include topics the student worked on in Review mode.)

The report can be generated for all students in the class or for individual students by clicking on the "Class" or "Individual" link below the "Time and Topic icon."

Class View

The class-wide report will display a list of the students' names, their total time in the class, possibly the total time spent in ALEKS from college, the last login date, the total time spent in ALEKS for this date range, and a listing of the number of topics attempted and mastered daily over the last week (Fig. 6.18). The date range for the report must be a minimum of one week, with a maximum range of 20 weeks, using the link directly over the table ("Change Date Range"). You can set a custom date range using the "From Date" and "To Date" drop-down selections, or check the "Date Range" drop-down menu to select a certain number of weeks to display. You can also choose how the information is broken down, by clicking on the daily, weekly, and monthly boxes. More than one selection may be included in the same report if desired.

Individual Student View

Clicking on individual student names in the report gives you detailed information on the topics each student has attempted and mastered. Each topic attempted or added to the Pie can be viewed with an example of that problem type. To see the student's **Learning Sequence Log** on a certain date, click on the date link. The Learning Sequence Log will display the time and result of the attempted topic. (Fig. 6.19). By clicking on the "Result" link (Wrong, Correct, or Added to Pie), it is possible to see specific problems the student worked on, along with their answer and the solution.

If a student has spent some time on an ALEKS assessment during that day, the session will be marked with a blue triangle in the top right hand corner. The total amount of time shown for a specific day includes time worked in Learning Mode, as well as any quizzes, homework, review problems, or assessments the student has done.

Instructors can also see the total time spent in ALEKS when viewing the Individual Time and Topic Report. This provides a more comprehensive view of a student's progress in the program, and includes the last login date, enrollment date, total hours in ALEKS, and hours per week. This information is also added in the Excel download for use with your external gradebook.

If the student wishes to view their Time and Topic Report, they simply click the Report link at the top of their page and select the tab for the appropriate report.

6.2.14 Knowledge Per Slice

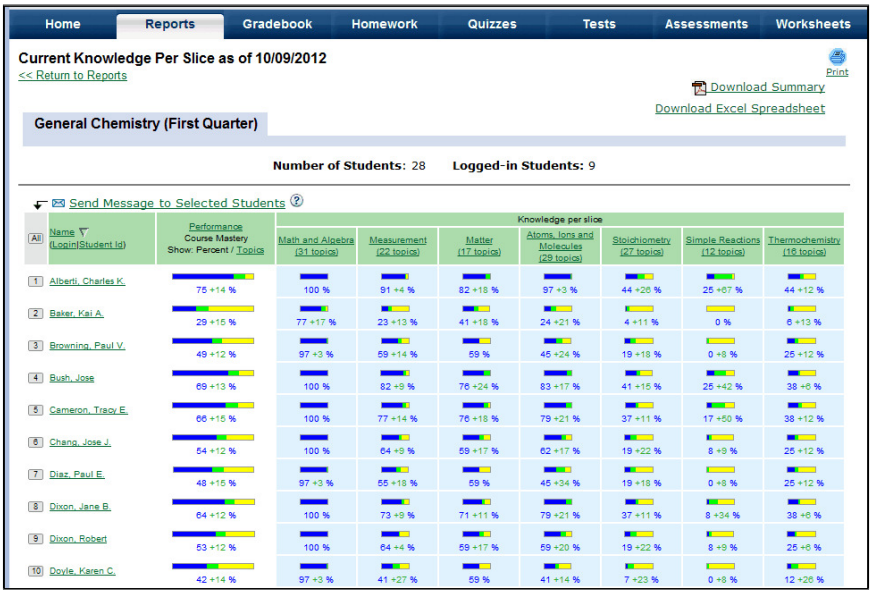


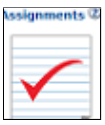
Figure 6.20: Knowledge Per Slice

The Knowledge Per Slice report allows instructors to view students' overall progress in each slice of the pie chart independently. This report is viewed by clicking the Reports tab and then selecting the "Class" or "Individual" link below the "Knowledge Per Slice" icon.

The class report will show a list of the students' names and their overall class mastery as seen in the general Progress Report (Fig. 6.20). The remaining columns show the names of pie slices and the percentages for each student's mastery in each. The bar graphs show the student's mastery as of their most recent assessment and their most recent progress in Learning Mode through the blue and green segments, respectively.

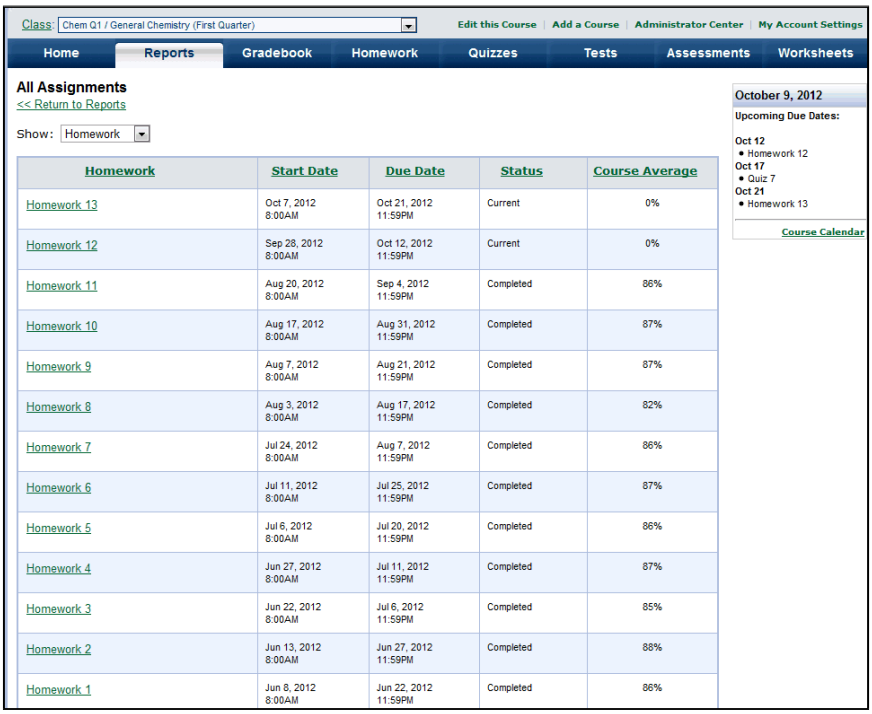
Instructors can download a PDF summary of data from the class report. Clicking the **Download Summary** link just above the report will generate a PDF that displays time spent in ALEKS, average topic mastery, and a comparison between the beginning knowledge state (based on the Initial Assessment) and current knowledge state for each pie slice. The report shows this data for both the class and individual student.

6.2.15 Assignment Reports



These are the reports which show the results of instructor-created assignments: Homework, Quizzes, Tests, and scheduled assessments. An assignment table provides instructors with quick access to Homework, Quiz, Test, and scheduled assessment results. Click on the name of the assignment to see the detailed class or individual results.

6.2.16 Homework, Quiz, and Test Results



Homework	Start Date	Due Date	Status	Course Average
Homework 13	Oct 7, 2012 8:00AM	Oct 21, 2012 11:59PM	Current	0%
Homework 12	Sep 28, 2012 8:00AM	Oct 12, 2012 11:59PM	Current	0%
Homework 11	Aug 20, 2012 8:00AM	Sep 4, 2012 11:59PM	Completed	86%
Homework 10	Aug 17, 2012 8:00AM	Aug 31, 2012 11:59PM	Completed	87%
Homework 9	Aug 7, 2012 8:00AM	Aug 21, 2012 11:59PM	Completed	87%
Homework 8	Aug 3, 2012 8:00AM	Aug 17, 2012 11:59PM	Completed	82%
Homework 7	Jul 24, 2012 8:00AM	Aug 7, 2012 11:59PM	Completed	86%
Homework 6	Jul 11, 2012 8:00AM	Jul 25, 2012 11:59PM	Completed	87%
Homework 5	Jul 6, 2012 8:00AM	Jul 20, 2012 11:59PM	Completed	86%
Homework 4	Jun 27, 2012 8:00AM	Jul 11, 2012 11:59PM	Completed	87%
Homework 3	Jun 22, 2012 8:00AM	Jul 6, 2012 11:59PM	Completed	85%
Homework 2	Jun 13, 2012 8:00AM	Jun 27, 2012 11:59PM	Completed	88%
Homework 1	Jun 8, 2012 8:00AM	Jun 22, 2012 11:59PM	Completed	86%

Figure 6.21: Homework Results

Fig. 6.21 shows the report page for Homework; the report pages for Quiz and Test are practically identical. For each student, we see the date the assignment was submitted, the percentage score, and the grade (if a grading scale was assigned). Clicking on the student's name gives a menu of all Homework (resp. Quiz, Test) results for that student; clicking on the submission date gives a detailed report on the assignments for the student, with access to the actual questions and the student's answers, showing the point values awarded. Point values can be adjusted manually by the instructor if necessary. At the bottom of the detailed results view is a link to delete the results; if this is done and the assignment is still active, the student will be able to retake the assignment.

Above the main display and to the right, ALEKS shows the average score for the class and the number of students who have submitted the assignment out of the total in the

class. Also, there are links at the top left to "Per Question Results," with a breakdown of the students' overall success on each question of the assignment, and "Detailed Student Results," which summarizes success or failure on each question for each student. Results are analyzed to considerable depth; keep on clicking the hyperlinks in this area to see all the available connections.

6.2.17 Scheduled Assessment Report

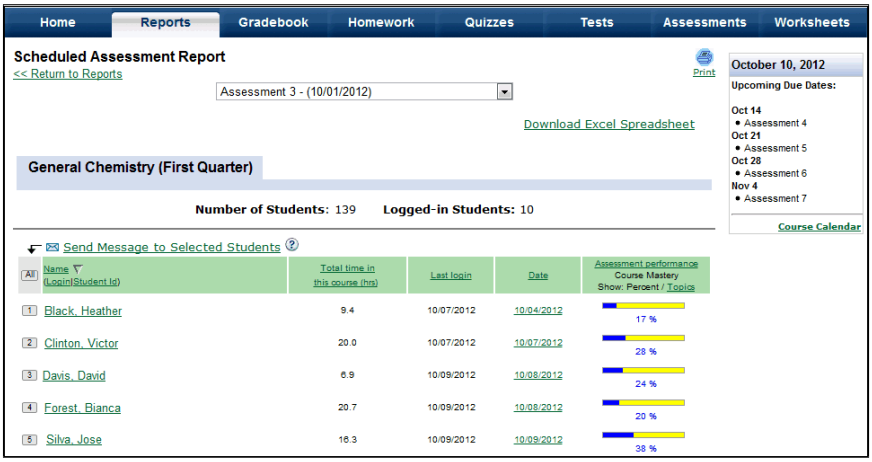


Figure 6.22: Scheduled Assessment Report

The report for Scheduled Assessments (those requested deliberately by the instructor, Sec. 6.4.9) is another bar-graph reporting style (Fig. 6.22). The difference from other such reports is that these show assessment results only, not work in the Learning Mode, so that there is only a dark blue bar showing the level of the student's mastery. Reports of this type may contain gaps; where no bar graph appears for a given student, this means that the student has not taken the assessment yet.

Above the display of assessment results is a menu of all scheduled assessments for the class.

NOTE. These assessment results are also included in all other reports where assessment results are displayed.

6.2.18 Custom Reports

ALEKS administrators and instructors can create custom reports for their institution and classes with the Custom Reports feature. This feature has many options to suit advanced reporting needs across classes and instructors. Administrators and instructors can select data from existing ALEKS reports and export the combined data into a single customized Excel report. Additionally, reports can conveniently be scheduled to save

time. Reports can be generated at multiple levels (e.g., institution, master template, instructor, class, and multi-class) based on the user's ALEKS account type. For example, administrators can select from options that are relevant to their administration level, and instructors can select from options that are relevant to their instructor level.

NOTE. Institution reports and reports spanning across multiple classes can be accessed from the Advanced Instructor Module only.

The feature can be accessed after selecting a class, then clicking on the "Reports" tab, and finally, clicking on the "Class" link under "Custom Reports." For more information on using this feature please see **Custom Reports** under the **Reports** section on our ALEKS Training Center.

6.3 Class Creation and Configuration

Classes are added (created) and edited in ALEKS through the same basic interface. To edit a class, select that class from the list, then click "Edit this Course" in the upper part of the window; the page that follows gives a list of class areas that may be modified (click on "edit" to modify, Fig. 6.27). To create a class, click "Add a Course."

The procedure for creating or editing a class includes the setup of Textbook Integration and content customization (if these are desired). It does not include creating Homework, Quizzes, Tests, or Scheduled Assessments, but these steps may then be completed later.

6.3.1 Basic Information

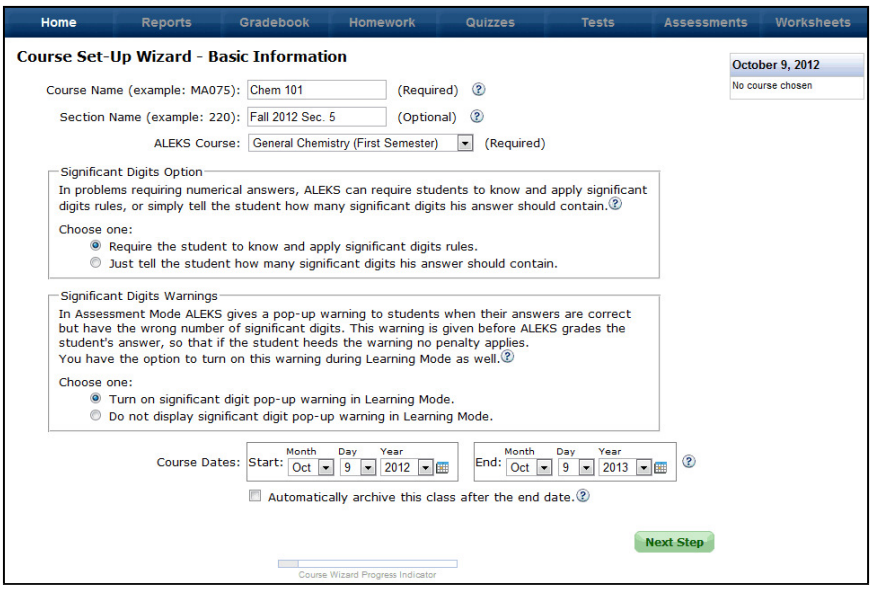


Figure 6.23: Basic Information

Administrator accounts can assign the class to another instructor when setting up the class.

The class is required to have a name; this name can be the name appearing in your institution's course catalogue or anything else you wish (Fig. 6.23). The Section Name is optional. Including the term and year in the section name makes it easier to keep track of ALEKS classes over time (e.g., "F 2011"). The ALEKS Class is the course product that will be used for the class (e.g., "General Chemistry"). This should not be changed after the class has begun unless absolutely necessary, as doing so will be disruptive to the students' learning and to the class reports and records. Other values on this page can usually be changed without disruption.

After choosing an ALEKS course product, two pop-up boxes will require your input related to Significant Digits. The first will ask if you wish to have your students know and apply the significant digits rules when answering problems. The second box will ask if you would like to have students warned in Learning Mode if they have a correct answer, but an incorrect number of significant digits. This warning is automatically turned on in Assessment Mode in ALEKS.

The Class Dates are used to configure the Course Calendar, and should include the entire period of time that the students will be using ALEKS. Instructors can also check the box "Automatically archive this class after the end date" to automatically archive the class following the selected class End Date (Sec. 6.1.7).

6.3.2 Select Textbook

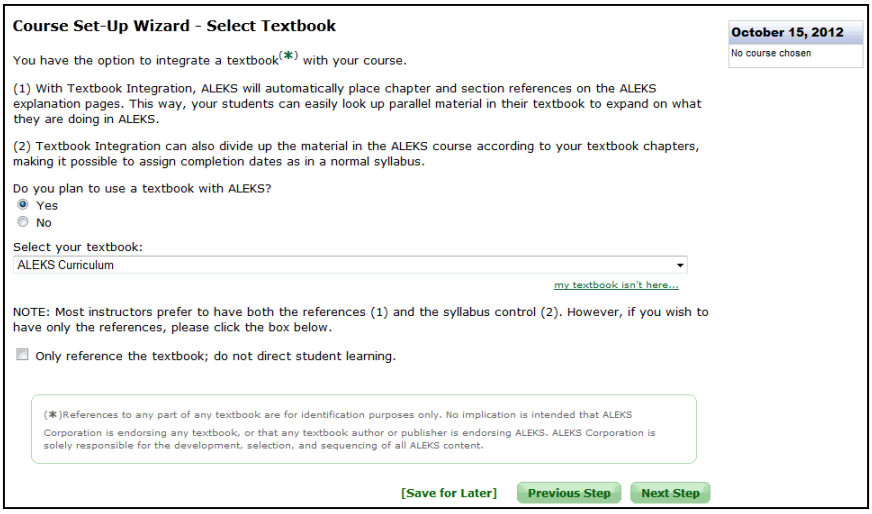


Figure 6.24: Select Textbook

You have the choice of integrating a textbook with your class. If you do not wish to integrate a textbook, just click "No," then "Next Step." If you do wish to integrate

a textbook, click "Yes." You will then see a menu of available textbooks from which you can choose the one you are using (Fig. 6.24). Note that some textbooks appear in multiple editions or versions; be sure to choose the correct one. If your textbook is not in the list, click the link below this menu to submit the request.

ALEKS Curriculum. You can also choose the "ALEKS Curriculum," which is a division of topics based on the slices of the ALEKS Pie for that course product. Using the ALEKS Curriculum enables you to structure your students' learning in classes where there is no textbook involved.

Underneath the menu is an additional choice, "Only reference the textbook; do not direct student learning." If you check this, references to the textbook will appear on the ALEKS Explanation pages (Sec. 5.3.2), but there will be no option to set completion dates for chapters, nor will the coverage of the class be adjusted to the textbook. In order to use all Textbook Integration features, leave this box **unchecked**.

6.3.3 Select Content and Schedule ALEKS Objectives

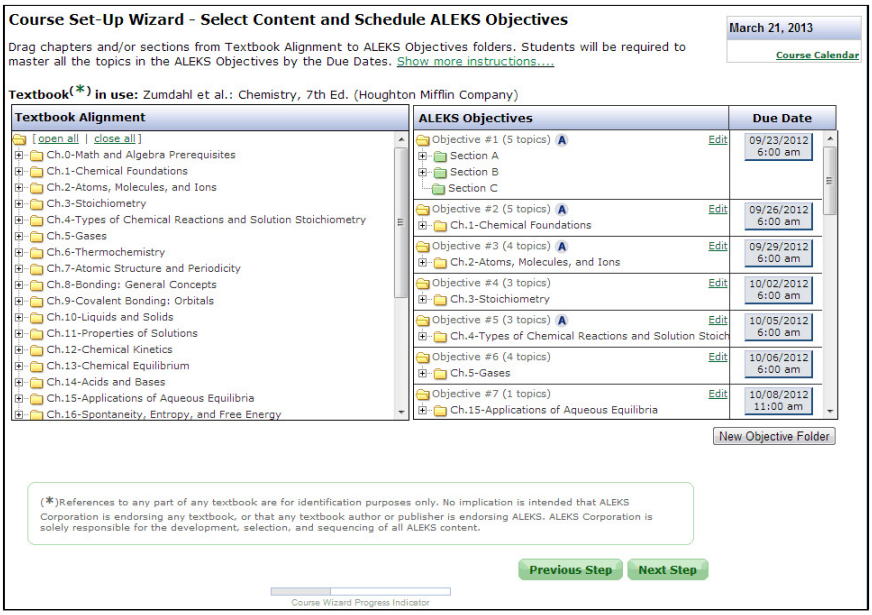


Figure 6.25: Select Chapters

Textbook integration tailors the contents of the ALEKS class to the content of the textbook, so that some topics normally included in a given ALEKS course product may be omitted. Even though ALEKS allows relative freedom to determine the content of your class, be careful about making deep cuts to the content, as these may cause ALEKS to function incorrectly. Only minor adjustments should be made to the content once students have begun working, to avoid unexpected disruption of the students' work.

Ordering Chapters. ALEKS permits you to order the textbook chapters any way you like. You should, however, maintain a reasonable and conventional ordering of materials. The default ordering of chapters may be the best choice for a smooth ALEKS implementation.

After setting the order of chapters, assign the completion dates by clicking in the box under Due Date and choosing a date and time from the popup calendar. Note that the Start Date for the first Objective/chapter is always the start date for the class, which you set under Basic Information; the Start Date for any other Objective/Chapter is one minute after the Due Date of the previous Objective. Start Dates cannot be set manually, nor can Objectives overlap in the calendar.

On the basis of experience with many users, the ALEKS designers recommend that in most cases you choose to have the students assessed automatically upon completion of each Objective. This assessment will be triggered either by the student completing the Objective or when the deadline passes, whichever comes first; the rationale is that students will benefit from extra work on the material of the current Objective, especially if there is a quiz or test on the Objective. The reassessment will check their retention of recently-learned topics and require review as needed. If, on the other hand, they move immediately into the material of the next Objective upon completing the current one, they may not remember the current Objective material perfectly when taking the quiz or test.

If on the Initial Assessment a student assesses to a level indicating mastery of material beyond the first Objective, the student will still be given an Objective completion assessment on the chapter due date for the "latest" chapter "completed" in assessment. This will prevent students from having a long period of time without assessments.

An added benefit of a student completing a(n) Chapter/Objective completion assessment before the next one begins is that the pie chart will become unlocked. All topics in the pie chart will be available for the student to work on, provided they are ready to learn them, even if they are in a future Chapter/Objective. All, or nearly all, of the previously un-mastered items should also appear in the unlocked pie. The pie will remain unlocked until the current deadline expires, at which time the student's learning will be limited to topics in the next Chapter/Objective.

Note that this option does not affect the student's score for chapter completion in the Gradebook; if they finish the chapter ahead of time, they always have 100% for completion of that chapter, regardless of the results of their reassessment (Sec. 6.5.1).

You have the option to cancel (or restore) Objective completion assessments for each individual chapter/intermediate Objective when you create or edit them. By default, all Objectives will be created with completion assessments enabled. This will be indicated in the Objective editor screen by a small blue "A" in the right column next to the Objective name. When assessments are disabled for the Objective, the icon will disappear.

6.3.4 Edit Content

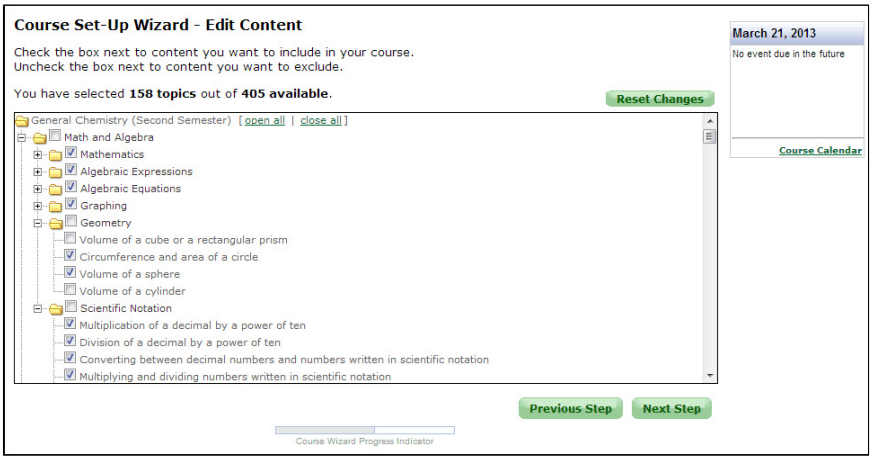


Figure 6.26: Edit Content

For classes without ALEKS Objectives, instructors can remove topics from the syllabus by using the steps below.

In the Edit Content window:

- All topics that are checked are currently included in the class.
- Unchecked topics are excluded from the class.
- Topics may be checked to include them in the class, or unchecked to remove them.
- To see a sample problem for any topic, double-click on the topic name.

NOTE. In classes that are configured with Objectives, the Content Editor will only display topics contained and structured according to those Objectives. As class content can be modified through the Objectives themselves, the Content Editor is mainly for use in classs where Objectives are not in use.

6.3.5 Section Level Content

For certain textbooks, the ALEKS items displayed in the Content Editor are organized not only by chapter, but also by section, making it more convenient to customize content on the basis of the textbook structure. Where available, section-level organization is also visible when you are choosing topics to include in Homework, Quizzes, and Test assignments.

6.3.6 Core Readiness Topics in the Content Editor

For some textbooks integrated with ALEKS, there is an initial chapter, preceding Chapter 1, that may be called a "Readiness Chapter." (The exact name of the Readiness Chapter can vary across books.) This chapter contains material that is not strictly part of the class coverage, but is important as foundational material.

If you would like the Readiness/Review chapter to be a distinct unit in the student's work, it should be assigned a completion date, like other chapters. If no separate completion date is assigned to this chapter, its core material will still be included, but as part of the first chapter.

For classes not using textbook integration, these topics will be listed in the Content Editor under the section "Core Readiness Topics," and you may remove as many of these topics as you wish. The other (non-core) topics coming from the Readiness Chapter are also shown in the Content Editor under the section "Other Topics," but these topics will not be included in the class.

6.3.7 Edit Course

Figure 6.27: Edit Course

To edit the class details, select a class and then click on "Edit this Class." You will see a screen listing all of the class creation areas. Click on "edit" for any area to go back and revise your choices in that area. Click "Save" to complete the process. The class configuration can be altered at any time, but it is better to finalize your choices before the students begin working in ALEKS.

To access the automatic archive class option, click on "edit" for Class Name, Section Name, ALEKS Class, Start Date, or End Date (Sec. 6.1.7).

ALEKS Class Syllabus

Also on this screen is a link to download the ALEKS Class Syllabus. You will have the choice of two formats, an HTML webpage or a PDF document. The ALEKS Class Syllabus contains a detailed summary of your class as it has been configured. You may want to print this out as a convenient reference or as documentation for the class.

6.4 Assignments

The following kinds of assignments can be created in ALEKS: Homework, Quizzes, Tests, and Scheduled Assessments. All are optional: ALEKS can be used without any of these, but they may enhance the effectiveness of ALEKS in certain instructional contexts. Homework, Quizzes, and Tests are similar in how they are configured. The process of creating a Homework assignment will be described below in full detail; Scheduled Assessments will be treated more briefly, focusing on how they differ from Homework, Quizzes, and Tests.

All assignments are separate categories in the ALEKS Gradebook (Sec. 6.5), and so it is helpful to keep them distinct from the viewpoint of class management and grading.

6.4.1 Homework

If Homework assignments have been created for this class, clicking on the Homework tab will display a table listing these assignments (Fig. 6.28). The table includes the following information: The Homework Name, Start Date, Due Date, Status of the Homework, and an Action drop-down menu.

Possible Status values are:

- **Current.** The Homework assignment is currently available.
- **Enabled.** The Homework assignment will be available at a future date.
- **Completed.** The Homework assignment due date has passed.
- **Disabled.** The Homework assignment has been set up as Disabled in Step 1 on the Homework setup screen.

Available Actions are:

- **Edit Homework.** Instructors can modify an existing Homework in the class.
- **Disable/Enable Homework.** Instructors can block or allow student access to the Homework after the start date.
- **View Homework Report.** Instructors can view a report showing each student's result on a Homework assignment.

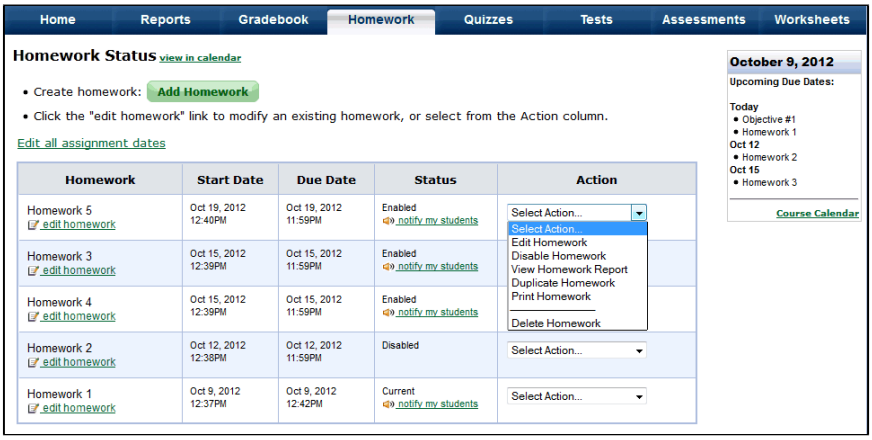


Figure 6.28: Homework Status

- **Duplicate Homework.** Instructors can copy the configuration of an existing Homework.
- **Print Homework.** Instructors can print up to five instances of the Homework.
- **Delete Homework.** Instructors can delete a Homework assignment.

6.4.2 Add Homework

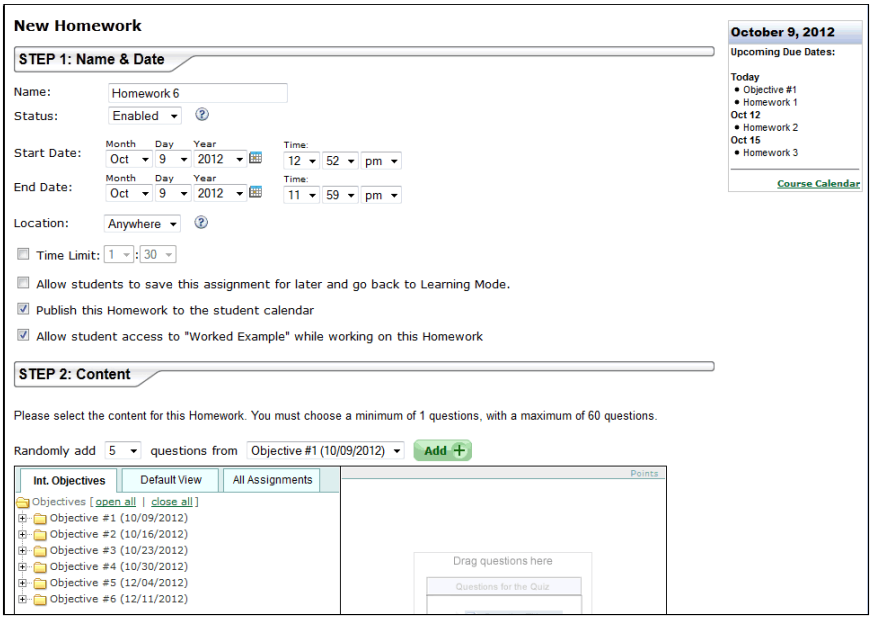


Figure 6.29: Add Homework

Instructors can create a new Homework assignment by clicking on the Add Homework button under the "Homework" tab (Fig. 6.28). The following steps are needed to complete the assignment creation process (Fig. 6.29):

- **STEP 1: Name and Date**. Basic information about the homework assignment is entered such as a name and the dates when it will be available (Sec. 6.4.3).
- **STEP 2: Content**. In this step content is added to the assignment (Sec. 6.4.4).
- **STEP 3: Gradebook Settings**. Instructors can specify when students can see their grades, or if multiple attempts are permitted for the assignment (Sec. 6.4.5).
- **STEP 4: Advanced Options**. In this step instructors can control student access to the assignment (Sec. 6.4.6).
- **STEP 5: Grading Scale**. A grading scale can be set for the assignment, with options for how this score is visible to students (Sec. 6.4.7).

6.4.3 Basic Information

STEP 1. This step allows the instructor to select a start date and time and end date and time for the Homework. The Homework will be available to the students during this period. By default, the start date and time is when you begin creating the Homework; the end date and time is 11:59 PM of the same day.

- **Name.** A sequential name for the Homework will be generated (e.g., Homework 1, Homework 2, etc.), or the instructor can choose a name.
- **Status**. Normally, the Homework will be left "Enabled"; if you wish to keep it hidden for the time being, change the Status to "Disabled" using the drop-down menu.
- **Time Limit**. By default, there is no time limit on a Homework, but one may be assigned.
- **Allow students to save this assignment for later and go back to Learning Mode**. By checking this box, instructors can allow students to start an assignment and then save it to complete later. This will permit students to work in Learning Mode or on other assignments before finishing this assignment. This option is not available for timed assignments.
- **Publish this Homework to the student calendar**. The assignment is normally published to the student calendar, but this can be disabled.
- **Location**. If IP addresses are used to restrict access to assignments to within the college, a Location drop-down menu will be available (Sec. 7.20.1).
- **Allow student access to "Worked Example" while working on this Homework**. By default, students will be allowed to access a "Worked Example" while working on the Homework. Uncheck the box to disable this feature.

6.4.4 Content

STEP 2. There are several ways to select the topics that the Homework assignment will cover.

- Using the directory on the left-hand side of the Selector window, select the topics you wish to include, and click on the "Add" button underneath the Selector. Shift and Ctrl can be used for easy selection of multiple topics. The directory may be organized by the textbook, if Textbook Integration is used (Sec. 6.3.2); otherwise, it will be organized using ALEKS's own categories.
- Select the All Assignments tab to create a Homework that contains the same topics used in another Homework assignment, Quiz, or Test.
- Another way to add questions is to specify the number of questions and the chapter from which they are to be taken, then click "Add" above the Selector window. The questions will be chosen at random from the chapter you specify. You can also do this for different chapters, then "Shuffle" them if desired. The total number of questions on the Homework cannot be less than 1 or greater than 60.
- To remove topics from the Homework, select them on the right-hand side and click the "Remove" button. The order of topics can be changed by dragging them in the list, or by selecting them and using the up and down arrows. Or, you can randomize the order by clicking the "Shuffle" button.

Instructors can modify the points assigned to each topic, ranging from 1 point up to 99 points. This allows some topics to be weighted more heavily on the assignment than others.

To see a sample question for a topic, double-click on the name of the topic. This is not the question that your students will see; the actual questions appearing on the assignment will be generated algorithmically at the time the Homework is taken. Each student will see a different question, but it will be equivalent to the sample question in topic and difficulty.

6.4.5 Gradebook Settings

STEP 3. You can choose whether the students will see their scores and grades immediately (default), or only after the end date (Fig. 6.30). You can also specify whether the assignment may be taken once or multiple times. If you click the option "This Homework can be taken multiple times," a window will open in which you can select a number of attempts, as well as options for which score should appear in the Gradebook (the best score, the final score, or the average of all attempts). Also in this window you can choose one of the following retake options:

Full Retake
Students must retake all problems (default).

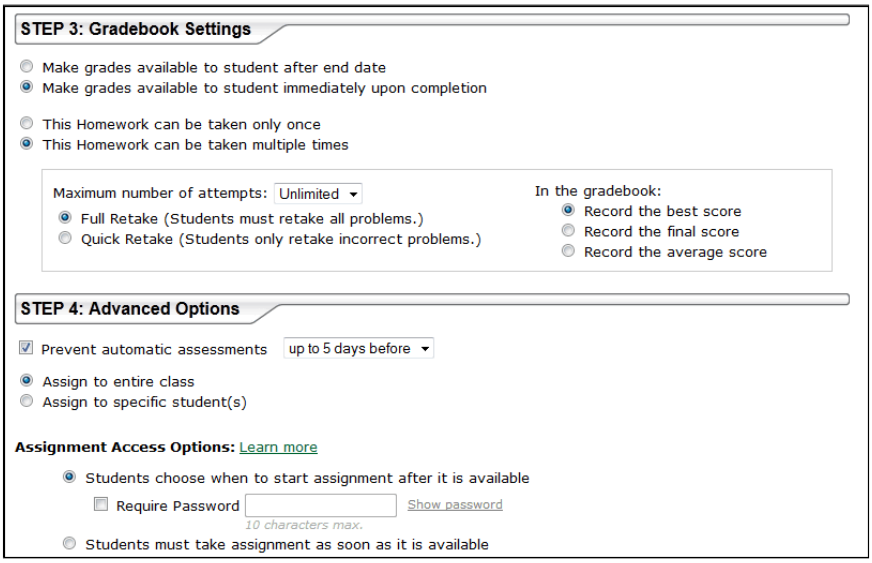


Figure 6.30: Add Homework (cont.)

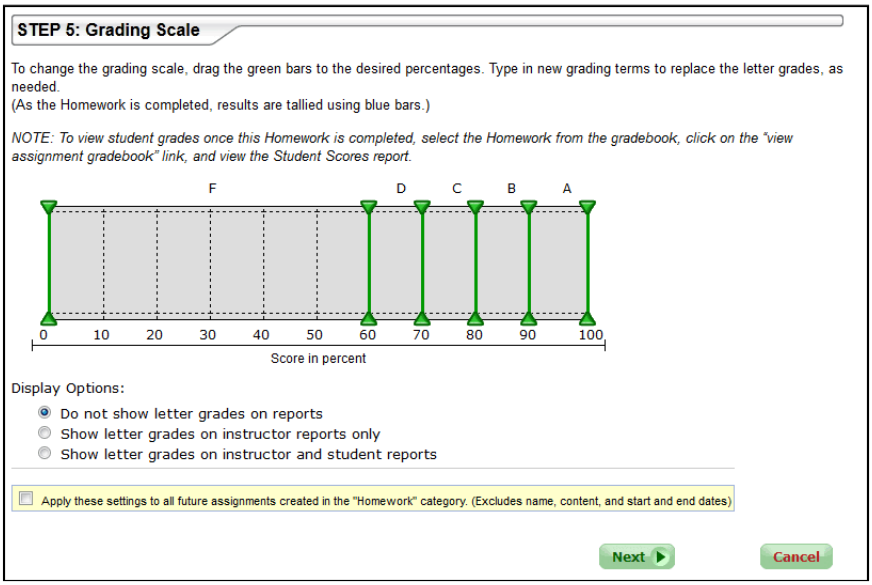


Figure 6.31: Add Homework (cont.)

Quick Retake

Students only retake incorrect problems.

6.4.6 Advanced Options

STEP 4. The **Prevent automatic assessments** option allows you to postpone automatic assessments for up to 7 days prior to the beginning of the assignment (defaults to 5 days). Postponed automatic assessments will occur as soon as the assignment is completed or its end date passes.

The instructor can choose whether to assign the Homework to the entire class or only some students in the class (including a single student, or no students). If you click the option for "specific student(s)," you will see a list of the names of students in the class with checkboxes.

NOTE. When an assignment is scheduled for some students, rather than the entire class, the assignment will be considered extra credit in the ALEKS gradebook. This ensures that the assignment will not hurt any student's grade.

Next you will be given the choice of how your students will access the Homework assignment. There are two options:

Students choose when to start Homework assignment after it is available

Students have the flexibility to choose when to start the Homework assignment so they can continue to work in other parts of ALEKS without being forced into the assignment.

Included in this option is the ability to password-protect the Homework assignment, providing more control of when and where the Homework assignment can be taken.

Students must begin the Homework assignment as soon as it is available

Students are "forced" into the Homework assignment as soon as they log in, after it becomes available. With this option, students will not be able to work in any other areas of ALEKS until they have completed the Homework assignment. See Sec. 6.4.10 for examples of how ALEKS will behave when this option is used.

6.4.7 Grading Scale

STEP 5. By default, no grading scale is used, and the students see only a percentage score. If the grading scale is used, its default is a conventional A, B, C, etc. scale using standard percentage breakpoints (Fig. 6.31). The sliders on the scale, however, can be moved and renamed; you can also add or remove sliders to set practically any scale desired. The labels on the sliders, which are used as grade notations, are limited to a few letters or numbers; to set the label, click on the existing label, type in the new label, then press "Return."

Use the "Display Options" under the grading scale to set whether the scale will be used. Even if the scale is not used, the graph will be populated as a histogram once the students begin taking the Homework, giving a useful illustration of the students' performance.

NOTE. You can choose to apply the settings on this screen to all future assignments created in this category, in the class by checking the box underneath the display options. This will not include the name, content, and start and end dates.

To complete the process, click "Next" at the bottom of the New Homework page, check the specifications of the Homework, then click "Back" to revise or "Save" to finalize. If you do not wish to save the Homework Assignment, click the "Cancel" button.

6.4.8 Edit Homework

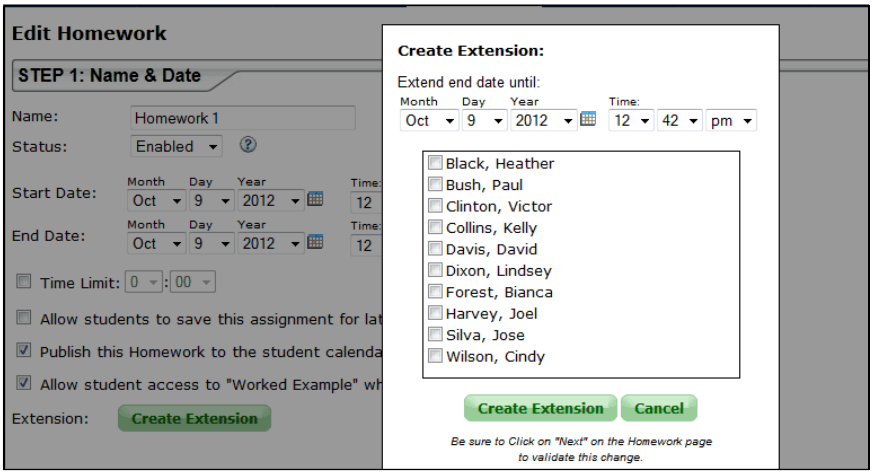


Figure 6.32: Create Extension

Clicking on the Homework tab displays the Homework Status screen, listing previously created Homework assignments for this class. Homework can be modified up to the moment when the first student begins to take it; extensions can be created at any time.

Edit a Homework assignment by clicking on the "edit homework" link under the Homework assignment name (or choose "Edit Homework" from the Action menu for that assignment). STEP 1 through STEP 5 can be edited on this screen. Also, at the bottom of the Edit Homework screen is a "**Delete this homework**" button. Clicking this button will delete the Homework assignment.

Create Extension. The feature is available on the Edit Homework page, if there are students in the class. Extensions can be created for one or more students. To create the extension, click on the "Create Extension" button, select the date and time

through which the extension will be in effect, choose the student(s) who will be given the extension, and click the "Create Extension" button (Fig. 6.32).

6.4.9 Assessments

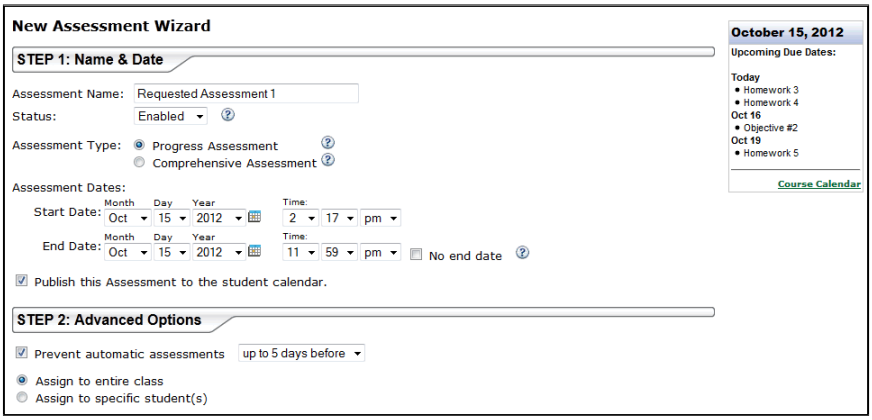


Figure 6.33: Add an Assessment

Scheduled assessments have many of the same options as Homework, Quizzes, and Tests (Fig. 6.33). The fundamental difference is that you do not specify the content of an assessment; the assessment is produced by ALEKS automatically, as with all other assessments (Sec. 4.3).

Scheduled Assessment features:

- When creating a scheduled assessment, the instructor has a choice between a "Progress"-style assessment and a "Comprehensive"-style assessment. Progress Assessments are slightly shorter and focus on the student's most recent learning history; comprehensive assessments are slightly longer and probe more deeply into the student's overall knowledge of the class content.
- Scheduled assessments will not allow access to worked examples, integrated eBooks, or multiple attempts.
- It is helpful to block automatic assessments for a number of days prior to the scheduled assessment, using the Prevent automatic asesssment option. A scheduled assessment will "reset the clock" for automatic assessments, so that the "blocked" assessments do not kick in when the assessment is completed.

Assessments and Grading. The score for all ALEKS assessments, including those scheduled as assignments, is always a percentage representing the student's knowledge of the entire class contents. Assessments do not measure the students' knowledge exclusively of a particular chapter, unit, or other portion of the class contents. Many instructors prefer not to use scheduled assessment results as part of the grading scheme.

If scheduled assessments are used for grading, the grading scale should be set carefully, to reflect your expectation of what the students will have learned at the time the assessment is taken. For more information on setting a goal percentage for a scheduled assessment, see Sec. 6.5.5.

6.4.10 Scheduled Assignment Behaviors

The following are several examples of how the ALEKS system will behave when a student must begin a scheduled assignment as soon as it becomes available in ALEKS.

- If a student is working on any kind of assessment, and a scheduled test or scheduled quiz becomes available, the system will interrupt the assessment, and the student will be prompted to take the scheduled test or quiz immediately. After the student completes the scheduled test or quiz, the assessment will continue where the student left off.
- If a student is working on any kind of assessment, and a scheduled assessment becomes available, the system will stop and **discard the current assessment**. The student will see a message that says the assessment was canceled. The student will be prompted to take the scheduled assessment immediately.
- If a student is working on a homework, quiz, or test, and another homework, quiz, test, or scheduled assessment becomes available, the system will not interrupt the student's work. The system will wait until the student has completed the current assignment before prompting the student to take the scheduled assignment.

6.4.11 Edit all Assignment Dates

Instructors can edit one or more of the class assignment dates by clicking on the "Edit all assignment dates" link. This link is available when clicking on any of the following buttons from the instructor's homepage: Homework, Quizzes, Tests, Assessments, or Course Calendar. The "Edit all assignment dates" link will display a page that includes all the assignments in the class. Using the "Show" drop-down menu allows you to filter by assignment type.

Quick Shift. To shift the start and end date on a group of assignments, first select the assignments. Next, use the Quick Shift tool to specify the number of days to shift forward or back. Then, click on the "Apply to selected" button to see your changes in the table below. After you have reviewed your changes, click on the "Save" button.

Edit Individual Assignment Dates. To change the start or end date on an individual assignment, use the calendar drop-down menus to enter a new date. Click the "Save" button near the bottom of the screen to save the changes.

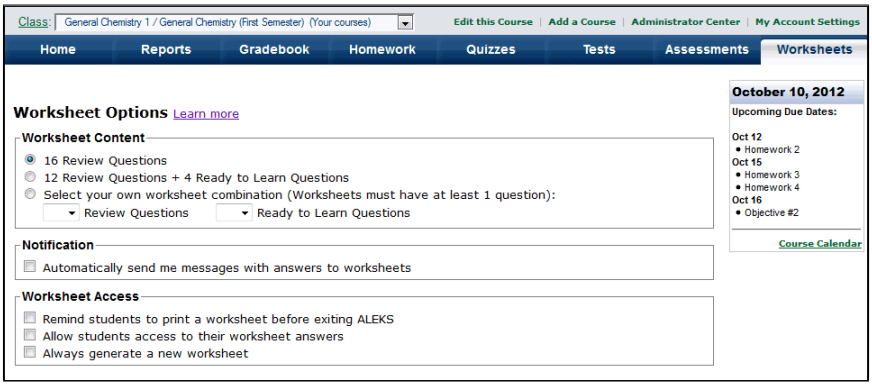


Figure 6.34: Worksheet Options

6.4.12 Worksheets

This tab lets you create individual worksheets for students in the class, or view worksheets that have been created in the past. Students also have the ability to print their own worksheets (Sec. 5.2.11).

To create a worksheet for a single student, select a student from the list.

Worksheet Options. Located to the right of the Manage Worksheets screen is the "Worksheet Options" link. There are several options available for worksheets in ALEKS (Fig. 6.34). Worksheets consist of 16 questions; by default, these are drawn from the student's recent learning history, but optionally four of the 16 may be chosen from material that the student may be working on soon ("Ready to Learn Questions"). Instructors can also manually select their own worksheet combination by using the drop-down menus to specify the number of "Review Questions" or "Ready to Learn Questions," to include in the worksheet. If this option is chosen, worksheets must have at least one question.

By default, the instructor always receives messages in ALEKS with the answers to worksheets that students have generated independently. This option can be turned off.

Other options are: to remind the students to print a worksheet at the end of an ALEKS session; to let students see the answers to their own worksheets; and always to "refresh" the worksheet content when a new worksheet is printed (by default, it is refreshed only if the student has done some work in Learning Mode).

6.4.13 Course Calendar

The Course Calendar can be accessed from any page in the Instructor Module where a class has been selected, by clicking "Course Calendar" in the Upcoming Due Dates box in the right-hand margin. It is similar to the Course Calendar viewed by students, but also permits you to create and modify assignments (Secs. 6.4.1 - 6.4.9). The Course

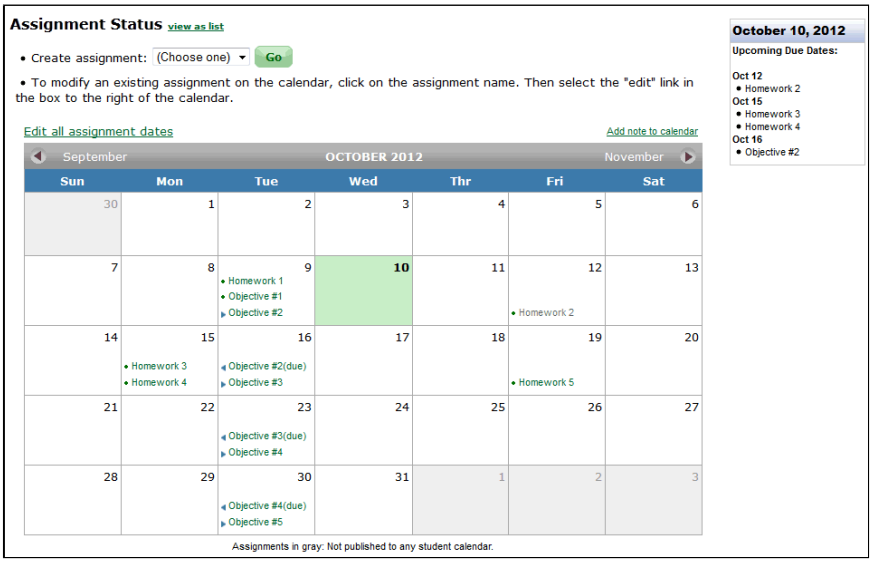


Figure 6.35: Course Calendar

Calendar shows all "assignments" in the class, one month at a time, with their start and end dates (Fig. 6.35).

The Course Calendar provides a link to the "Edit all assignment dates" page (Sec. 6.4.11).

Date Range. Hovering your mouse pointer over either a start date or an end date will highlight both the start date and the end date for the assignment. Clicking on either a start date or an end date will open an information box containing links for editing or viewing more details about the assignment. New assignments can be created from the menu just above the Calendar display.

Calendar and Gradebook. The Course Calendar is parallel to the Gradebook, as it is based on ALEKS assignments. All assignments appearing in the Calendar may be included in the class grading scheme. Assignments do **not** have to be graded, however, to appear in the Calendar. All assignments, graded or not, will appear in the Calendar unless deliberately excluded. The contents of the Calendar can also be shown in simple list format by using the link "view as list" to upper left.

Calendar Notes. It is also possible to add arbitrary notes to the Calendar by clicking the link, "Add note to Calendar" (upper right).

6.5 Gradebook

The Gradebook is central to the class management capacities of the ALEKS Instructor Module. There are currently six types of data that can be used by the Gradebook: Quizzes, Tests, Homework, Scheduled Assessments, Objectives (Chapter Completion), and External Assignments. These are what we call "assignments" in discussing the

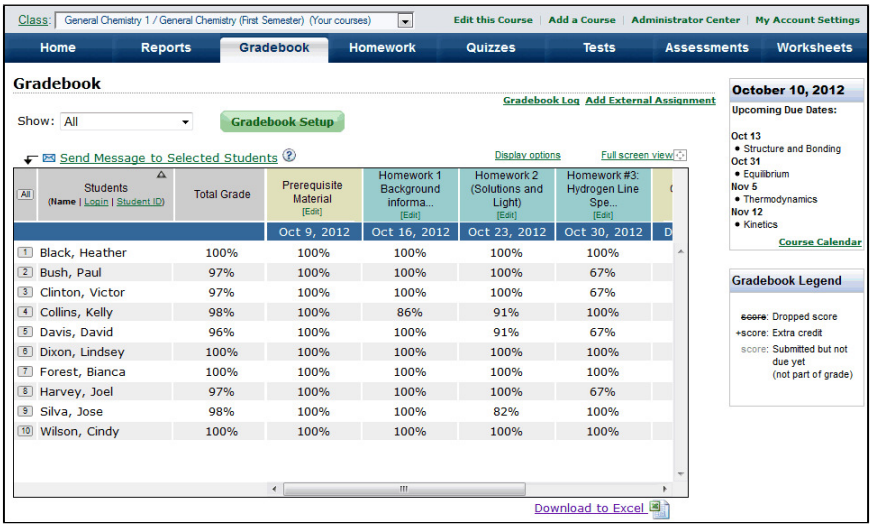


Figure 6.36: Gradebook

Gradebook features. When configuring the Gradebook for a class, the instructor can choose any selection of these types of data (or none, if the Gradebook is not being used). Also, it is possible to use these kinds of assignments and not include them in the Gradebook configuration; for example, the instructor may choose to set up a series of Homework assignments for the class to prepare students for Quizzes or Tests, but not make the Homework assignments part of the grade.

NOTE. The full benefit of the ALEKS Gradebook will be obtained if the configuration is thought out carefully before the beginning of the class, and then left unchanged while the class is in progress. In particular, if the students have begun to complete assignments, and grades for the assigments appear in the Gradebook, changes to the configuration may be confusing to students who check their Gradebook data.

6.5.1 Gradebook Interface

The main Gradebook interface is shown in Fig. 6.36. Several options are available for this display. By default, all gradebook data is displayed, but the "Show" menu lets you select one specific category of data for separate display.

Gradebook Setup. To view or set the configuration of the Gradebook, click on the "Gradebook Setup" button (Sec. 6.5.5).

Display Options. The menu lets you choose to see the grading information in terms of points (based on the points allotted for each category in the Gradebook configuration) or by percentage of the total points possible; it also lets you set a date range for the display. For any changes to the display to take effect, you must click the "Update Display" button.

Full Screen View. Click on the link to view the Gradebook in an expanded screen.

Send Message to Selected Students. Instructors can quickly send a message to students while viewing the Gradebook. There is a number icon by each student's name that gives the position of the student in the sorted list. Since the default sort is by student name, the numbers will reflect the position of the student in the alphabetical list. If instructors sort on a different column, the numbers will show the position of the student relative to the new sort. By sorting on a column and then using this feature, you can quickly send messages to groups of students who have high or low values for any column. Furthermore, you can send messages without having to navigate through the ALEKS Message Center or lose your place in the Gradebook.

Download to Excel. As with other reporting displays in ALEKS, the contents of the Gradebook can be downloaded into an Excel spreadsheet for use outside of ALEKS. It is recommended that you download the Gradebook into Excel on a regular basis in order to have a backup file on hand. This can be useful in the event of a discrepancy or if edits need to be made to student scores.

Students are listed in the left-hand column; there are also options to show their ALEKS Login Names or student ID numbers instead of names.

Total Grade. The Total Grade column appears when choosing "Show: All" from the drop-down menu. It shows a computation of the student's current grade based on assignments completed or for which the due date has passed. This column attempts to predict or approximate the student's grade for the class based on any work to date; for example, if the class is half completed and a student has 70% in this column, it means that if the student's work continues at the same level for the remainder of the class, it is likely that the final grade will be around 70%. If a particular category (e.g. Quizzes) is chosen rather than "All," it shows the total grade to date based only on that category of assignments. If a date range is specified other than the entire period of the class, the display will use only the assignments whose dates fall within that range.

Student Grades. The Gradebook displays in columnar format where specific assignments are chronologically ordered by due date. Each assignment has a name, is color-coded by category, and shows its due date. As the students complete the assignments, values are inserted into the corresponding cells. Cells where the student has not completed the assignment are empty or, if the due date has passed, contain a value of 0. If the student has completed the assignment but the due date has not passed, the value appears in grey indicating that it will not be used in computing the current "Total Grade." For some types of assignments (e.g., Homework with multiple attempts, Sec. 6.4.5), students have the option of redoing or retaking the assignment, so that values in grey may change before the due date.

If you click on the heading for the "Students" or "Total Grade" column, the list will be sorted on the values in that column. If you click on the "[Edit]" link in any column for a specific assignment, a box will open containing options to edit and view student results. These are similar to the analytical options in the regular report views for similar assignments (Sec. 6.2.16).

Chapter or Objective Completion. Scores for chapter or Objective Completion,

in the ALEKS Gradebook, are received from the Textbook Integration or Objective features (Sec. 6.3.2).

Each chapter or Objective has a due date by which students are expected to complete the material in that unit. If a student completes the chapter or unit before the due date, a grade of 100% is entered into the student's cell for that assignment. The score will appear in grey, and it will not be used to compute the Total Grade until the due date has passed. It is not, however, subject to change; even if the student loses material in a subsequent assessment, the 100% score will remain. If the student does not complete the unit by the due date, the percentage of unit material that the student did complete will appear in the cell as the student's score.

Students using ALEKS have access to Gradebook information for their own work, similar to the information described in this chapter.

6.5.2 External Assignments

The External Assignment feature is ideal for including student scores on assignments or exams completed outside of ALEKS. To access, click on the Gradebook tab. Then, click on "Add External Assignment" to the upper right.

Creating the External Assigment. Enter the name of the assignment, adjust the assignment date if necessary, assign a maximum score, and click on the "Set Maximum Score" button.

Entering Student Scores. Either type in the scores for each student in the table, or paste in the scores from a spreadsheet. To paste the scores in from a spreadsheet, follow these steps:

1. Download the student roster by clicking on this link: Excel template (this includes the entire student roster for this class).
2. Instead of clicking on "Open" in pop-up file window, click on "Save" and save the file to your desktop.
3. Open the file. If you receive a warning message from Excel, click on "Yes." Follow the instructions included in the Excel document to enter your students' scores into the ALEKS Gradebook.

Unlimited Categories. If you have more than one External Assignment category, you can supply additional categories and rename them. This enhancement allows you to use the ALEKS Gradebook to include grades of various non-ALEKS assignments more accurately within the ALEKS Gradebook. Instead of recording all non-ALEKS assignments in the catch-all "External Assignments" category with a single weight towards the grade, you can create an unlimited number of external assignment categories, each with its own weight.

To access:

- Select a class and, under the Gradebook tab, click on the "Gradebook Setup" button.
- To change the name of an external assignment category, click on the "Edit Name" link.
- To add an assignment to a particular category, assign an overall weight to the category and click on the "Add External Assignment" link.
- If you wish to delete an external assignment category, click on the "Edit Weight for Each Assignment" link, delete the assignments and then click on the "Delete Category" link.

6.5.3 Adjust Student Scores

Instructors can adjust student scores for ALEKS assignments and external assignments directly through the Gradebook.

To access:

1. Click on the "Gradebook tab."
2. Click on "Edit" for the assignment you want to adjust.
3. Click on "Edit Student Scores."
4. Edit the scores as necessary.
5. Click the "Save" button.

6.5.4 Gradebook Log

The Gradebook Log is a record of any adjustments made to student scores in the ALEKS Gradebook. Adjustments may be made to Gradebook scores by you, the primary instructor, teaching assistants, or other instructors who have edit privileges for the class Gradebook. This feature can also be used to monitor adjustments made to the Gradebook by anyone with Shared Course Access (Sec. 6.6.10). This feature can be accessed through a link just above the main Gradebook table, to the right (Fig. 6.36).

6.5.5 Gradebook Setup

For each of the six grading categories (Quizzes, Tests, Homework, Assessments, Objectives, and External Assignments), a total percentage can be assigned (Fig. 6.37). If a value of 0 is assigned, that category is not included in the Gradebook. For categories whose weight is greater than 0, the percentage determines the total weight of that category. The total percentage weight of all categories combined must equal 100%. When the combined total percentage weight is different than 100% an error message will display when attempting to save the Gradebook Setup page.

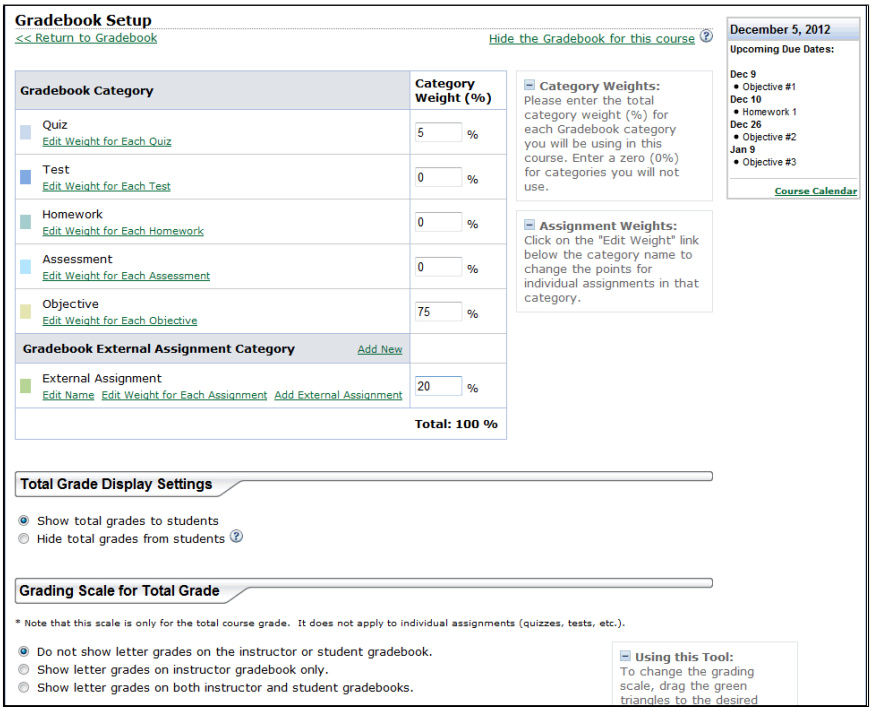


Figure 6.37: Gradebook Setup

Assignment Weights. The assignments within each Gradebook category can also have different weights. The weight of each individual assignment can be assigned by clicking on the link "Edit Weight for Each type of assignment." When entering the weight for each assignment, you have the option to click on the link "Show Details" of the weight of each assignment. These details include the percent value of each assignment within the category and the percent value of the assignment relative to all assignments within the overall Gradebook.

Dropping Low Scores. Suppose you have defined ten ALEKS Quizzes for the term and have specified that the two lowest scores be dropped. ALEKS will do nothing with that specification until the 9th Quiz has been completed by the students. At that time, the lowest of the nine scores is determined and it is dropped when ALEKS computes the overall score for the Quiz category in the Gradebook. When the 10th Quiz has been completed by the students, the two lowest of the 10 scores are determined, and they are dropped when ALEKS computes the overall score for the Quiz category in the Gradebook. ALEKS recommends that you wait until the end of the class to drop the lowest score(s).

Extra Credit. Instructors can designate assignments to be for extra credit. Students who do not complete the extra credit assignment will not be penalized. (Students who do complete the assignment can only improve, never hurt, their grades.) Extra credit assignments are differentiated from regular assignments by a "+" next to the score.

NOTE. In ALEKS, assignments not assigned to the entire class are by default flagged as Extra Credit. This ensures that the assignment will not hurt the grades of other students.

Assessments. In the Gradebook, assessments refer only to Scheduled Assessments; results from other assessments cannot be used in the Gradebook (Sec. 4.3).

Each scheduled assessment in the class can be assigned a goal percentage. The "Goal" is the percentage of the class that grades on the assessment are based on. For example, midway through the class, the goal for an assessment might be set at 50%. Then, a student who assessed as knowing 40% of the entire class would get a score of 80% on the assessment. (Meeting or exceeding the goal percentage gives a score of 100% for the assessment.)

Disable Gradebook. You can choose to disable the class Gradebook. You will find this feature by clicking on the "Gradebook Setup" button under the Gradebook tab. Clicking on the "Hide the Gradebook for this class" link will do the following:

- Hide the contents below the Gradebook Setup.
- Hide the class Gradebook from you and the students in the class; the "Gradebook" tab will still be visible, however.
- The "Hide the Gradebook for this class" link will turn into a "Show the Gradebook for this class" link.

You have the option to reactivate the Gradebook at any time.

Total Grade Display Settings. By default, the option "Show total grades to students" will be selected in this section of the Gradebook setup. If desired, you can elect to hide the total grades from students by selecting "Hide total grades from students."

6.5.6 Grading Scale for Total Grade

The Grading Scale for Total Grade allows the instructor to assign a grading scale for the total class grade. By default, no grading scale is used, and the students see only a percentage score. The default grading scale is a conventional A, B, C, etc., scale using standard percentage breakpoints. The sliders on the scale, however, can be moved and renamed; you can also add or remove sliders to set practically any scale desired. The labels on the sliders, which are used as grade notations, are limited to a few letters or numbers; to set the label, click on the existing label, type in the new label, then press your "Return" key.

Use the options above the grading scale to set whether the scale will be used or not, and who will see it. Even if the scale is not used, the graph will be populated as a histogram, giving a useful illustration of the distribution of students' scores.

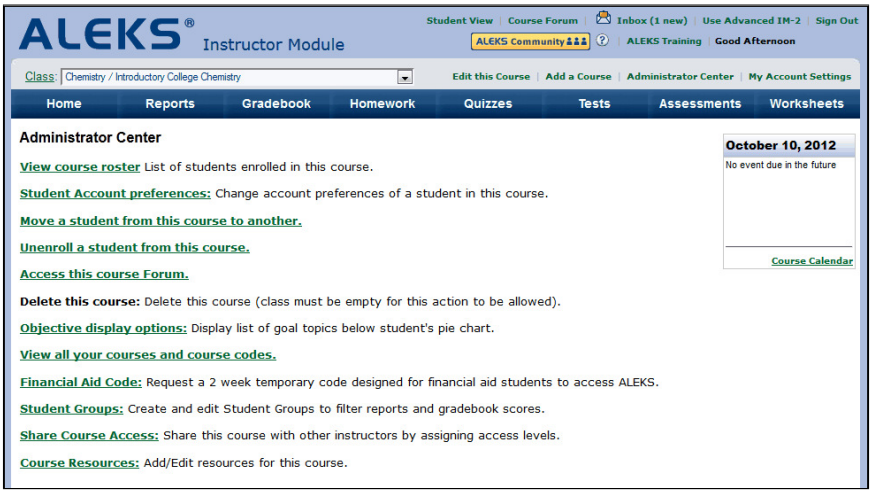


Figure 6.38: Administrator Center

6.6 Administrator Center

The Administrator Center is used for the management of student enrollment in your classes (Fig. 6.38). You can edit student account information, unenroll students or move them to new classs, and delete empty classes. You can also obtain a list of all classes and Class codes.

6.6.1 View Class Roster

To see a list of students enrolled in this class, click "View class roster." This list includes the student name, login name, and the date that the student account will expire. You can print the class roster by clicking on the "Print" icon, or download it to an Excel spreadsheet. The number of students in the class is displayed at the top of the list.

NOTE. Passwords are not included in the roster. A column for "Student ID" will be displayed if at least one student in the class entered a student ID during the registration process in ALEKS. If there are more than 200 students in the class, up to 200 students will be displayed per page, and you can use the links provided to see the remaining students.

6.6.2 Student Account Preferences

Student Account preferences allows you to make corrections or changes to a student's name and email address. To edit a student's account preferences, click "Student Account preferences" and then click the student account to be edited.

6.6.3 Move a Student from this Class to Another

To move a student from the current class to another class click "Move a student from this class to another." Click the name of the student to be moved. Select the class from the list displayed. If you are an ALEKS Administrator at the college, all classes at the college will be displayed in the list.

6.6.4 Unenroll a Student from this Class

To unenroll a student from this class, click "Unenroll a student from this class." Click the box next to the student(s) to be unenrolled. To unenroll all students at once, check the box next to "select all." There is also a check box for "select none" of the students listed. After the student or students are selected to be unenrolled, click "Next." Click "Confirm" to proceed with unenrolling the student or students from the class.

If a student is accidentally unenrolled from a class, an instructor can re-enroll the student using the Advanced Instructor module. The process of enrolling students, previously unenrolled or in another class, is explained in the next chapter (Sec. 7.3.4).

6.6.5 Access this Course Forum

The class forum can be accessed either through the Administrator Center or by clicking on the "Course Forum" link, in the upper part of the screen on the class Home page (Sec. 6.1.3). Through the Administrator Center, click on "Access this Course Forum" to access the forum. If the class forum has not been previously authorized, you will be prompted to authorize it. You can use the Course Forum to share ideas with your students, post your class syllabus, and maintain an open channel of discussion in ALEKS.

6.6.6 Delete this Class

Classes with no currently enrolled students can be deleted. Click "Delete this class" to delete the class in ALEKS. This link will not be active if there are students currently enrolled in the class.

6.6.7 Objective Display Options

If ALEKS Objectives are included in the class, students will see a list of goal topics below their pie chart. Uncheck the box to disable this feature.

6.6.8 Financial Aid Code

A Financial Aid Access code can be requested to allow students enrolled in the class free temporary access to ALEKS. The code is valid for a period of 2 weeks. If the class is set for 6-week access codes only, the Financial Aid Access Code is valid for two days after activation. The Financial Aid Access code is designed to assist students experiencing financial aid delays.

To request a Financial Aid Access Code for your class, click on Administrator Center. Next, click on the Financial Aid Code link. (If this link is not available in the Administrator Center, please contact ALEKS Customer Support to have it enabled for your college.) Click on the "Request a Financial Aid Code" button; you will receive a message in your ALEKS Message Center Inbox containing your class code, Financial Aid Access Code, and instructions for the students on how to register with ALEKS. It is recommended that you print out the email or forward it to the students who need it. The code can be used by any number of students in the class, but only for that class. This process should be completed for each class where the Financial Aid Code is needed.

NOTE. When students purchase their access code, the time used in ALEKS with the Financial Aid Access code will be subtracted from the time available on the purchased access code; in other words, **using the Financial Aid Access code does not add two weeks to the total length of an account**.

6.6.9 Student Groups

Instructors have the option of dividing their classes into Student Groups. These Student Groups can then be used to filter reports and Gradebook scores. This feature is available in the Administrator Center after the Instructor selects a class. Click on the option that says "Student Groups," then click on "Add Student Group" to create a new group. Students can be added to more than one Student Group; in other words, Groups can overlap. Instructors can enter a name for the group or use the default name, then select the students to be added to the group and click the "Save" button.

Instructors can edit, view, or delete existing Student Groups. To edit or modify an existing Student Group, the Instructor clicks on the "edit student group" link; an action column will appear. Click on "Save" for changes to take effect. Using "Show all students and groups" will show all students and the groups they belong to. Each column can be sorted in ascending or descending order by clicking on the column title.

Instructors can choose "View Student Group" to filter the different Student Groups using a drop down menu which will contain "All Students," "Students not in any group," and the Student Groups already created and named. Instructors can filter reports by Student Groups using the "Show" drop-down menu to select from the currently created Student Groups. Instructors can also filter Gradebook scores by using the "Group Filter" drop-down menu to display the Gradebook scores for the selected group.

6.6.10 Share Course Access

Instructors can share access to their classes with TAs (Teaching Assistants) and other instructors by assigning access levels through the Share Course Access feature. Clicking on the Share Course Access feature will pop up a window displaying a summary of how to use this feature. This pop-up window will continue to appear each time the feature is selected, until the instructor assigns access levels. Only TAs and Instructors who have been set up in ALEKS will be included in the list of instructors to share the course with.

The instructor of the class will have three options for assigning an access level:

Read Only
: TAs and instructors can review and download reports in ALEKS. Read Only access will prohibit modifications to the Gradebook, assignments, or any other class settings.

Gradebook
: TAs and instructors can review reports in ALEKS. Gradebook access will allow changes to Gradebook scores. No other class modifications are allowed.

Full
: TAs and instructors can modify the Gradebook, assignments, and many other class settings. Only a few settings cannot be modified, such as "Delete Class" and "Move Class."

When an instructor or TA shares a class with another instructor, the class will be displayed on the Home tab in ALEKS, with the instructor's name in italics.

NOTE. College administrators always have full access to all classes within the school. "Sharing" is not necessary with administrators.

6.6.11 Course Resources

Instructors can add Course Resources to their classes; these may be shared files and links to aid student learning. An example of a Class Resource is an online video that relates to a particular topic in ALEKS.

To upload a file:

1. Click on the "Course Resources" link. (The first time you click on this option, you will be prompted to agree to the terms of the ALEKS Course Resources.)
2. Click on the "Add Resource" button.
3. Enter the name for the resource.
4. Select the "Upload a file" option.
5. Click on the "Browse" button to upload a file into ALEKS.

6. Click on the "Add Resource" button.

After a file has been uploaded, you can edit its name. You can also delete the file or preview the file after uploading.

NOTE. The file upload size is limited to 4MB per file. The total amount of resources that instructors can upload in each class is limited to 30MB. Many file extensions are accepted for upload.

To add a link:

1. Click on the "Course Resources" link. (The first time you click on this option, you will be prompted to agree to the terms of the ALEKS Course Resources.)
2. Click on the "Add Resource" button.
3. Enter a name for the resource.
4. Select the "Paste a link" option.
5. Enter the URL in the textbox provided.
6. Click on the "Add Resource" button.

NOTE. Valid URLs must begin with **http**://, **https**:// or **www**. There is no limitation on the number of links that instructors can add as Course Resources.

When more than one resource has been added to a class, you can use the arrows in the "Reorder" column to move the resource into the desired position.

6.6.12 View all your Classes and Class Codes

The option to view all your classes and Class Codes displays a table showing each class, how many students are enrolled in the class, and the corresponding Class Code. ALEKS administrators will see all ALEKS classes, for each instructor at the college.

6.6.13 Create a New Instructor Account (Admin only)

Instructors with administrator privileges can create new instructor accounts using this link. Fill in the new instructor's name, email address, and instructor account type. The following is a list of instructor account types:

Instructor
: Can create, configure, and view their own classes only.

Instructor and Administrator
: Can create, configure, and view their own classes and those of other instructors; can create new instructor accounts.

TA (Instructor)

Has no classes of his or her own; can access only the classes of other instructors, based on access and permission levels that the other instructors provide through Share Class Access (Sec. 6.6.10).

6.6.14 Password Issues (Admin only)

The Password issues link allows ALEKS administrators to reset their own ALEKS password or any other instructor's password.

6.6.15 Instructor Account Preferences (Admin only)

ALEKS administrators can edit the accounts of other instructors using ALEKS. Along with the data that instructors can edit (Sec. 6.1.1), the administrator can also set the permissions for the instructor account (Sec. 6.6.13).

The Instructor Account Preferences screen has options relating to ALEKS messaging. These options can be set or adjusted for the instructor.

6.6.16 Move a Class from One Instructor to Another (Admin only)

ALEKS administrators can move a class from one instructor to a another instructor. This will move the ALEKS class and all the students enrolled in the class to the new instructor. Prior to clicking on "Move a Class from One Instructor to Another," verify that the class displayed in the "My Class" drop-down is the class you want to move. Next, click on "Move a Class from One Instructor to Another." This will display a list of instructors. Choose the instructor to whom you wish to move the class.

6.6.17 Delete an Instructor Account (Admin only)

You can delete an instructor who has no ALEKS classes by clicking on the link "Delete an Instructor Account." Select the name of the instructor you wish to delete. You will not be able to delete an instructor account if any classes are set up for that instructor, even if these classes contain no students; the classes should be deleted first.

Chapter 7

Advanced Instructor Module

The Advanced Instructor Module in ALEKS provides alternative, more efficient access to essentially the same features as are found in the Basic Instructor Module. The fundamental technique in using the Advanced Instructor Module is to choose a class, instructor, or student from the Selector window, then click on an action or operation from those offered underneath the Selector window (and organized by tab: "Home," "Reports," etc.). The action or operation will affect the account selected. Users with Administrator privileges have greater scope (Sec. 7.20).

For the most part, the actions carried out in the Advanced Instructor Module are identical to those in the Basic Module. This chapter will not repeat the details from the previous chapter, but rather provide references to the corresponding sections. There are some functions, however, that do not appear in the Basic Instructor Module. Here is a list for quick reference:

- Cleanup Tool (Sec. 7.2.2)
- Instructor Resources (Sec. 7.2.4)
- Course Options (Sec. 7.3.1)
- Duplicate Course (Sec. 7.3.3)
- Assessment Options (Sec. 7.9.1)
- Student Gradebook (Sec. 7.13)
- Request Assessment (Sec. 7.17.1)
- Cancel Current Assessment (Sec. 7.17.2)

Other functions exclusive to the Advanced Instructor Module are associated with the Administrator privilege level:

- Master Templates (Sec. 7.19)
- Edit College (Sec. 7.20.1)

- Search College (Sec. 7.20.2)
- LMS Integration (Sec. 7.20.3)
- Add Instructor (Sec. 7.20.4)
- Schedule Domain Upgrade (Sec. 7.20.8)
- Enrollment List (Sec. 7.20.9)
- Edit Subscription (Sec. 7.20.10)
- Server Reports (Sec. 7.20.11)

These areas are fully described in the current chapter.

7.1 Selector Window

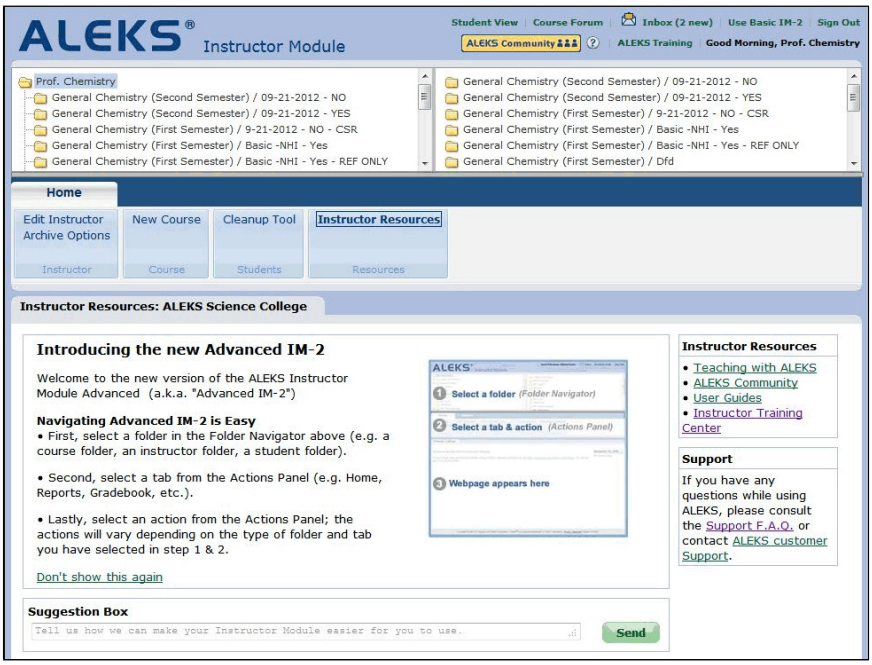


Figure 7.1: Selector Window and Instructor Resources

The Selector window is divided vertically into two sections (Fig. 7.1). Selecting any account in the left-hand or right-hand section displays contained accounts in the right-hand section. For example, selecting a class account displays the students contained in that class. The institution account contains instructors, the instructor account contains classes, and the class account contains students. Selecting any one of these displays the corresponding actions (organized by tab) in the space below the Selector. Only instructors with Administrator privileges can see accounts above the instructor level.

An alternative technique for navigating the Selector is to click the plus sign ("+") for any group to expand the group, or the minus sign ("-") for any group to collapse the group.

7.2 Instructor Folder

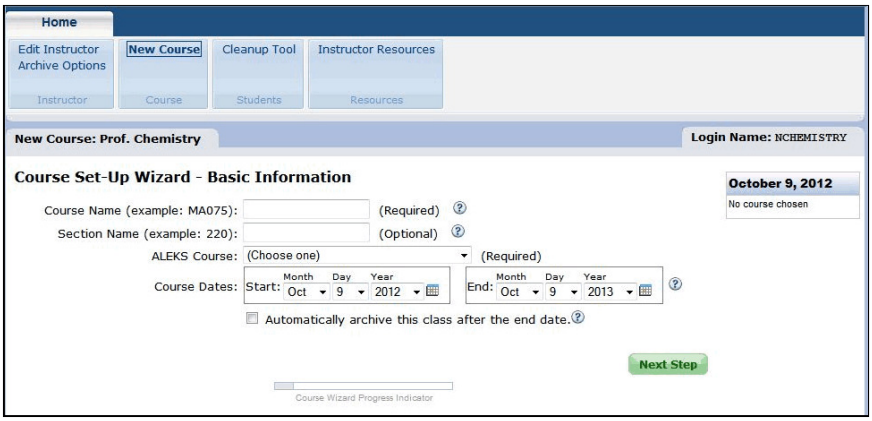


Figure 7.2: New Course

Selecting the Instructor account displays the following actions under "Home" (Fig. 7.2):

- Edit Instructor (Sec. 6.6.15 and Sec. 7.2.1)
- Archive Options (Sec. 6.1.7)
- Delete Account (Adminstrators only, and only when there are no classes or students for that instructor)
- New Course (Sec. 6.3)
- View Course Codes (Administrators only, Sec. 7.20.7)
- Cleanup Tool (Sec. 7.2.2)
- Send Message (Administrators only, Sec. 7.2.3)
- Instructor Resources (Sec. 7.2.4)

7.2.1 Edit Instructor

Clicking on "Edit Instructor" allows you to modify your instructor account data: name, title, password, email, log out time, and messaging options (Fig. 7.3).

Archive Account. Check this option to archive your ALEKS instructor account. If the option is checked, your Instructor Module display will not be affected. It will affect the administrator display, however, by moving your instructor folder (and classes) to the "Achived Instructors" folder.

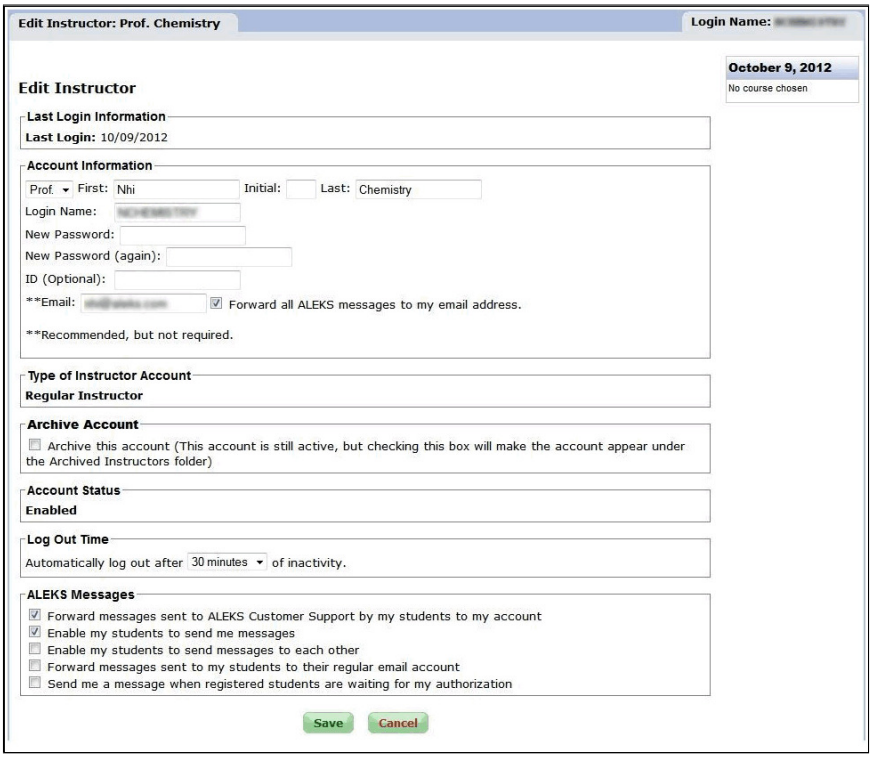


Figure 7.3: Edit Instructor

7.2.2 Cleanup Tool

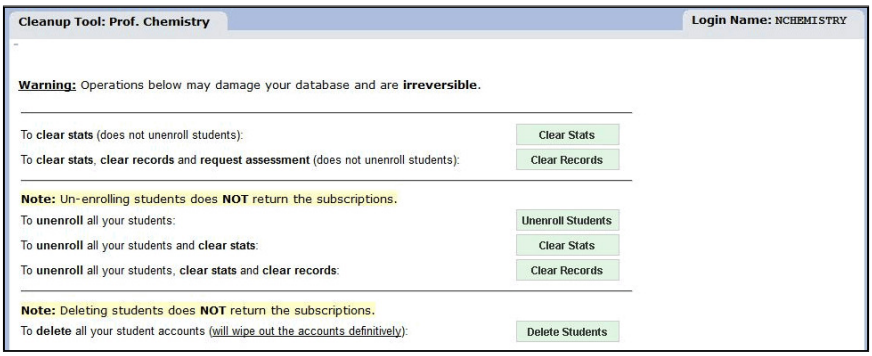


Figure 7.4: Cleanup Tool

The Cleanup Tool should be used with **extreme caution**. The actions shown here are not reversible and may cause great disruption to your class. Most instructors do not need to use these tools and can disregard them (Fig. 7.4).

- **Clear Stats** removes all records of time spent by your students in the system,

along with any statistics that involve time.

- **Clear Records** removes all records of student work.
- **Unenroll Students** removes all student accounts from your class.
- **Clear Stats** (second) removes all records of time spent by your students in the system, along with any statistics that involve time, and unenrolls them.
- **Clear Records** (second) removes all records of student work and unenrolls them.
- **Delete Students** destroys the students' accounts.

In particular, when these tools are used with the instructor account selected, they will have effect for all classes under that instructor. This kind of cleanup is **very risky** and seldom needed.

7.2.3 Send Message

Clicking on this link enables you to send messages to different ALEKS users depending on the level from which it is accessed under the Home tab. Selecting the class folder and then clicking "Send Message" will send the message to the entire class. Selecting a student's name and then clicking "Send Message" will send the message to the selected student. An instructor can check the box next to "Mark as urgent" if desired. When students receive a message marked as urgent, they will see "Urgent Message" displayed above their ALEKS INBOX icon. If you have Administrator privileges in ALEKS, clicking on an instructor's folder and then "Send Message" will send the message to that instructor.

7.2.4 Instructor Resources

This link provides convenient access through the Instructor account to a set of informational and training resources (also available directly from the ALEKS web site) (Fig. 7.1).

7.3 Course Home

Selecting a class account and clicking the "Home" tab displays the following actions (Fig. 7.5):

- Edit Course (Sec. 6.3)
- Course Options (Sec. 7.3.1)
- Advanced Options (Sec. 7.3.2)
- Actions (Sec. 7.3.3)
- Textbook Selection (Sec. 6.3.2)

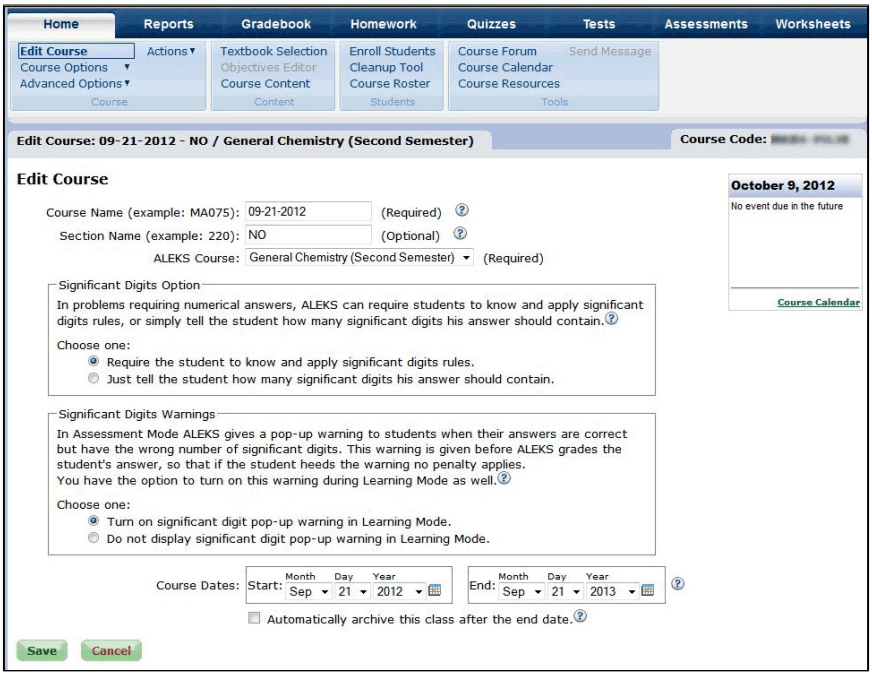


Figure 7.5: Edit Course

- Objectives Editor (Sec. 6.3.3)
- Course Content (Sec. 6.3.4)
- Enroll Students (Sec. 7.3.4)
- Cleanup Tool (Sec. 7.2.2)
- Financial Aid Code (Sec. 6.6.8)
- Course Roster (Sec. 6.6.1)
- Course Forum (Sec. 6.1.3)
- Class Calendar (Sec. 6.4.13)
- Class Resources (Sec. 6.6.11)
- Send Message (Sec. 7.2.3)

7.3.1 Course Options

Clicking on Class Options gives you the following choices:

Access Options

These options allow you to close enrollment in the class or constrain the students' access to it: Regular (assessment and learning), or Denied (no access). This screen also allows you to close or open enrollment in the class.

Learning Options

These options allow you to choose the learning options available to students and ask for notification (to yourself and to the student) of Objective completion. See Sec. 6.3.2 for a description of Chapters and Objectives.

Archive Options

This option allows instructors to archive their own classes. After selecting this option, instructors check the box next to "Archive this class" and then click on the "Save" button. An "Archived Classes" folder will appear at the bottom of the instructor's class list. Clicking on the "+" sign will expand the "Archived Classes" folder.

To unarchive a class, first navigate to "Archived Classes" and then select a class folder. Click on "Edit Class" and choose Archive Options. Uncheck the box next to "Archive this class" and click on the "Save" button.

7.3.2 Advanced Options

The items on the Advanced Options link are all comprehensively discussed in the previous chapter.

- Share Class Access (Sec. 6.6.10)
- Student Groups (Sec. 6.6.9)

7.3.3 Actions

Selecting the Actions link displays the following operations:

New Course. See Sec. 6.3 for a detailed explanation of how to use the Course Set-Up Wizard.

Move Course. To move a class, select the instructor who is going to teach the class. This option is available only to instructors with Administrator privileges.

Delete Course. This link will only be available if no students are enrolled in the class.

Duplicate Course. Use this link to create a duplicate of the selected class. After duplication, you will be able to modify the new class in any way you wish. This is a good, time-saving way to create multiple sections based on a class, especially when there has been much customization to the master or template class. For instructors with Administrator privileges, see also Master Templates, Sec. 7.19.

7.3.4 Enroll Students

Using this link, you can click on a class in the Selector window to see a list of students currently enrolled at the college. Students highlighted in grey are enrolled in the current

class. Students highlighted in green are enrolled in another class. Instructors with Administrator privileges will also see any students not highlighted in any color, who are unenrolled. Instructors without Adminstrator privileges therefore are unable to enroll students, but they can move enrolled students from another class into the current class.

7.4 Reports

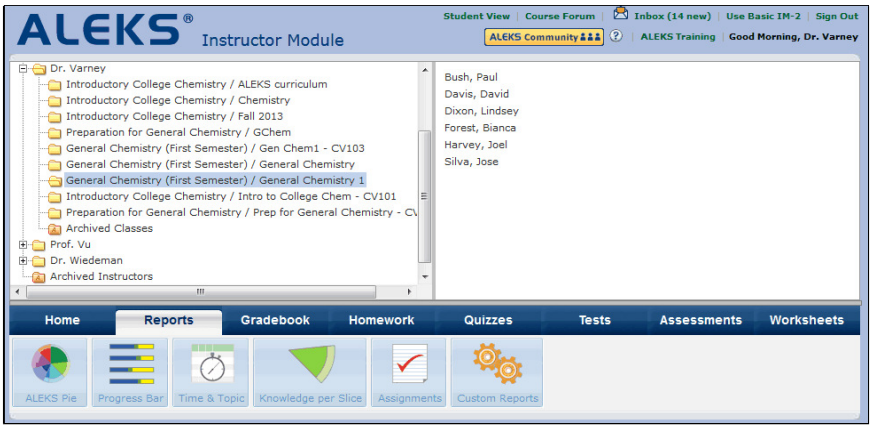


Figure 7.6: Report Options

Selecting a class account and clicking the "Reports" tab will display icons for the available reports in the blue navigation bar (Fig. 7.6). Hovering over an icon will display a description of the report.

7.4.1 Class Reports

If instructors want to run a class report, for example the ALEKS Pie report, they first select the class name folder, and then click on the "Reports" tab. Finally, they click on the ALEKS Pie icon.

7.4.2 Individual Student Reports

If instructors want to run an individual student report, for example the ALEKS Pie report, they first select the class name folder, then click on the name of the student for whom they want to run the report. Then, they click on the "Reports" tab. Finally, they click on the ALEKS Pie icon.

7.4.3 Available Reports

The reports are organized by the following report types:

- ALEKS Pie (Secs. 6.2.6, 6.2.7)
- Progress Bar (Secs. 6.2.8- 6.2.12)
- Time and Topic (Sec. 6.2.13)
- Knowledge Per Slice (Sec. 6.2.14)
- Assignments (Sec. 6.2.15- 6.2.17)
- Custom Reports (Sec. 6.2.18)

7.4.4 Assign Learning Rates

Some of the report styles in the Advanced Instructor Module have a link in the upper right of the screen, "Assign Learning Rates." This link will bring you to a page where you can set three types of "grading" scales for the students' work. If they are used, the values will appear on relevant report pages. The three types of "grading" scales are: percentage of class goals mastered, total hours spent in ALEKS, and the average items gained per hour of use. Note that this feature is unrelated to the ALEKS Gradebook and does not feed data to the Gradebook (Sec. 6.5). For additional information on Assign Learning Rates, see Sec. 8.13.

7.5 Course Gradebook

Selecting a class account and clicking the "Gradebook" tab displays the following actions (Fig. 7.7):

- Course Gradebook (Sec. 6.5)
- Gradebook Setup (Sec. 6.5.5)
- Gradebook Log (Sec. 6.5.4)
- External Assignments Weights (Sec. 6.5.2)
- Edit External Assignments (Sec. 6.5.2)
- Add External Assignment (Sec. 6.5.2)

Please see Sec. 6.5 for a complete discussion of the Gradebook features.

7.6 Class Homework

Selecting a class account and clicking the "Homework" tab displays the following actions (Fig. 7.8):

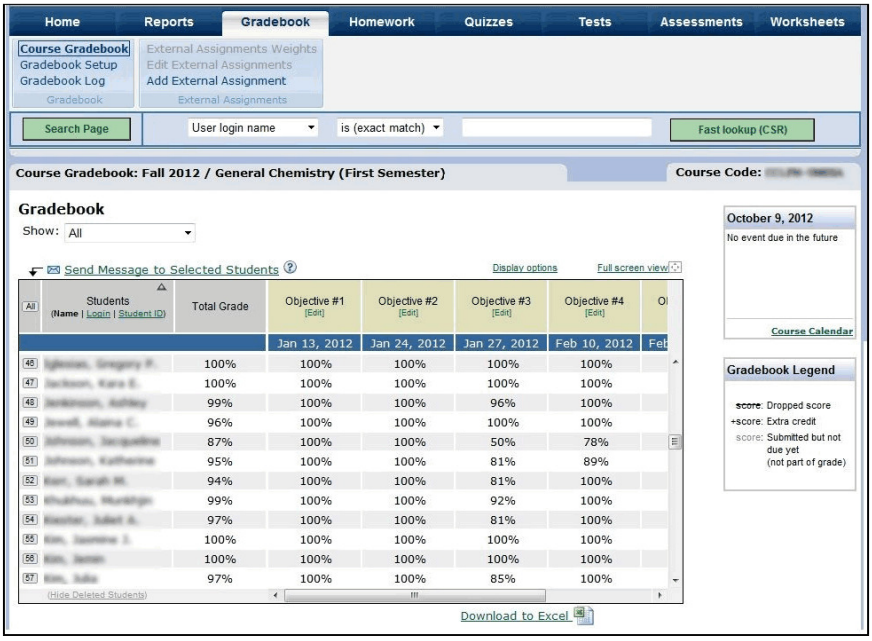


Figure 7.7: Gradebook Weighting

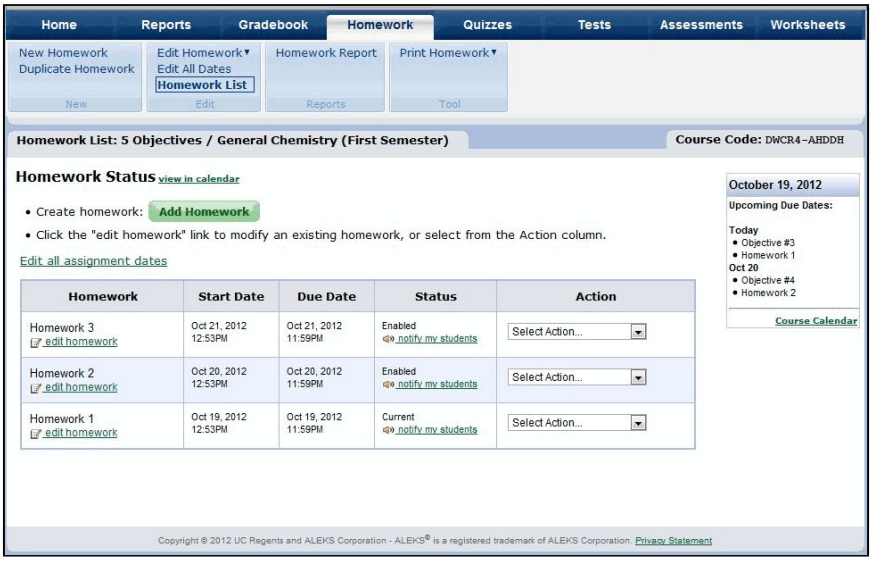


Figure 7.8: Homework List

- New Homework (Sec. 6.4.2)
- Duplicate Homework (Sec. 7.6.1)
- Edit Homework (Sec. 6.4.8)
- Edit All Dates (Sec. 6.4.11)
- Homework List (Sec. 6.4.1)
- Homework Report (Sec. 6.2.16)
- Print Homework (Sec. 7.6.2)

Please see Sec. 6.4 for detailed information on how to create Homework assignments in ALEKS.

7.6.1 Duplicate Homework

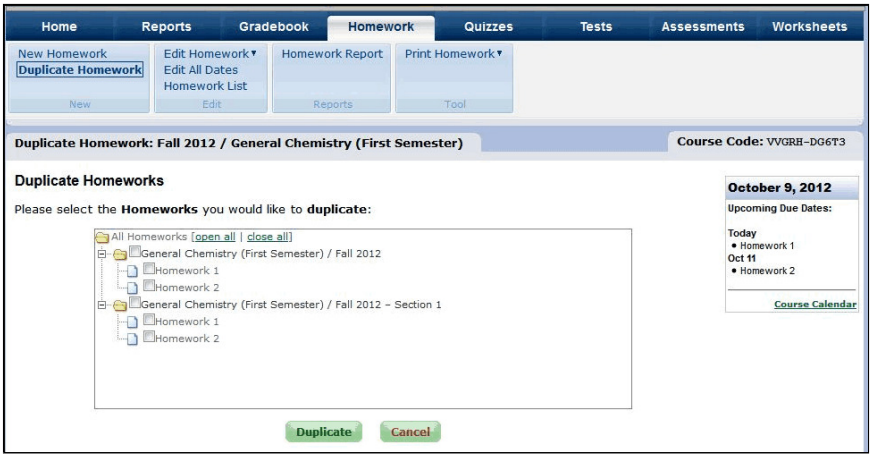


Figure 7.9: Duplicate Homework

To duplicate a Homework assignment previously created in ALEKS, click "Duplicate Homework." From the folders provided, select the Homework to be duplicated (Fig. 7.9). The Homework assignment will be created in the current class and can then be modified. Instructors who are ALEKS Administrators have the option to duplicate Homework from other instructors' classes.

7.6.2 Print Homework

ALEKS allows you to print up to five different instances of a Homework (Fig. 7.10). This may be useful if the Homework is to be taken without computers, or if a printed version is needed for any other reason. The Homeworks are created in PDF format and may take up to a minute to generate.

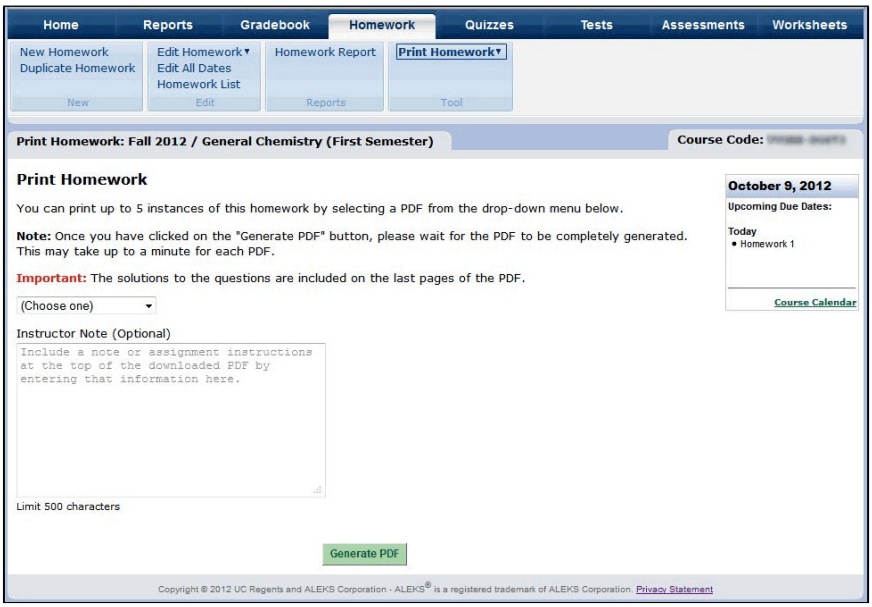


Figure 7.10: Print Homework

7.7 Class Quizzes

Selecting a class account and clicking the "Quizzes" tab displays the following actions:

- New Quiz (Sec. 6.4.2)
- Duplicate Quiz (Sec. 7.6.1)
- Edit Quiz (Sec. 6.4.8)
- Edit All Dates (Sec. 6.4.11)
- Quiz List (Sec. 6.4.1)
- Quiz Report (Sec. 6.2.16)
- Print Quiz (Sec. 7.6.2)

Please see Sec. 6.4 for detailed information on how to create a Quiz in ALEKS.

7.8 Class Test

Selecting a class account and clicking the "Tests" tab displays the following actions:

- New Test (Sec. 6.4.2)
- Duplicate Test (Sec. 7.6.1)
- Edit Test (Sec. 6.4.8)

- Edit All Dates (Sec. 6.4.11)
- Test List (Sec. 6.4.1)
- Test Report (Sec. 6.2.16)
- Print Test (Sec. 7.6.2)

Please see Sec. 6.4 for detailed information on how to create a Test in ALEKS.

7.9 Class Assessments

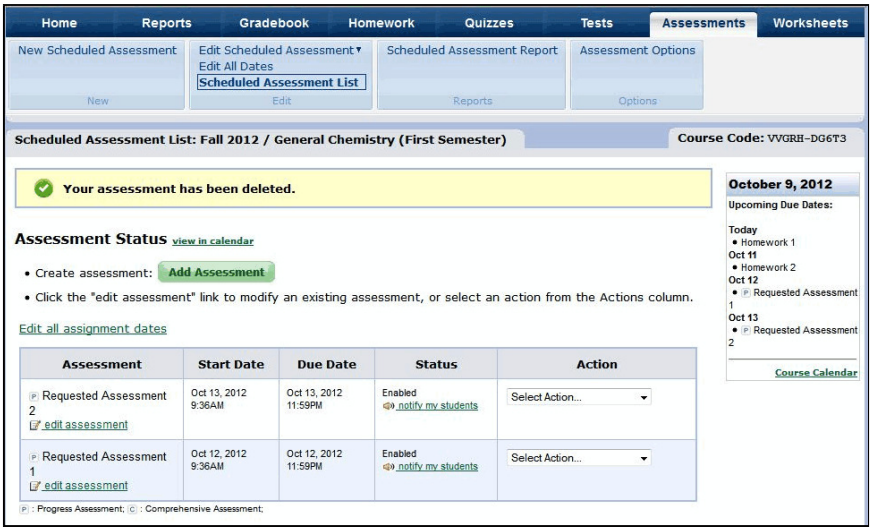


Figure 7.11: Scheduled Assessment List

Selecting a class account and clicking the “Assessments” tab displays the following actions (Fig. 7.11):

- New Scheduled Assessment (Sec. 6.4.9)
- Edit Scheduled Assessment (Sec. 6.4.9)
- Edit All Dates (Sec. 6.4.11)
- Scheduled Assessment List (Sec. 6.4.1)
- Scheduled Assessment Report (Sec. 6.2.17)
- Assessment Options (Sec. 7.9.1)

7.9.1 Assessment Options

It is possible to restrict assessments to the college network if desired. For this to take effect, the campus IP addresses must be entered in ALEKS (Sec. 7.20.1).

By default, you will be notified if any student assesses at 100% in your class material. This may be an indication that the student has substantially completed the material and can be moved to a higher-level class. However, you can adjust the percentage used here to some degree.

In classes where Objectives are not in use, instructors can modify the parameters of Progress Assessments by changing the number of items learned.

7.10 Class Worksheets

Selecting a class account and clicking the "Worksheets" tab displays Worksheet Options. See Sec. 6.4.12 for a description of the Worksheet Options.

7.11 Student Home

Selecting a student account and clicking the "Home" tab displays the following actions:

- Edit Student (Sec. 6.6.2)
- Unenroll from class (Sec. 7.11.2)
- Cleanup Tool (Sec. 7.2.2)
- Course Forum (Sec. 6.1.3)
- Course Calendar (Sec. 6.4.13)
- Send Message (Sec. 6.1.4)

7.11.1 Move Student by Drag and Drop

Individual students can be moved from one class to another using drag and drop. Click on the student you would like to move, hold the mouse button down, move the student to the class you would like them to be in, and then release the mouse button.

If you move a student into a new class, when the difference between the Start Date of the two classs is less than or equal to 30 days and both ALEKS classs are the same:

- The student will appear in the new class
- The student and her progress will no longer appear in the old class

If you move a student into a new class when the difference between the Start Date of the two classs is greater than 30 days or both ALEKS classs are different:

- The student will appear in the new class; this will be a new account
- The student and her progress will still appear in the old class

7.11.2 Unenroll from Class

This action enables you to unenroll the selected student from the class. Click "Confirm" to complete the process.

7.12 Student Report

Selecting a student account and clicking the "Reports" tab displays the following actions:

- ALEKS Pie (Sec. 6.2.7)
- Progress Bar (Sec. 6.2.12)
- Time & Topic (Sec. 6.2.13)
- Knowledge Per Slice (Sec. 6.2.14)
- Assignments (Sec. 6.2.15)

All actions listed here are links to other parts of the Instructor Module.

7.13 Student Gradebook

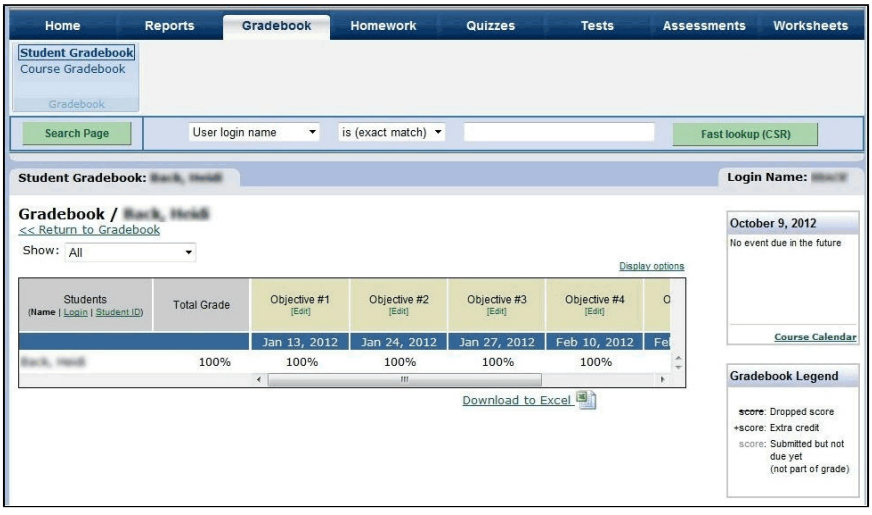


Figure 7.12: Student Gradebook

Selecting a student account and clicking the "Gradebook" tab displays the following actions (Fig. 7.12):

- Student Gradebook (Sec. 6.5)
- Class Gradebook (Sec. 6.5)

The Student Gradebook view provides detailed information on grades for the student selected (Fig. 7.12). The features are similar to those for the class Gradebook, but for a single student only. The Class Gradebook can also be accessed from this tab.

7.14 Student Homework

Selecting a student account and clicking the "Homework" tab displays the following actions:

- New Homework (Sec. 6.4.2)
- Duplicate Homework (Sec. 7.6.1)
- Edit Homework (Sec. 6.4.8)
- Homework List (Sec. 6.4.1)
- Homework Report (Sec. 6.2.16)

Please see each section referenced for more details.

7.15 Student Quizzes

Selecting a student account and clicking the "Quizzes" tab displays the following actions:

- New Quiz (Sec. 6.4.2)
- Duplicate Quiz (Sec. 7.6.1)
- Edit Quiz (Sec. 6.4.8)
- Quiz List (Sec. 6.4.1)
- Quiz Report (Sec. 6.2.16)

Please see each section referenced for more details.

7.16 Student Tests

Selecting a student account and clicking the "Tests" tab displays the following actions:

- New Test (Sec. 6.4.2)
- Duplicate Test (Sec. 7.6.1)
- Edit Test (Sec. 6.4.8)
- Test List (Sec. 6.4.1)
- Test Report (Sec. 6.2.16)

Please see each section referenced for more details.

7.17 Student Assessments

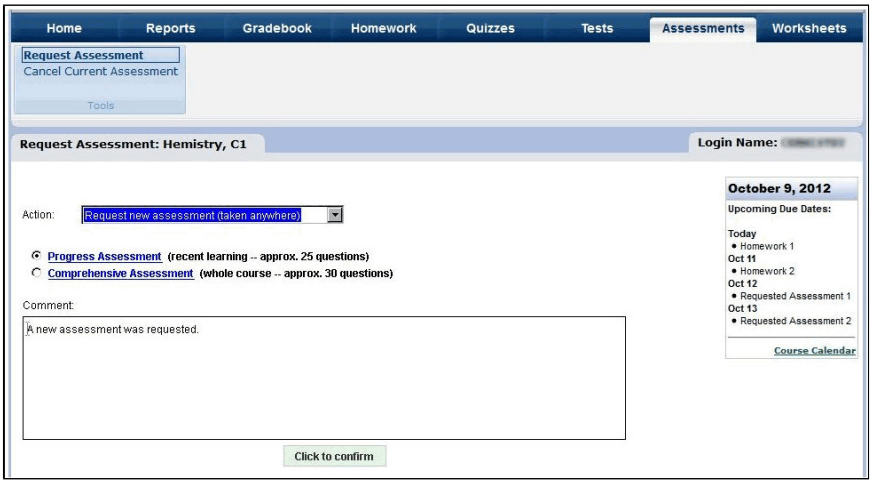


Figure 7.13: Request Assessment

Selecting a student account and clicking the "Assessments" tab displays the following actions (Fig. 7.13):

- Request Assessment (Sec. 7.17.1)
- Cancel Current Assessment (Sec. 7.17.2)

7.17.1 Request Assessment

This button enables you to request an assessment for a single student, effective immediately. Choosing "Progress Assessment" produces an assessment focusing on the student's most recent learning. Choosing "Comprehensive Assessment" produces a slightly longer, more probing assessment of the student's overall mastery of class materials. You can choose, via the drop-down action menu, where the student takes the assessment. If your college has IP addresses in place at the school level, you can restrict the assessment

to be taken on campus (Sec. 7.20.1). The comment box allows the instructor to type a message that the student will see when they log in to take the assessment.

7.17.2 Cancel Current Assessment

Using this tool will cancel any current or pending assessment for the student, until midnight of that day. An automatic reassessment that is cancelled in this way will become active again on the following day.

7.18 Student Worksheets

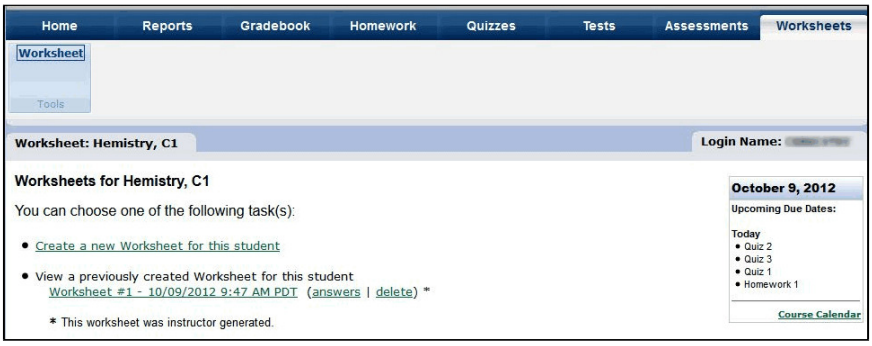


Figure 7.14: Worksheet

Selecting a student account and clicking the "Worksheets" tab displays the Worksheet action (Fig. 7.14). See Sec. 6.4.12 for a description of the Worksheets feature.

7.19 Master Templates

The Master Template provides an efficient way to create and control class instances based on a master class. Instructors who have Administrator privileges can create a Master Template, add assignments, and create any number of linked classes based on the Master Template. Instructors teaching the linked classes can edit their individual class settings and assignments, and add their own assignments (unless "Lockout" is used; see Sec. 7.19.4).Changes made subsequently to the Master Template will propagate to the linked classes, overriding pevious settings as well as changes made by individual instructors. If this feature is not available in your account, please contact ALEKS Customer Support to request that it be enabled.

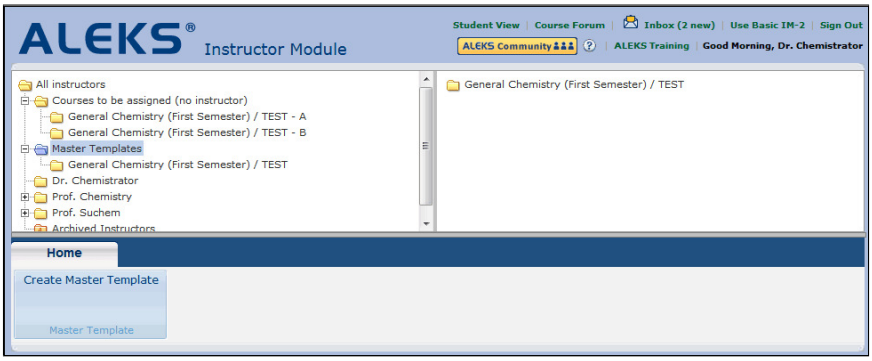


Figure 7.15: Master Template Home

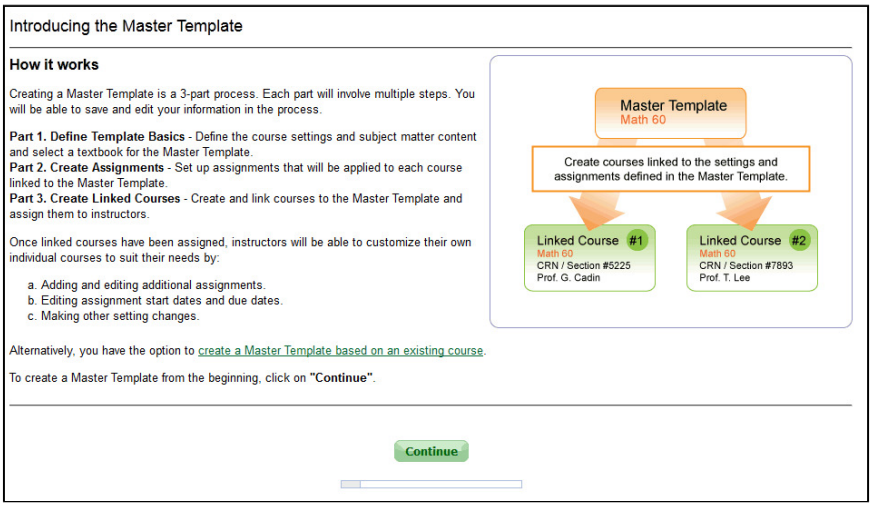


Figure 7.16: Getting Started

7.19.1 Getting Started

Selecting the purple "Master Templates" folder from the Selector window and clicking the "Home" tab displays the "Create Master Template" option (Fig. 7.15).

Clicking this action will give you two options to create a Master Template (Fig. 7.16). From the introductory page, you can choose to:

- Create a Master Template from scratch. This option allows you to customize your own class settings and assignments. Click "Continue" to "Define Template Basics" (Sec. 7.19.3).
- Create a Master Template based on an existing class at your institution. This timesaving option allows you to copy all class settings and assignments from the existing class into the new Master Template. Click "create a Master Template based on an existing class" to start the process (Sec. 7.19.7).

Creating a Master Template is a three-part process. After the Master Template is created, Administrators can view it under the purple Master Templates folder in the Selector window. The template is listed as ALEKS Class / Master Template Name.

7.19.2 Master Template Summary

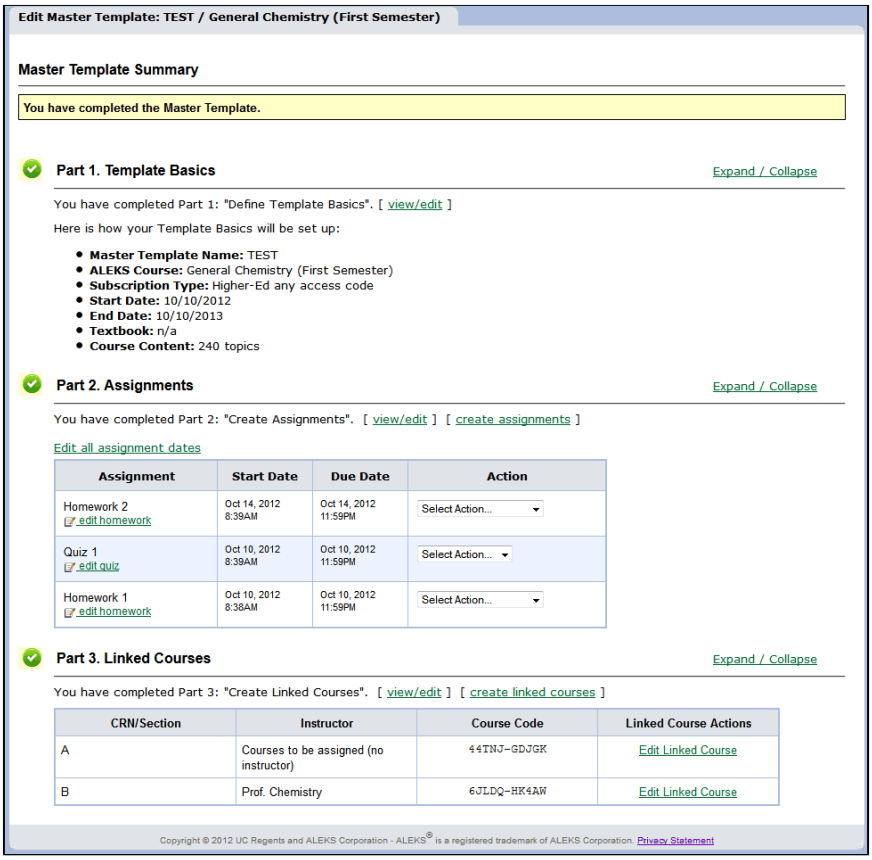


Figure 7.17: Master Template Summary

The Master Template Summary page may be used as a guideline to show which parts have been completed or require completion (Fig. 7.17). At the end of each part, Administrators can view or return to the Master Template Summary page by clicking on "View Master Template Summary." Administrators can view or edit any part by selecting the appropriate link.

7.19.3 Define Template Basics

Part 1 of the Master Template creation process is Define Template Basics. This part allows you to select the ALEKS course product and textbook, edit the content, and

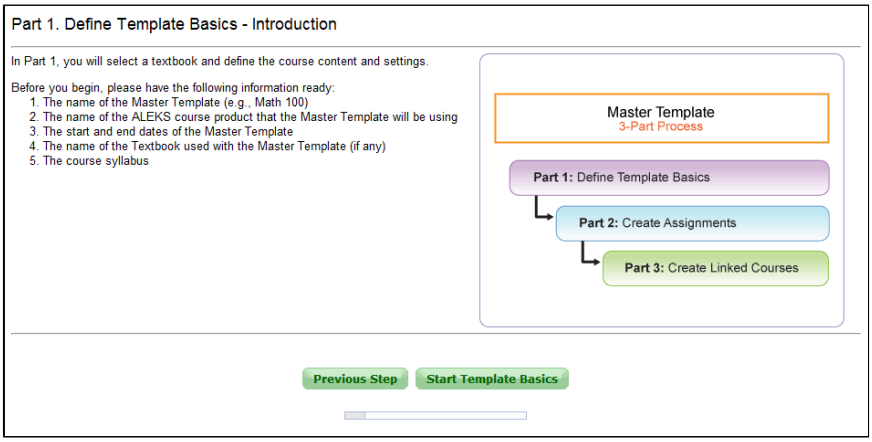


Figure 7.18: Define Template Basics

define other class settings. Select the "Start Template Basics" button to configure the following areas (Fig. 7.18):

Basic Information

- The Master Template is required to have a name; this name can be the name appearing in your institution's class catalogue or anything else you wish. The Master Template name will be a part of the linked classes' names. ALEKS Class is the course product that will be used.
- ALEKS provides options relating to Significant Digits when creating the Master Template. ALEKS can be set to let students know how many significant digits should be included in their answers. Additionally there is an option to turn on a pop-up warning, in Learning Mode, warning the students that their answer is correct but has the incorrect number of significant digits.
- Class Dates are used to configure the Class Calendar, and should include the entire period of time that the students will be using ALEKS. All linked classes created with this Master Template will have the same Start and End dates. The option to automatically archive the linked class is also available at this step (Sec. 6.1.7).

Textbook Integration, Custom Objectives, and Modules

- For complete details, see Sec. 6.3.2.

Edit Content

- For complete details, see Sec. 6.3.4.

Within the "Part 1. Define Template Basics - Review and Save" screen, you can make changes by clicking on the "edit" link next to each item or click on "Previous Step." Click on "Save" to finalize your settings.

7.19.4 Additional Options in Part 1

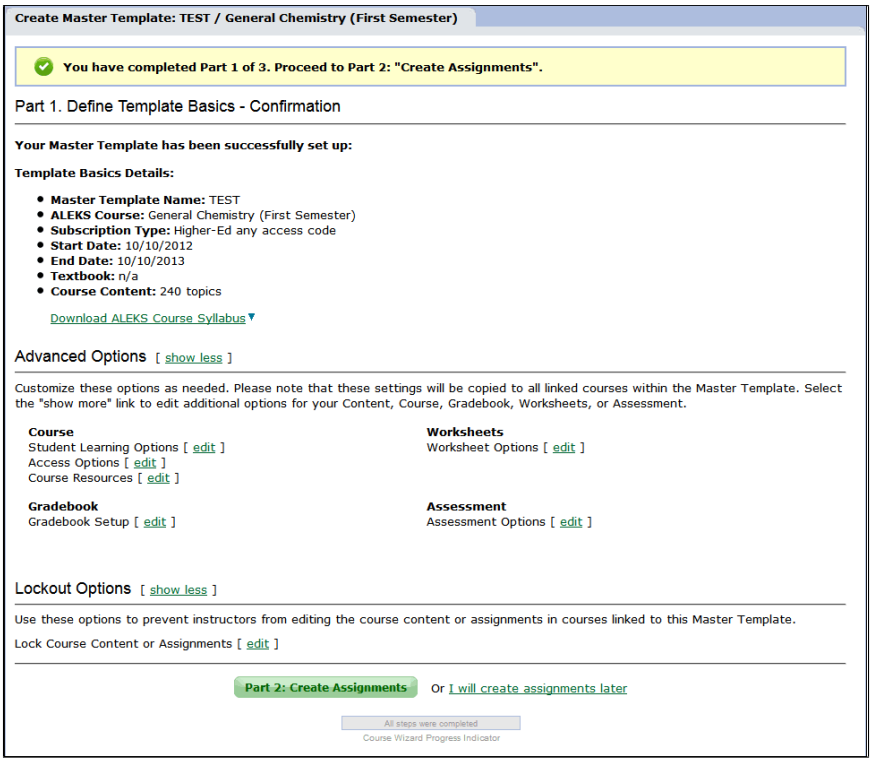


Figure 7.19: Define Template Basics (confirmation)

Once you have completed Part 1 of the Master Template creation process, the confirmation screen will display the following options (Fig. 7.19):

Download ALEKS Class Syllabus

Click this link to see a detailed summary of your class as it has been configured. You can download this information in HTML or PDF format.

Advanced Options

Click the "show more" link to view other relevant options for the Master Template, under Class, Gradebook, Worksheets, or Assessment. Customizing the settings for these options in the Master Template will apply to all linked classes. Instructors can then edit these settings for their individual classes. Click "edit" next to each option to customize the setting as needed:

- Student Learning Options (Sec. 7.3.1)
- Access Options (Sec. 7.3.1)
- Course Resources (Sec. 6.6.11)
- Gradebook Setup (Sec. 6.5.5)

- Worksheet Options (Sec. 6.4.12)
- Assessment Options (Sec. 7.9.1)

Lockout Options

Click on "show more" and then the "edit" link to view options to prevent instructors from editing the class content or assignments in classes linked to the Master Template.

- **Class Content**. If this option is selected, instructors of linked classes cannot edit the class content for their linked classes. Additionally, if adminstrators use textbook integration or Objectives with the Master Template, instructors of linked classes can edit the due dates for each objective, but cannot edit the content within an objective.
- **Assignments**. If this option is selected, instructors of linked classes cannot edit or delete their assignments linked to the Master Template. However, they can adjust the dates for these assignments and also create additional assignments for the linked classes.

NOTE. If Administrators want to create External assignments in the Master Template, they can do this after clicking on the "[edit]" link by "Gradebook Setup." Only the assignment name and date can be set at the Master Template level; the student grades and maximum point values are set at the linked class level.

At the bottom of this confirmation screen, you have the option to continue to Part 2 of the Master Template creation process to create assignments, or you can do this at another time. Selecting the "I will create assignments later" link takes you to the Master Template Summary page. Selecting the "Part 2: Create Assignments" button takes you to Part 2. Create Assignments - Introduction page.

7.19.5 Create Assignments in Master Template

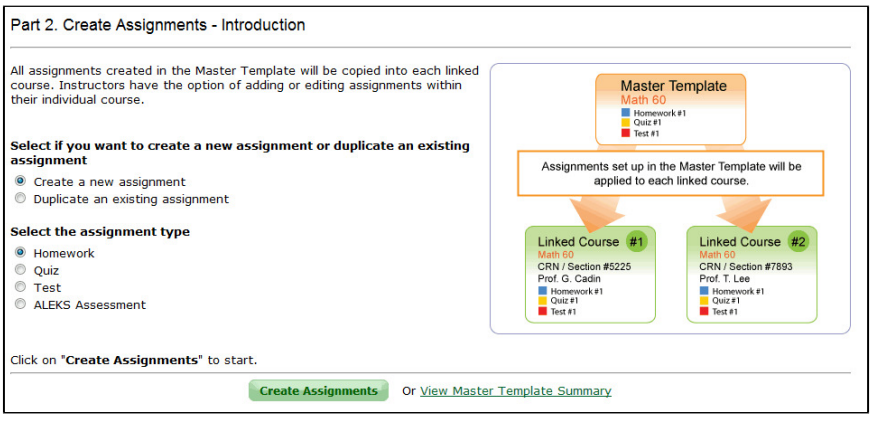


Figure 7.20: Create Assignments in Master Template

Part 2 of the Master Template creation process is Create Assignments. This part allows you to create assignments in the Master Template. From the "Part 2: Create Assignments - Introduction" screen, you will see two options for creating an assignment (Fig. 7.20):

- **Create a new assignment**. This option takes you through the ALEKS assignment creation process (Sec. 6.4).
- **Duplicate an existing assignment**. This option allows you to duplicate an existing assignment (Sec. 7.6.1).

You must specify the assignment type that you wish to create or duplicate, such as Homework, Quiz, Test, or ALEKS Assessment.

After creating assignments, you will see an Assignment list with the assignments created in the Master Template. You have the options to change the display of assignment categories, create another assignment, and edit, disable, duplicate, print, or delete an assignment. You also have the option to create linked classes in Part 3 of the Master Template creation process. To do this, click the "Part 3: Create Linked Classes" button. Otherwise, click on "View Master Template Summary."

7.19.6 Create Linked Classes

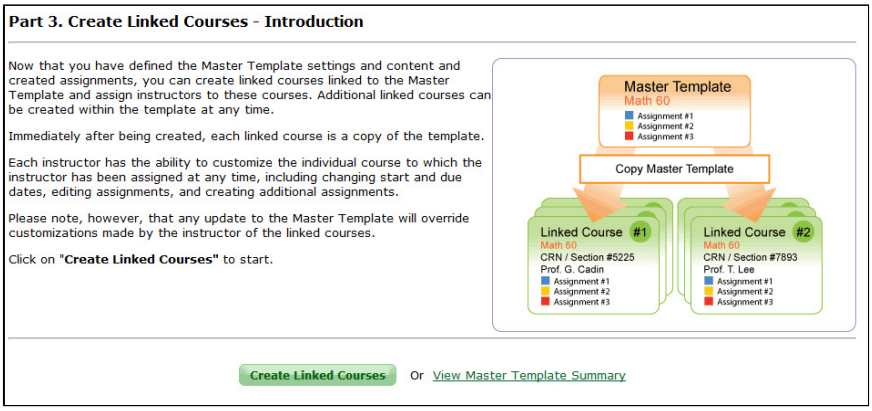


Figure 7.21: Create Linked Classes

Part 3 of the Master Template creation process is Create Linked Classes. A linked class contains the same content and settings as the Master Template. Once a linked class is created, all existing class settings and assignments from the Master Template will be applied to the linked class. Both the Administrator and the instructor assigned to the class will receive a message in their ALEKS Message Center (Inbox) containing important information about the linked classes.

To start adding linked classes, from the introductory page of Part 3, click on the "Create Linked Classes" button (Fig. 7.21).

On the "Assign Instructor to Linked Classes" page, enter the name of the Class CRN/Section and assign an instructor to the individual linked class. (The name of the linked class will consist of the name of the template plus the name of the CRN/Section.) There are three options for the "Instructor" field:

Existing ALEKS Instructor

Select this option and then use the drop-down menu to select the name of the Instructor teaching the linked class.

Instructor to be announced (TBA)

Select this option if the name of the instructor is unknown. The linked class can be assigned at another time (Sec. 7.19.11).

Create a new Instructor

Select this option if the instructor does not have an existing ALEKS account. Enter the title, first and last name, and e-mail address of the Instructor teaching the linked class. ALEKS will send an email message containing login information to the instructor. If an email address is not provided, the Administrator will need to edit the instructor account, change the password, and send it to the instructor at another time (Sec. 6.6.15).

A maximum of 15 linked classes can be created at a time. To add more linked classes, click the "Create another Linked Class" button. Click the "Save" button to finish creating the new linked class(s).

NOTE. There is no limit on the number of linked classes you can associate with a Master Template. To add more than 15 linked classes, you must return to the Master Template Summary screen by selecting "Edit Master Template."

At the end of Part 3, you will see a confirmation page with the linked classes created in the Master Template. You can create another linked class, edit the linked classes, or complete the Master Template set-up process by clicking "I am done creating linked classes."

7.19.7 Create a Master Template Based on an Existing Class

After clicking on "create a Master Template based on an existing class," use the drop-down menu to select an existing class, and then click on "Create Master Template" (Fig. 7.22). The class template basics will show up in Part 1 and the assignments that were copied from the existing class will be in Part 2. Administrators can click on "Go to Master Template Summary" to create linked classes in Part 3.

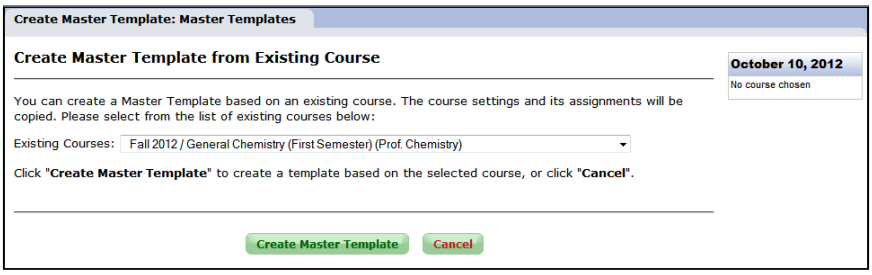


Figure 7.22: Create Master Template Based on Existing Class

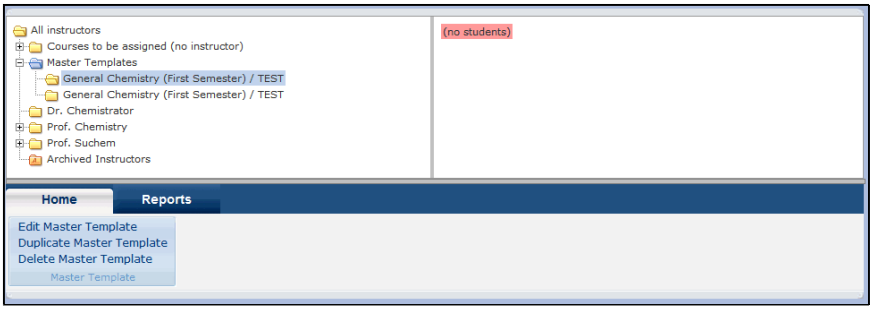


Figure 7.23: Manage Master Template

7.19.8 Edit Master Template

Selecting a Master Template class and clicking the "Edit Master Template" link (under "Home," Fig. 7.23) will take Administrators to the Master Template Summary page to modify the class basic settings, assignments, or linked classes.

The effects of editing a Master Template are as follows:

- Edits to the Master Template will apply automatically to all linked classes under the Master Template.
- Updates to the Master Template will override customizations made by the instructors of the linked classes.
- Instructors will receive a message in their ALEKS Message Center (Inbox) when an Administrator has made a change to the Master Template.

Use the "Expand/Collapse" link to view all the details of each part of the Master Template, or use the "view/edit" link to customize specific settings. You can also add more assignments by selecting "Create Assignments" or add more linked classes by selecting "Create linked classes."

7.19.9 Duplicate Master Template

Selecting a Master Template class and clicking the "Duplicate Master Template" link (under "Home," Fig. 7.23) is a quick and easy way to create a new Master Template. This action will duplicate Parts 1 and 2 of the Master Template creation process.

The settings that will be duplicated are:

- Content Editor
- Textbook Integration
- Grading
- Assignments
- Other Miscellaneous class options

Once the Master Template is duplicated, Administrators will need to create linked classes, assign instructors, and change the class start and end dates and assignment dates.

7.19.10 Delete Master Template

Selecting a Master Template class and clicking the "Delete Master Template" link (under "Home" Fig. 7.23) will remove the selected template from the system.

The effects of deleting the Master Template are:

- The deletion will not delete any classes linked to the Master Template.
- Settings in any of the linked classes will not be affected by the deletion.
- A message will be sent to the instructors of the linked classes saying that the Master Template has been deleted.

To proceed with the deletion, click the "Confirm" button.

7.19.11 Classes to be Assigned

The "Classes to be assigned (no instructor)" folder in the selector pane contains linked classes that were set to "Instructor to be announced (TBA)" (Fig. 7.24). Click on the "+" sign to expand the folder, and then click on the name of the linked class to assign an instructor.

Under the Home tab, click on "Actions" and then choose the "Move Class" option. Select the instructor who is going to teach the class.

Once a linked class has been assigned, the instructor assigned to the class will receive a message about the new class information in their ALEKS Message Center (Inbox).

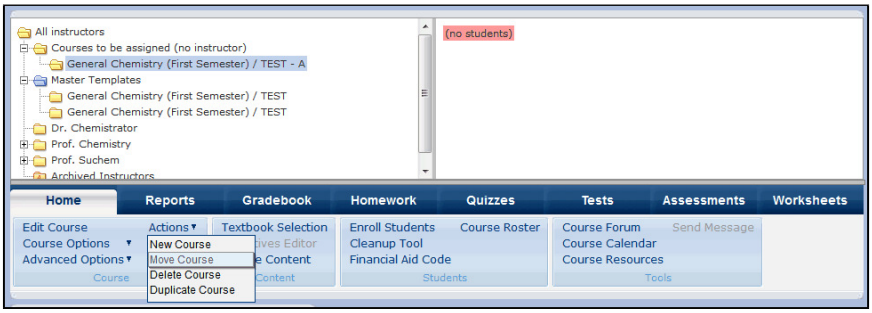


Figure 7.24: Classes to be Assigned

Instructors will be able to view and edit their linked classes after selecting their folder name. The Master Template name will be part of the linked Class Name; instructors can view this information by clicking on "Edit this Class" in the Basic Module and "Edit Class" in the Advanced Instructor Module.

7.19.12 Master Template Reports

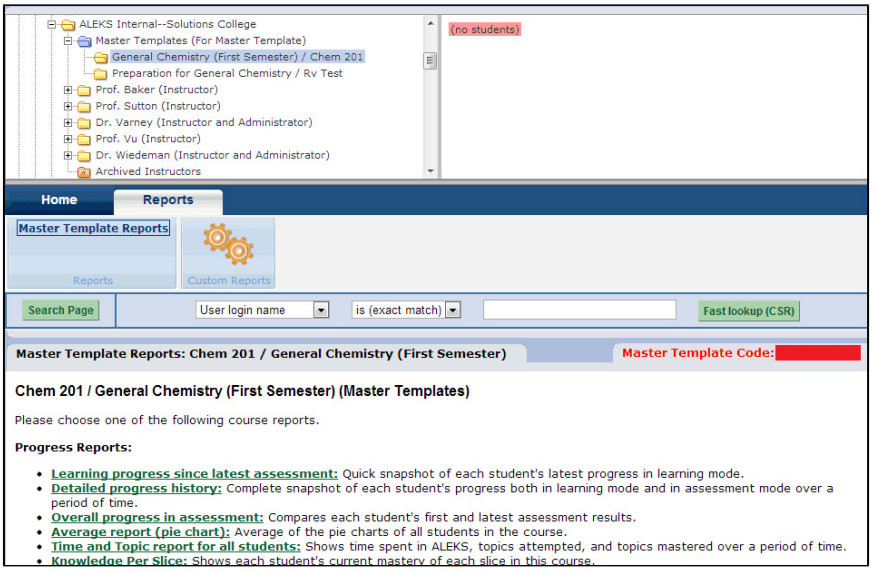


Figure 7.25: Master Template Reports

Administrators can run reports quickly and easily at the Master Template level using the Master Template Reports feature. This feature allows Administrators to generate a single report for all classes linked to a Master Template.

For each Master Template in use:

- Administrators can select from a variety of report options.

- ALEKS will generate the report and email it to the Administrator as an Excel attachment.
- The report will include the students' names, instructors' names, class sections, and the relevant report data.

To access the Master Template reports (Fig. 7.25):

1. From the Selector window, click on the "+" next to the purple "Master Templates" folder.
2. Select the Master Template for which you wish to run reports.
3. Under the Reports tab, click on the "Master Template Reports" link.
4. You will see a list of available reports. Click on the link of the report you would like to generate.
5. Click on the "Email me the report" button. Alternatively, you can click on the "Email me the report" button directly from the Sample Report window after selecting the "Example" link.

At the end of the process, you will see a confirmation message letting you know that the request is being processed.

NOTE. Blank Excel attachments will be generated if linked classes to a Master Template do not contain students.

7.20 Administrator Account

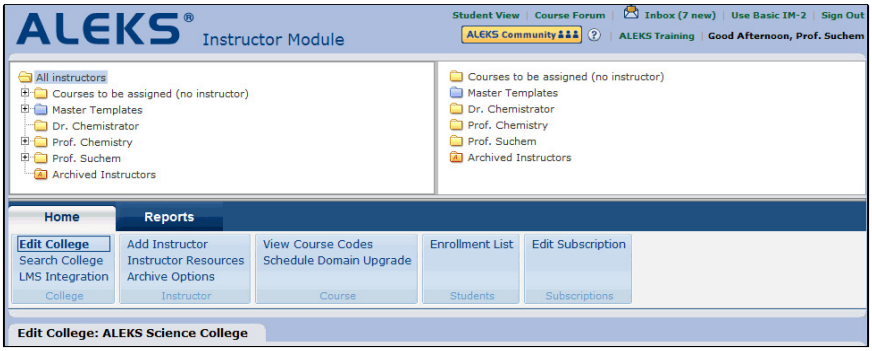


Figure 7.26: Administrator Home Tab

For instructors with Administrator privileges in ALEKS, all instructors using ALEKS at their campus will be visible, along with their classes and students. The following actions are available to Administrator accounts. The folder marked "All instructors" in the far upper left of the Selector window stands for the institution or campus account

itself. Selecting "All instructors" and clicking the "Home" tab displays the following actions (Fig. 7.26):

- Edit College (Sec. 7.20.1)
- Search College (Sec. 7.20.2)
- LMS Integration (Sec. 7.20.3)
- Add Instructor (Sec. 7.20.4)
- Instructor Resources (Sec. 7.20.5)
- Archive Options (Sec. 7.20.6)
- View Class Codes (Sec. 7.20.7)
- Schedule Domain Upgrade (Sec. 7.20.8)
- Enrollment List (Sec. 7.20.9)
- Edit Subscription (Sec. 7.20.10)

Selecting "All instructors" and clicking the "Reports" tab displays a number of reports for the college as a whole. Descriptions of these reports can be found in Sec. 7.20.11.

Administrators will also have access to the Master Template feature, located directly below the "All Instructors" folder. For information on utilizing this feature, see Sec. 7.19.

7.20.1 Edit College

This page can be used to modify the state and time zone settings for the institution in the ALEKS database. Usually, these are set correctly when the institution account is first created, and do not need to be changed.

Under **College Settings** are the two options for the access level to Student History report data across multiple ALEKS classes at the College. Please see Sec. 6.2.4 for more details about the reports available for student history.

- **Limited Access (Default setting).** Administrators can see report data for all classes taken by a student. Instructors can only see report data for classes they have taught.
- **Full Access.** Administrators **and** instructors can see report data for all classes taken by students.

Under **College Networking**, there are spaces for entering the IP (Internet Protocol) addresses used by computer networks at the institution. These are needed if you wish to restrict assessments, Homeworks, Quizzes or Tests to the campus network (Sec. 7.9.1).

Single IP School Assignment will require students to complete all assessments from the same IP address where they began them. This reduces the flexibility of access that students usually have to their ALEKS accounts, but in some cases it may be desired.

7.20.2 Search College

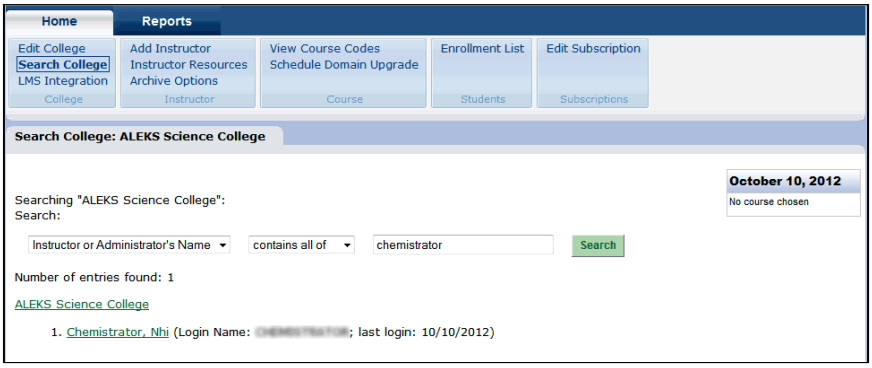


Figure 7.27: Search College

Use this tool to search for a particular student, instructor, or class in your campus accounts (Fig. 7.27).

7.20.3 Learning Management System (LMS) Integration

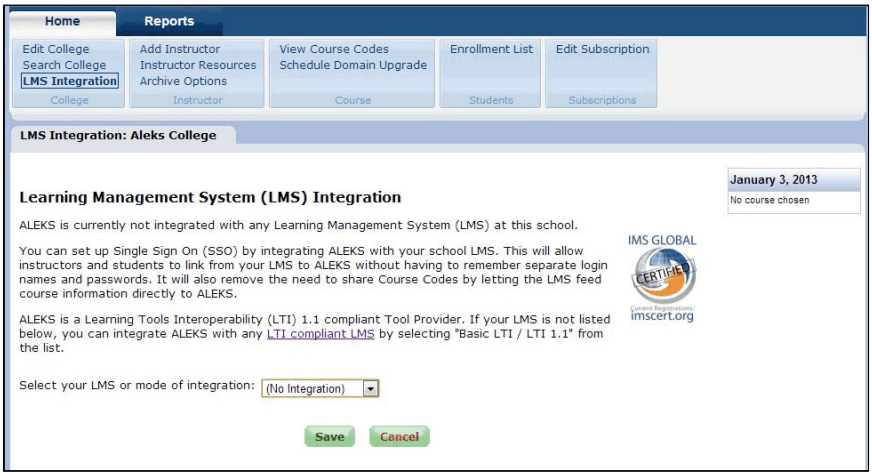


Figure 7.28: Learning Management System (LMS) Integration

You can set up Single Sign On (SSO) by integrating ALEKS with your school Learning Management System (LMS). This will allow instructors and students to link from your LMS to ALEKS without having to remember separate login names and passwords. It will also remove the need to share Class Codes by letting the LMS feed class information directly to ALEKS. LMS integration is available for all ALEKS Higher Ed classes.

ALEKS is a Learning Tools Interoperability (LTI) 1.1 compliant Tool Provider. Your school can integrate ALEKS with any LTI compliant LMS. It is a two-part process, which involves Part 1 - logging into ALEKS to obtain the LTI parameters - and Part 2 - logging into the school's LMS to input the parameters.

Part 1 - Obtain Parameters. After logging into ALEKS in the Advanced Instructor Module, administrators click on the "All instructors" folder. From the Home tab, click on the "LMS Integration" link. You will arrive at the Learning Management System (LMS) page. To obtain the parameters for the college, use the drop-down menu to select the LMS that the college is using or the mode of integration. If your LMS is not listed, you can integrate ALEKS with any LTI compliant LMS by selecting "Basic LTI/LTI 1.1" from the list as your mode of integration.

After making a selection in the drop-down menu, the parameters for the selected LMS or mode of integration will appear on the screen. Enabling LMS Gradebook Integration will allow instructors to synchronize the overall score for each student in their ALEKS gradebook with their LMS gradebook. Review the parameters carefully and then click on the "Save" button. This will complete the first part of the integration.

Part 2 - Configure a School's LMS with ALEKS. Administrators now log into their college's LMS to configure the integration with ALEKS using the parameters obtained from the ALEKS "LMS Integration" page. Some of the LMS selections will show one or more "?" icons on the page. Clicking on a "?" will open a pop-up with additional instructions.

Once the setup between the LMS and ALEKS is complete, instructors and students can pair their LMS accounts and classes with their ALEKS classes. For detailed instructions on institution, instructor, class, and student pairing, please visit the ALEKS Training Center.

7.20.4 Add Instructor

Frequently, instructor accounts are created by ALEKS Corporation for the college. Administrators, however, are able to create them independently using this tool (Fig. 7.29). Note that new instructors may be set up with Administrator privileges.

7.20.5 Instructor Resources

This link provides convenient access through the instructor account to a set of informational and training resources and is available to all instructors, see Sec. 7.2.4 (Fig. 7.1).

7.20.6 Archive Options

This option allows administrators to archive classes or instructors. For a complete description of archiving classes and instructors, see Sec. 6.1.7.

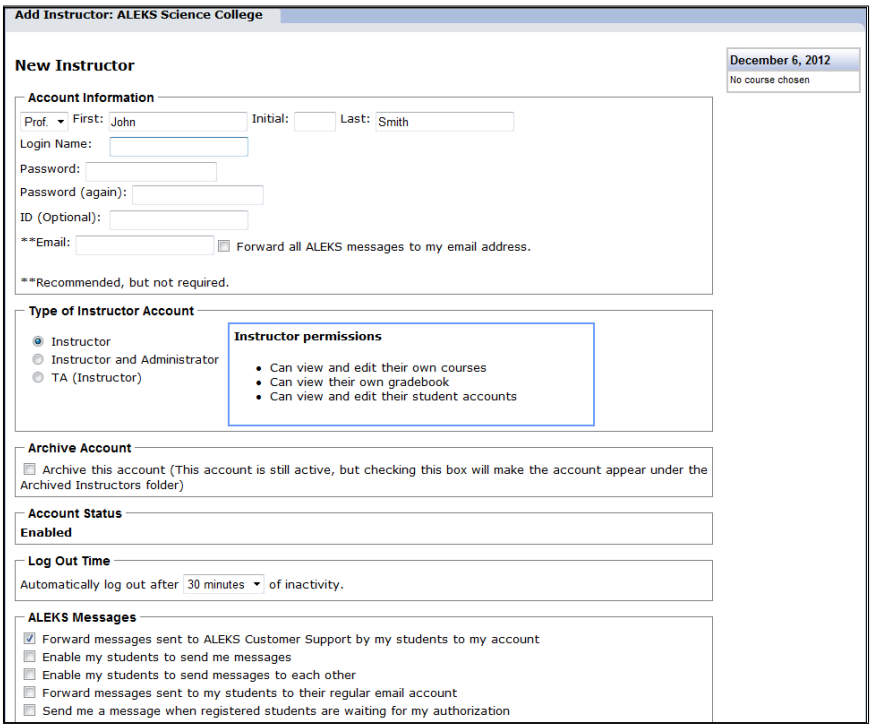


Figure 7.29: Add Instructor

7.20.7 View Class Codes

This action displays a complete list of classes and class codes for the institution, organized by instructor.

7.20.8 Schedule Domain Upgrade

ALEKS Corporation periodically releases new versions of its class products. When this occurs, there is an announcement to users of the window of time during which users may upgrade, as well as the default date on which the upgrade will occur if no action is taken. If the college wishes to schedule the upgrade earlier than the default date, the Administrator can use this tool to pick the desired date.

NOTE. If an update is available, the changes in the upgrade will be described in detail on this page. Click on the underlined name of the class product to see the details.

7.20.9 Enrollment List

Clicking on "Enrollment List" produces a list of all students who are currently enrolled in ALEKS at the college. Information such as Login Name and recent usage data also

appears in the list. It can be downloaded in CSV (Comma Separated Values) format using the link to upper right. If the list is more than 1000 students long, it will be divided into "pages" of a fixed length, which may be downloaded.

7.20.10 Edit Subscription

For some purposes, it may be preferable to use "subscriptions" (or virtual account inventory) rather than access codes for creating student accounts in ALEKS. If the college has used subscriptions for any of its students' access to ALEKS, a summary of subscription activity will appear on this page: how many have been purchased, how many have been used, and how many are remaining. Detailed information on the use of subscriptions can be found by clicking the underlined numbers under "Used."

NOTE. This page does not show the usage of access codes at the college. Many institutions use only access codes; in such cases, no information will appear on this page.

7.20.11 Reports

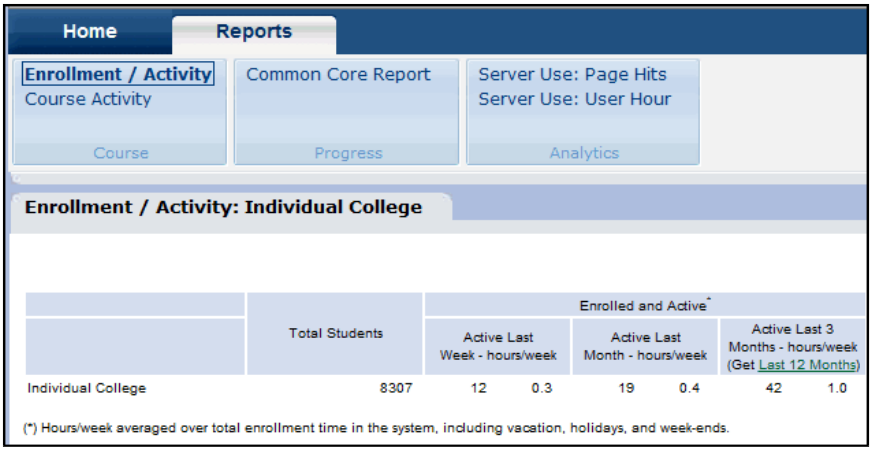


Figure 7.30: Administrator Reports

A number of campus-wide reports are available under this tab.

- **Enrollment/Activity** shows the total number of students ever enrolled in ALEKS at the institution, and the numbers of students active in the system during the last week, the last month, or the last three months (optionally 12 months). For each of these intervals, it also shows the average number of hours spent weekly by the students who were active.

- **Class Activity** is a more detailed view of campus activity. For each instructor and class, it shows the total number of students ever enrolled, then, for each of the last six full months, the number of students active and the average hours per week spent by active students. (Note that the current month does not appear in this report.) Click on the instructor's name to view that instructor's classes, or on the "++" at the top to see all classes for all instructors. This report can be generated for either ALEKS or QuickTables using the drop-down menu.
- **Server Use: Page Hits** presents a graph of page hits over time by users of ALEKS at the college. The "Data Range" menu can be used to set the time period that is graphed. Beneath the graph may appear summary statistics, depending on the time span chosen.
- **Server Use: User Hour** is similar to the "Server Use: Page Hits" report, but graphs the number of user-hours over time.

Chapter 8

Teaching with ALEKS

8.1 The ALEKS Educational Paradigm

ALEKS is based on the understanding that students learn science in different ways, at differing speeds. Starting from an accurate assessment of their current knowledge, students in ALEKS are only offered what they have shown themselves ready to learn. They therefore experience less frustration (from material that is too difficult) and boredom (from material that is too easy). Students are engaged in the learning process, and grow in confidence and independence as they use the program. ALEKS periodically reassesses students to test their retention of new knowledge, and if they forget what was once learned, ALEKS smoothly and efficiently guides them through necessary review and reinforcement. With time and persistence, every ALEKS student will progress toward mastery, in a way clearly visible to both student and instructor.

It is normal for students to be in disparate knowledge states; ALEKS puts this information clearly at the instructor's disposal. The relative mastery attained by students appears clearly from the "Learning Progress Since Latest Assessment" Report in the Instructor Module. ALEKS does not require students to progress as a unified group. ALEKS will permit a student to work on any topic in the category "ready to learn," a list of topics that the student has not yet learned, but has demonstrated (within ALEKS) the readiness to begin learning.

Students using ALEKS will experience new independence and excitement in learning. Instructors also may find different opportunities for optimizing their role in the learning process, with a greatly expanded ability to accurately monitor and effectively promote their students' learning. The role of the instructor is critical in providing structure, support, and reward for the students' effective use of ALEKS. If ALEKS is used properly, the instructor's scope for individual coaching and small-group instruction will be greatly expanded, as will the freedom to teach science in a broader and richer way.

ALEKS gives the instructor a set of powerful resources. Various styles of use of ALEKS are possible. The following should be understood as suggestions, designed to give in-

structors a sense of the possibilities offered by ALEKS's extensive library of tools.

8.2 The Instructor and ALEKS

ALEKS is often used in regular classroom settings.

The instructor in an ALEKS class need not be collecting, correcting, or distributing papers, organizing groups, managing materials, giving instructions, or supervising activities. The instructor in an ALEKS class may be just as busy teaching chemistry to individual learners: getting one student started on a new topic, checking another student's work, responding to questions, suggesting alternate methods and explanations, making or reinforcing connections among concepts, and congratulating those who add an item to their pie. ALEKS provides comprehensive support to the student in every phase of its use; yet the instructor will find that the additional direct support given this way is especially productive. The relation of teacher and student is based on knowledge and discovery, not management and sanction. No one is "behind" in ALEKS; setbacks are readily addressed and overcome; every student can expect to make progress and be recognized.

It is important, especially in the early stages of an ALEKS class, to be generous in recognizing student progress. Students need to understand that when they add an item to their pie, or show progress in a new assessment, it is an achievement. At the same time, formal rewards for the effective use of ALEKS need to be built into the class structure and made clear from the outset (Sec. 8.3).

Students will be assessed at the beginning of their use of ALEKS (following Registration and the Tutorial), and at regular intervals after that. The instructor does not need to supervise all ALEKS assessments; normally, students will be using ALEKS both in and out of the classroom, and taking assessments at various times and locations. Once the students realize that the purpose of the ALEKS assessment is to provide appropriate material in the Learning Mode, there will be little reason to get help, use the textbook or calculator inappropriately, or in any other way achieve inaccurate assessment results.

We recommend supervising the Initial Assessment. The students may need assistance in their first use of the system, they will need to be reassured that the assessment is not for a grade, and it is important to get valid results on this Initial Assessment, so that that the students' work in the Learning Mode will be productive from the start. For the instructor's own information, other supervised assessments may also be held at regular intervals to provide accurate "snapshots" of overall progress by the class (Sec. 8.10). We suggest that such supervised assessments be scheduled at the midpoint and end of the class. Also, any assessment results which may be used as a component in the students' grades should, of course, be obtained from supervised assessments (Sec. 8.13).

NOTE. In cases where students do not seem to be making adequate progress in ALEKS, the student may have received help, or inappropriately used a calculator on an unsupervised assessment, skewing the assessment results and leading to inappropriate material

in the Learning Mode. This can be corrected by requesting a new assessment for the student.

8.3 Planning the ALEKS Class

In ALEKS, the instructor has complete freedom in planning lectures, lessons, and assignments, while ALEKS ensures that students can progress toward mastery regardless of their level of preparation. To the extent that students will be working independently in ALEKS, the content of lab classes is provided by their work in ALEKS. Instructors can, however, plan focused small-group instruction from week to week (Sec. 8.5).

It is important to make ALEKS an integral part of the class requirements and grading scheme. The main factor influencing the success of students using ALEKS is the time that they spend in it. This means that the students must be required to spend a suitable amount of time in ALEKS on a weekly basis. (A minimum of three hours is recommended.) They should be informed of this at the beginning of the class, and the instructor should monitor their fulfillment of this obligation. The amount of time required must be reasonable and in balance with other requirements for the course; the instructor should not simply include an ALEKS requirement without reducing the other requirements that the students have to fulfill. For example, the quantity of homework problems may be reduced, as the students will be solving problems in their ALEKS sessions.

These are only suggestions, and experienced instructors may well find approaches that will be more effective with their own students. There must, however, be clear, formal support for the use of ALEKS.

One approach is to provide a certain number of points toward the final grade for each week that the student fulfills their required hours. It is advisable to reward each week, so that the student does not fall into the expectation that all of the required hours can be done at the end; consistency should be rewarded, along with total hours. If a student falls short of the specified hours during a particular week, that week is not rewarded, but the "deficit" is not carried forward; the next week begins with a clean slate (the primary concern is regular use of the system; for this reason a surplus is also not carried forward). Proportional rewards can also be used; each hour spent has a point value, up to the required minimum.

In order to effectively monitor the students' use, the instructor should check the hours on the "Learning progress since latest assessment" page or the "Time and Topic" report. This page can be printed out every week for record-keeping. In rare cases, students may try to fool ALEKS by logging on to their accounts and doing something else; this can be seen when the number of items gained per hour is far too low. ALEKS will log the student off if there is no activity after a certain amount of time. Instructors can obtain a precise record of a student's actual work in ALEKS by viewing the student's "Time and Topic" report.

The students' achievement in ALEKS (as opposed to their use of the system) may also be used as a component in their final grade. For information on how to do this, see Sec. 8.13.

8.4 Preparing Your Students

The following considerations may be useful in preparing your students to begin to use ALEKS.

Difficulty of Assessment Questions

The ALEKS Initial Assessment is always comprehensive, in order to achieve the highest accuracy and reliability. In the course of the assessment, some questions may be too easy or too difficult for some students. The students should be told to click the "I don't know" button only if a question is completely unfamiliar to them; otherwise they should do their best to answer. As the assessment proceeds, the questions will focus more and more closely on the outer limits of the student's actual knowledge. In Learning Mode (following the assessment), students will be provided only material that they are prepared to learn.

Length of Assessments

The number of questions asked in an ALEKS assessment varies. Normally, an assessment in General Chemistry requires between 20 and 30 questions.

No Help in Assessments

Explain to the students that they will need paper and pencil for answering assessment questions, but that no help or collaboration whatsoever is permitted during assessment. If the teacher or anyone else helps the student during assessment, even just explaining or rephrasing a question, assessment results may be inaccurate and the student's learning in ALEKS may initially be hindered. Be sure students understand that the purpose of the Initial Assessment is to gain a precise, detailed understanding of what they know, so that in Learning Mode they are given material they are ready to learn. It is not a "test" to pass or fail, and they will not receive a grade on an ALEKS assessment (unless the instructor chooses to use assessments for grading).

8.5 Focused Instruction with ALEKS

The features of the Instructor Module make it possible to prepare students for specific topics that they are going to work on, and to reinforce and expand on knowledge that students have recently acquired. This involves either guiding lectures or focused instruction to small groups of students based on data obtained from ALEKS.

The two kinds of "teaching opportunities" cued by ALEKS come from two types of information maintained by the system for students over the entire time that they use

it: the set of items a student is "ready to learn" (or "outer fringe" of the student's knowledge state), and the set of items most recently learned ("what students can do," the "highest" topics in the student's knowledge state, called the "inner fringe"). (See the Instructor's Manual under "Inner and Outer Fringes of a Knowledge State," in the chapter "Knowledge Spaces and the Theory Behind ALEKS".) The items "ready to learn" are the topics a student may normally choose to work on in ALEKS; the items recently learned ("what a student can do") are considered the least secure and most likely to need reinforcement. (These items can be reviewed by clicking the "Review" button.) When the students are logged on to ALEKS, these two types of information are used automatically to guide and manage their learning. The instructor, however, can also view the inner and outer fringes in a convenient format to plan focused instruction that will parallel, supplement, and enhance the individual work that their students are doing in ALEKS.

To find this information for a class, the instructor can enter the Instructor Module and select the class, then click on "Reports" and select the "ALEKS Pie" report. This report represents the average student in the given class, and displays the weaknesses and strengths of the class as a whole. The "Show" drop-down box can be used to filter the report by "Current Learning," "Most Recent Assessment," or "Initial Assessment." Complete details on which topics students have mastered, not mastered, and are ready to learn in the class are available in the section below the pie chart and can be viewed by Objectives (if textbook integration or intermediate objectives are being used) or ALEKS Table of Contents.

Using the ALEKS Pie Report we can see a breakdown of student mastery for each topic, send messages directly to students, and view additional topics that a group of students is ready to learn. The purpose of this analysis is that the instructor may pick one or more topics from the list and schedule small-group sessions of focused instruction.

The following are examples that illustrate how these features may be used.

Example 1: Basic

On a Friday evening, the instructor sits down to plan lessons for the following week. He or she logs onto ALEKS, selects the name of a class in General Chemistry, selects "Reports", and clicks "ALEKS Pie" to access the ALEKS Pie Report. A pie chart appears showing the average profile of mastery in the class. The "slice" of the pie chart for Atoms, Ions and Molecules is full to about 90 percent; the slices for Simple Reactions and for Thermochemistry are filled much less, ranging between 20 and 40 percent. This indicates that lessons for the week may focus profitably on the most advanced topics under Atoms, Ions and Molecules, as well as on topics of moderate difficulty in Simple Reactions and Thermochemistry.

Example 2: Intermediate

On a weekend afternoon, the instructor logs on to ALEKS, selects the name of a class in General Chemistry, and then opens the "Average report (pie chart)." After a look at the pie chart, the instructor selects "Current Learning" from the "Show" drop-down box, and clicks "OK." Next the instructor clicks on the "View

all topics" toggle, in either the ALEKS tab or the Objectives tab, and when the list of topics appears, the instructor scans this list for items of particular difficulty. "Calculating molarity using solute moles" has 16 students currently able to choose this topic from their pie charts. The instructor notes this topic down for class discussion early in the week. With the benefit of some timely preparation, the students can be expected to master this troublesome topic with less difficulty.

Example 3: Advanced

On a Monday morning, the instructor logs on to his or her ALEKS account, selects the name of a class in General Chemistry, and then opens the "Average report (pie chart)." After a look at the pie chart, the instructor selects "Current Learning" from the "Show" drop-down box, and clicks "OK." Next, the instructor clicks on the "View all topics" toggle, in either the ALEKS tab or the Objectives tab, and the list of topics appears, clearly showing what students have mastered, not mastered and are ready to learn. The experience and expertise of the instructor are used to used to plan with this information. Suppose that there is only time in the week's schedule for two small group sessions. (The ALEKS class has only one hour in the lab, and ten minutes are set aside to speak with each small group; the remaining 40 minutes are for helping students in the lab.) The instructor will look over the topics with two questions in mind: which topics have the greatest numbers of students, and which are most worth discussing.

For example, looking at the list of topics "Ready to learn," the instructor sees "Elemental analysis." The instructor knows from experience that students have difficulty with the concept, and that they are more successful with it if they have had a chance to review. This topic has 12 students out of 30 in the class. The instructor uses the message feature to send a note to these students, asking them to meet in the front of the room at the beginning of the lab; the students will receive this note the next time they log on to ALEKS, no later than the beginning of that lab.

Looking over the list of topics "Mastered," the instructor sees "Understanding periodic trends in atomic size," with 10 students. Although the number of students is less than for other topics, this one seems to the instructor richer in its content of chemistry culture than the others. Thus this is chosen as the second topic, and a second message is sent to these students, to meet at the front of the room, ten minutes into the lab.

8.6 Models of Classroom Integration

There are numerous ways in which ALEKS can be and is used in concrete educational situations.

1. **Supervised Science Lab**

   Expert supervision can be provided for the students' use of ALEKS in regularly scheduled science lab periods, whether or not these are part of a conventional class

structure. Students benefit from the direct coaching and assistance of qualified instructors in the course of their work with ALEKS.

2. **Science Lab in Structured Course**

   The supervised science lab may be part of a structure of class meetings, combined with conventional and lecture-style classes. The instructor in such a setting need not gear the sequence of topics covered in classes in any way to what the students are doing in ALEKS; the students' independent work in ALEKS will increasingly benefit their performance on quizzes and tests, as well as their understanding of lectures. ALEKS is not designed to "teach to the test," although experience has shown that students' performance on comprehensive tests improves dramatically when they have worked with ALEKS over time.

3. **Small-Group Instruction**

   The recommended use of ALEKS in a classroom setting makes use of the detailed analysis of individual student knowledge provided through the Class Report page to tailor the lectures to the skills of students.

4. **Self-Paced Learning**

   In this scenario students may use the college computer lab on their own, with only informal supervision. ALEKS is used in this case much as it is for distance learning, except that students have the opportunity for closer consultation with the instructor.

5. **Distance Learning**

   ALEKS is used by students who may never enter the physical classroom, or may enter only on a few occasions for orientation and supervised assessments. ALEKS provides a range of features for communication between instructor and student, as well as powerful facilities for the monitoring and evaluation of student work.

Regardless of which approach is used, you can derive more benefit from ALEKS though monitoring the students' use of ALEKS and communicating with them, whether in direct contact, by email, or by messages through the ALEKS system. As discussed above, we recommend that a certain number of hours in ALEKS each week be required (Sec. 8.3); this should be made clear from the start as part of the published course syllabus and rewarded appropriately through the grading scheme. Students' progress in ALEKS should be recognized and reinforced early on; conversely, students who do not seem to make adequate progress should be contacted promptly.

The following sections of this chapter provide more information on these issues affecting the classroom use and integration of ALEKS.

8.7 Monitoring Student Use

In the day-to-day use of ALEKS by a class, a principal concern of the instructor is to monitor that students are using ALEKS regularly and for at least the required amount

of time. The most convenient place to find this information is the "Time and Topic report for all students" (under "Reports"). Each student's name is displayed on this page along with the total number of hours that student has spent logged on to the system. There is also a breakdown of how much time the student has spent in ALEKS on a daily basis. Students can see this same breakdown of daily usage in their own accounts by using the "Report" link.

It is also important that critical assessments be supervised by the instructor, to ensure that valid results are received (Sec. 8.2).

8.8 Monitoring the Progress of a Class

The instructor can also use the bar graphs on the "Learning progress since latest assessment" page to see how close each student is to mastery of the subject matter. Keep in mind that the bar graphs displayed on this page show only the students' achievement as of their last assessment (in blue) and any progress made in the Learning Mode since that assessment (in green). For a more panoramic view of the progress made by a group, select the "Total progress" report. This displays the difference between the students' knowledge on their first and their most recent assessments.

The "Detailed progress history" report is an expanded version of "Learning progress since latest assessment." It shows the learning history for all students, with one bar graph for each assessment taken. The bar graphs are stacked, with the earliest on the bottom, and the most recent at the top. To the left of each bar there is the date of the assessment and a notation indicating the reason for the assessment.

To see each of the assessments for a given student, with that student's progress subsequent to each assessment in the Learning Mode, the instructor should view the page "Progress report for a particular student in this class" for the student.

8.9 Monitoring Individual Progress

On the page "Progress report for a particular student in this class" there is a line for each assessment taken by a particular student, with bar graphs showing mastery as of that assessment and subsequent progress made in the Learning Mode. The Initial Assessment is shown in the bottom line, with later assessments "stacked" upward. By following progression from earlier to later assessments, the instructor can see very clearly how a student is progressing toward mastery of the subject matter.

Use caution in interpreting this information. Students vary widely in how they master material. Progress made in the Learning Mode (green bar) is not always immediately reflected in the student's level of mastery on a subsequent assessment. Some students progress more quickly in Assessment Mode than in the Learning Mode. In such cases the "new" blue line is further ahead than the green line just below it. On the other

hand, many students make faster progress in the Learning Mode than in assessment. In such cases the "new" blue line lags behind the green line below it. It is very common for a student to master the entire subject matter two or more times in the Learning Mode before that mastery is finally confirmed in an assessment. Part of the power of the ALEKS system is that it accommodates individual differences in behavior.

NOTE. In cases where a student moves backward in his or her mastery, the instructor should contact the student. If the student did not take the assessment seriously enough, a new one can be requested.

8.10 Ordering Assessments

Following the Initial Assessment (which should be taken under the instructor's supervision), the ALEKS system will automatically schedule other assessments as needed to guide the students' progress. The instructor, however, can order an individual or group assessment at any time. It is a good practice for the instructor to schedule supervised assessments at regular intervals (midterm and end of the class), as "snapshots" of overall class achievement.

8.11 Independent Study and Distance Learning

The ALEKS system is well suited to use in an independent study or distance learning context. ALEKS is self-contained and adaptable to any syllabus or class materials. Students using ALEKS under these circumstances know exactly what the class goals are, where they stand in relation to those goals, and what they need to do to achieve them.

For the instructor administering an independent study or distance learning program, ALEKS solves nearly every problem of management, oversight, evaluation, and communication. All of the information needed to keep track of far-flung independent learners is at the instructor's fingertips, through the features of the Instructor Module. The internal message system of ALEKS puts the instructor in constant touch with students, without dependence on telephone or email communication.

8.12 The ALEKS Knowledge Structure

Each ALEKS subject, such as General Chemistry, has a knowledge structure associated with it. The number of items comprised in a knowledge structure ranges roughly between 200 and 500 topics. A knowledge state is a subset of items which may correspond to the knowledge of an actual student (i.e., there may be a student who has mastered exactly those items, and no others). A knowledge structure is the family of all the knowledge states that we may encounter for a given subject.

An ALEKS structure affects virtually every aspect of ALEKS's functioning. In the ALEKS Assessment Mode it enables ALEKS to make inferences from student answers, keeping the ALEKS assessments brief but accurate.

The structure is also crucial in the ALEKS Learning Mode. Using the structure of a given course product, the system knows precisely which items are in the inner fringe and outer fringe of each of the knowledge states in ALEKS. The items in the outer fringe of a student's knowledge state are those items that the student is the most ready to learn next. (From a technical standpoint, an item is in the outer fringe of a state if adding that item to the state results in another feasible knowledge state.) These items are presented to the student in MyPie when the student moves the mouse pointer over the ALEKS Pie Chart. Similarly, an item in the inner fringe of a student's state is an item either recently learned or one whose mastery by the student might be shaky. (Technically, an item is in the inner fringe of a state if removing that item from the state results in another feasible knowledge state.) They are presented to the student when the student is having difficulty in the ALEKS Learning Mode and during ALEKS Review.

An additional benefit of the proliferation of connections among items in ALEKS is its extreme flexibility from the students' viewpoint: for any particular topic, there is a vast number of possible approaches, or learning paths, which may lead students to mastery of that topic. This flexibility does not imply, however, that *any* order is possible. Each learning path leading to a particular topic must contain, at a minimum, the items which are "below" such topic in the ALEKS structure.

8.13 Learning Rates in ALEKS

ALEKS allows instructors to flexibly evaluate and interpret student learning. There are three criteria, which can be used in any combination: percentage of course goals mastered, total hours spent in ALEKS, and average items gained per hour of use. Each can be set to "Private," so that only the instructor sees the evaluations, to "Public," so that the instructor sees the evaluations for all students, and each student sees their own, or to "Disabled," so that no one sees them.

Instructions on how to access the learning rates feature can be found in the Instructor's Manual under "Assign Learning Rates," in the chapter "Advanced Instructor Module: Course Reports."

Any of these criteria that is set to "Public" will be seen by the students. For example, if the evaluation for percentage of course goals mastered is set to A for 90 percent, B for 80 percent, C for 70 percent, D for 60 percent, and Failure below that, the students will see these letters in their accounts as long as their percentage mastery is in the ranges given (i.e., D when it is between 60 and 69 percent). **This will only make sense when the students are close to finishing the course, and may cause confusion if the grades are made "Public" before then.**

The same proviso applies to the other kinds of evaluations available through ALEKS. The value of using these evaluations in the "Public" mode may be greatly enhanced if the instructor decides to set a new scale every week, or at other appropriate intervals. This might mean, for example, that A is set to 20 percent for the first week, to 25 percent for the second week, and so forth, with the other evaluations set accordingly. Such a procedure requires more work by the instructor, but it certainly gives the students a more meaningful frame of reference for their progress.

Some of the kinds of evaluations in ALEKS may be more useful for the instructor alone than for the students. Such evaluations should be set to "Private." The evaluation based on average items gained per hour, for example, might be set to some minimum value like 1 (in a Chemistry class requiring 1 topic of work in ALEKS per hour as a minimum). Now, the instructor would not want to send the message to the students that 1 items gained per hour is "Enough," since many students in the class may be capable of much more. Conversely, a student whose progress falls below this rate might not be helped by the stern notation in their account that their progress is "Not enough"; there may be all kinds of reasons for slow progress. At the same time, a student making slower progress than this should be brought to the instructor's attention for intervention of some kind. If the evaluation is set to "Private," the instructor will see the flag "Not enough" appearing next to the names of students whose progress is slower than this, on the Class Progress page, alerting them to the need for special attention.

Chapter 9

Knowledge Spaces and the Theory Behind ALEKS

9.1 History

Knowledge Space Theory has been under development since 1983 by Professor Jean-Claude Falmagne, who is the Chairman and founder of ALEKS Corporation, and other scientists (especially, Jean-Paul Doignon from Belgium) in the United States and Europe.

ALEKS is the first computer system to embody Knowledge Space Theory for assessment and teaching.

9.2 Theory

A complete exposition of Knowledge Space Theory is not intended here. The Bibliography contains a number of references for those interested in further details (Sec. 9.3). Knowledge Space Theory is expressed in a mathematical discipline often referred to as "Combinatorics." What follows here is a brief, intuitive summary introducing certain fundamental terms employed in discussions of ALEKS.

9.2.1 Domain, Items, and Instances

An academic discipline such as Basic Math, Algebra, or Chemistry is represented as a particular set of problems or questions that comprehensively embody the knowledge of the discipline. That set is called the **domain**, and the problems are called **items**. A symbolic representation of the domain of General Chemistry uses dots standing for items (Fig. 9.1). One of the items, which might be entitled "Calculating molarity using

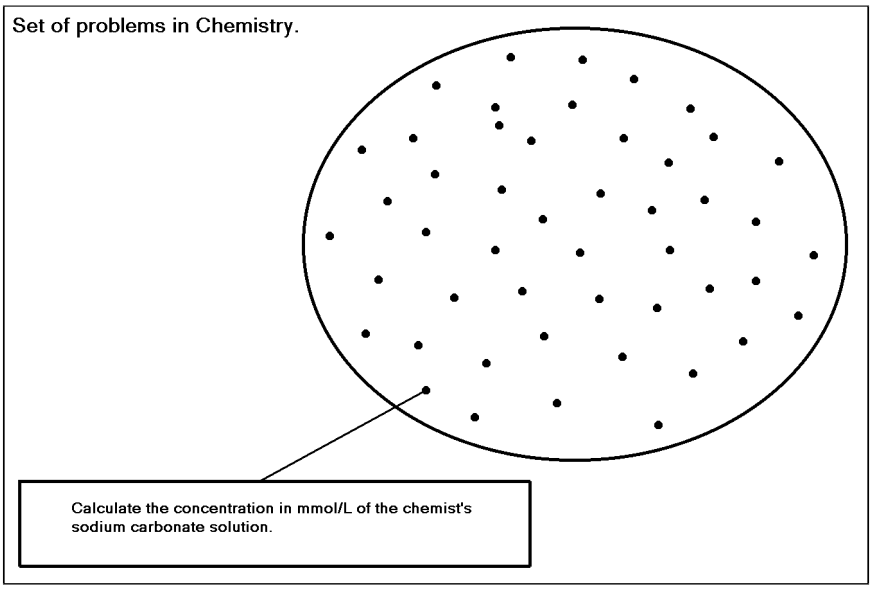


Figure 9.1: Domain of General Chemistry

solute moles," is indicated by a line. The problem in the rectangle is an **instance** of that item.

Each item, or problem type, has at least dozens, more often hundreds or thousands of instances. Full mastery of the subject implies the ability to solve problems corresponding to all the items making up the domain.

Determining the set of items that make up the domain is the first step in constructing a "knowledge structure" for that domain. This is done by research in instructional materials and standards and systematic consultation with professionals. Substantial agreement is achieved among expert pedagogues on the choice and definition of items. The set of items finally arrived at and forming the domain must be comprehensive, that is, it must cover all the concepts that are included in the particular academic discipline.

9.2.2 Knowledge States

The **knowledge state** of a student is represented by the set of items in the domain that he or she is capable of solving under ideal conditions (Fig. 9.2). This means that the student is not working under time pressure, is not upset or impaired in any way, etc. In reality, careless errors may arise. Also, the correct response to a question may occasionally be guessed by a subject lacking any real understanding of the question asked. (This will occur very rarely when using the ALEKS system, because multiple-choice answers are not used.) An individual's knowledge state is not directly observable and has to be inferred from responses to questions.

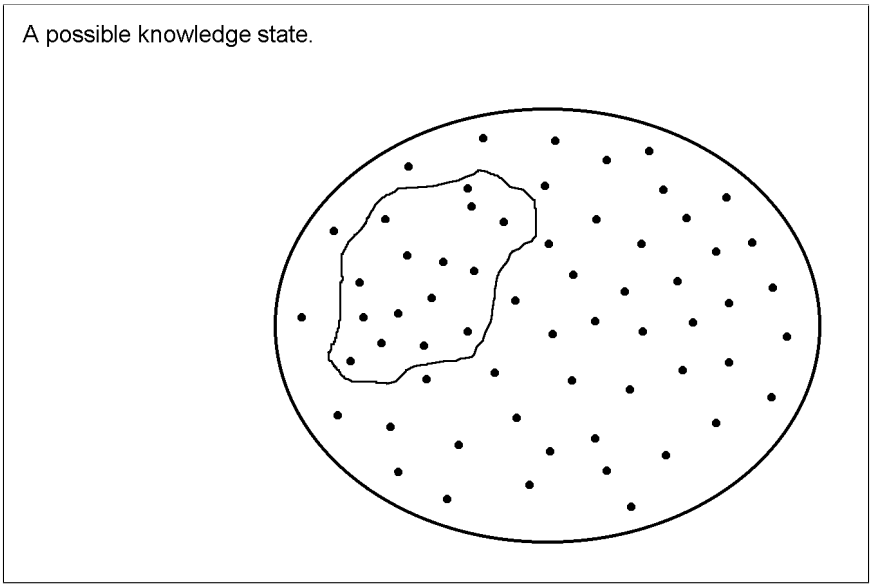


Figure 9.2: Knowledge State

9.2.3 Knowledge Structures and Knowledge Spaces

It should be obvious that not all possible subsets of the domain are feasible knowledge states. For instance, every student having mastered "long division" would also have mastered "addition of decimal numbers." Thus, there is no knowledge state containing the "long division" item that does not also contain the "addition of decimal numbers" item. The collection of all feasible knowledge states is referred to as the **knowledge structure**. The very large number of states for any product means that there are many possible ways of acquiring knowledge, i.e., many learning paths (Fig. 9.3). In the ALEKS knowledge structure there are literally billions of such learning paths. A "knowledge space" is a particular kind of knowledge structure.

As in many real-life applications, "noise" and errors of various sorts often creep in, which require the elaboration of a probabilistic theory. The ALEKS System is based on such a probabilistic theory, which makes it capable of recovering from errors. For instance, ALEKS is capable of deciding that a student has mastered an item, even though the student has actually made an error when presented with a problem instantiating this item. This is not mysterious: a sensible examiner in an oral exam, observing an error to a question about addition would nevertheless conclude that the student has mastered addition, for example, if that student had given evidence of skillful manipulation of fractions.

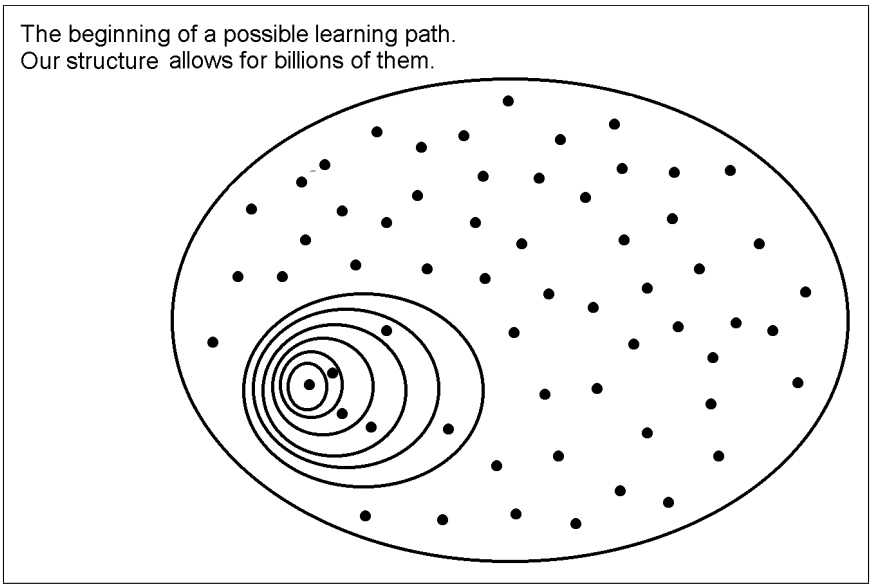


Figure 9.3: Learning Path

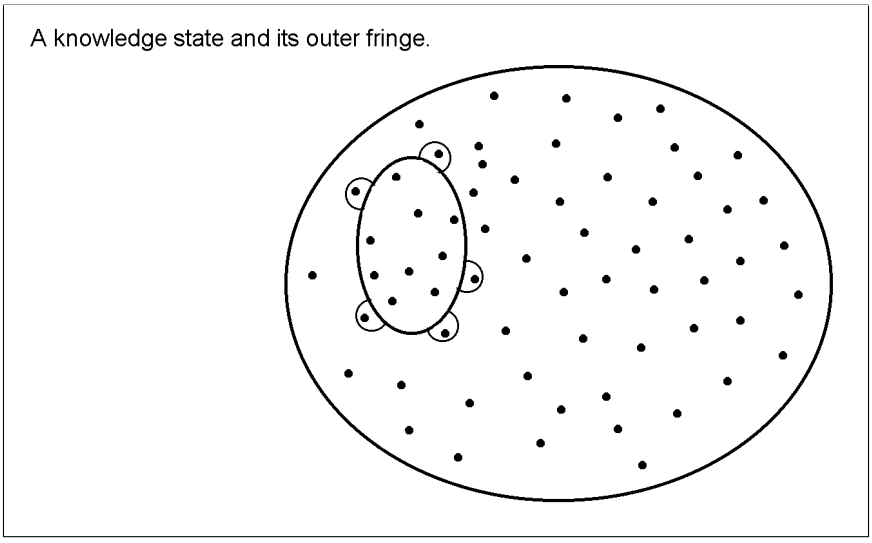


Figure 9.4: Outer Fringe of a Knowledge State

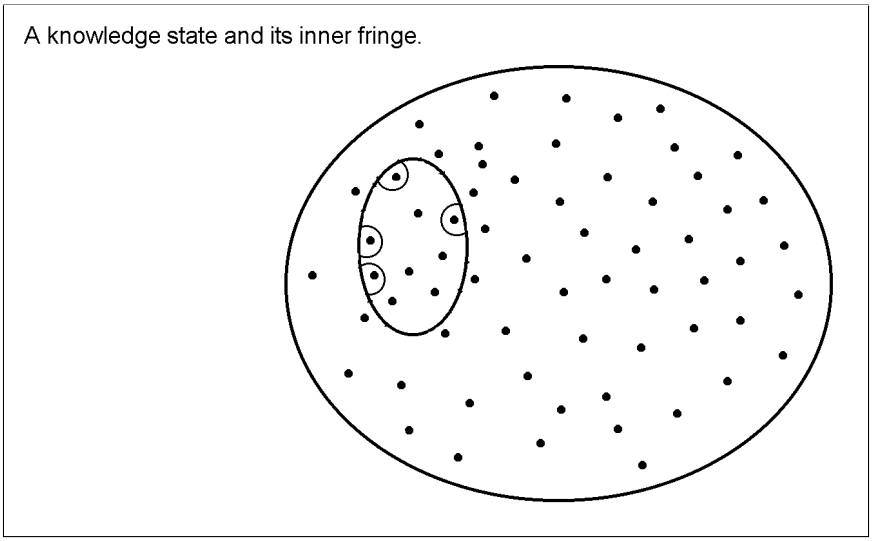


Figure 9.5: Inner Fringe of a Knowledge State

9.2.4 Inner and Outer Fringes of a Knowledge State

An item that has not yet been mastered by a student may not be immediately learnable by that student. Learning one or more prerequisite items may be necessary. Consider a student in a particular knowledge state **K**. The set of all items that may be learned immediately by a student in that state **K** is called the **outer fringe** of the state **K**. The outer fringe of a state **K** is defined as the set of all items, any one of which **may** be the next one learned. An item is in the outer fringe of the state **K** if the addition of that item to the state **K** forms a new, feasible knowledge state (Fig. 9.4). Typically, the outer fringe of a knowledge state will contain between one and several items.

Similarly, an item is in the inner fringe of a state **K** if there is some other knowledge state to which that item may be added to form state **K** (Fig. 9.5). The **inner fringe** of a state **K** is thus defined as the set of all items, any one of which **may** have been the last one learned.

These two concepts of inner and outer fringes are used in powerful ways in the Learning Mode of the ALEKS system. For example, the system always offers a student problems to solve that are based on items in the outer fringe of his or her state. If ALEKS judges that a student is experiencing difficulties in learning some new item, ALEKS typically reviews the mastery of items in the inner fringe of the student's state that are also related to the new item to be learned.

9.2.5 Assessment

How can ALEKS uncover, by efficient questioning, the particular knowledge state of a student? While the details of ALEKS's method for achieving such a goal are technical,

the guiding intuition is straightforward. At every moment of an assessment, ALEKS chooses a question to be "as informative as possible." In our context, this means a question which the student has, in the system's estimate, about a 50 percent chance of getting right. The student's response (correct or false) determines a change in all the likelihood values: for instance, if the question involved manipulation of fractions, and the student's response was correct, then all the knowledge states containing this item would have their likelihood values increased. The specific way the questions are chosen and the likelihood values altered makes it possible for ALEKS to pinpoint the student's state in a relatively short time. In General Chemistry, for example, approximately 20–30 questions usually suffice.

Finally, it should be noted that the assessment report given to students, instructors, and administrators is a very precise **summary** of the student's knowledge state. If the structure is known, the outer fringe and inner fringe together completely define the student's knowledge state. Internally, the system registers the student's knowledge or non-knowledge of each item in the domain.

A more thorough but still accessible overview of Knowledge Space Theory is available on the ALEKS website: Cosyn, Doignon, Falmagne, "The Assessment of Knowledge, in Theory and Practice":

http://www.aleks.com/about_aleks/Science_Behind_ALEKS.pdf

A comprehensive treatment of Knowledge Space Theory can be found in Doignon and Falmagne, **Learning Spaces** (Springer-Verlag, Berlin, Heidelberg, 2011).

A comprehensive scientific bibliography on Knowledge Spaces is maintained here:

http://css.uni-graz.at/kst.php

For a more selective bibliography, see the following section.

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Chapter 10

Frequently Asked Questions

10.1 General

General questions on ALEKS concern what it is, its purpose, and what it contains.

What is ALEKS?

ALEKS is an online educational software program based on a cycle of assessment and learning. ALEKS course products include Mathematics, Statistics, Accounting, Business, and Chemistry. By knowing exactly which concepts the student has mastered and which are new but within reach, ALEKS enables the student to work on those concepts they are most ready to learn. ALEKS is a full-time automated tutor, including explanations, practice and feedback. ALEKS interacts closely with the student, continuously updating its precise map of the student's knowledge state. ALEKS combines the advantages of one-on-one instruction and evaluation with the convenience of being on-call, on your computer, 24 hours a day, seven days a week. The cost of ALEKS is a small fraction of the cost of a human tutor.

What makes ALEKS different?

A great many important differences exist between ALEKS and other kinds of "educational software," including its finely individualized instructional features, easy access over the Internet, rigorous and comprehensive educational content, and full-featured class-management module for instructors and administrators.

A critical difference is the capacity of ALEKS for efficient, precise, comprehensive, and qualitative assessment. This not only makes it a valuable tool for monitoring educational progress, but also enables it to provide students with the material they are most able to learn at a particular time. Students will not be given material they have already mastered, or topics for which they have not yet demonstrated prerequisite knowledge.

ALEKS is a self-contained learning environment, with complete sets of practice and explanatory units needed for the subjects that it covers. The units may also be

referenced or linked to textbooks for extended treatment of concepts. There is an online student ALEKSpedia accessed by clicking on underlined terms (hypertext links), and a diagnostic feedback facility that, in many cases, is able to explain the nature of misunderstandings and errors made by students.

For instructors, ALEKS offers a complete administrative and monitoring facility through which individual and group progress can be checked, standards established, enrollment managed, and messages exchanged. ALEKS can be configured for use with diverse educational standards.

ALEKS is not a game or "edutainment." It is an automated educational tool with robust, carefully-designed features for both learners and educators.

What are the parts or "modules" of ALEKS?

The principal "modules" of ALEKS are the **Assessment Mode**, in which student knowledge is rigorously assessed, the **Learning Mode**, where students work on mastering specific concepts, the Instructor Module, in which instructors and administrators are able to monitor student progress and carry out administrative functions, and the Administrator Account, which permits management and monitoring of an arbitrary number of separate institutions, such as those making up a multi-campus college system. There is also a Tutorial (which students take when first registering with the system), online help, a chemical ALEKSpedia, graphic display of assessment results and learning progress, and many other features.

Why is ALEKS on the Internet?

ALEKS is available on the Internet so that a student who has registered with the system can use it from any suitable computer, in any location. Very little technical preparation is required. All you need is a self-installing, self-maintaining "plug-in" obtained directly from the ALEKS website. No disks, CD's, peripherals, or backup facilities are required. All data is kept securely on the ALEKS Corporation servers.

10.2 Technical

The technical information needed to use ALEKS is minimal. These few questions are all that are likely to be asked, even in a large group of users.

What are the system requirements for using ALEKS?

[Sec. 3.2] Fig. 10.1 presents the technical requirements for ALEKS in summary form.

Note that any of the kinds of Internet connection (cable, ISDN, DSL, or wireless) typical in computer labs are adequate for use with ALEKS. If your computer lab has security safeguards in place, you will need the cooperation of your technology administrator to install the ALEKS plug-in.

Where can I get more information on ALEKS? How can I try out the system?

	PC	Macintosh
Operating System	Windows	MacOS 10.4+
Processor	Any	Any
RAM Memory	64+ MB	64+ MB
Browser	Explorer 7.0+, Firefox 3+, Chrome 4+	Safari 4+, Firefox 3+
Screen Resolution	1024x768	1024x768

Figure 10.1: System Requirements

The ALEKS website provides complete information on the ALEKS system, including a Quick Tour, Free Trial use, licensing, history and theory, and technical support.

http://www.aleks.com

10.3 Theory

For those interested in looking beneath the surface, these questions concern the principles on which ALEKS is designed and constructed.

What is the theory behind ALEKS?

[Chapter 9] ALEKS is based on a field of Cognitive Science (Mathematical Psychology) called "Knowledge Spaces" (or "Learning Spaces"). The purpose of research in Knowledge Spaces is to model human knowledge in any subject, using mathematical tools such as Set Theory, Combinatorics, and Markovian Processes, so as to make possible fast and accurate assessment through interactive computer applications. There are numerous scientific publications in the field of Knowledge Spaces dating back to the early 1980's. A recent, authoritative treatment (with Bibliography) is Doignon and Falmagne, *Learning Spaces* (Berlin, Heidelberg: Springer-Verlag, 2011).

What is an "item"?

[Sec. 9.2.1] In Knowledge Space theory, an "item" is a concept or skill to be learned, the mastery of which is captured by a "problem type" serving as the basis for specific assessment and practice problems. Thus the item "Addition of two-digit numbers without carry" might produce the problem (instance) "What is 25 plus 11?"

What is a "domain"?

[Sec. 9.2.1] In Knowledge Space theory, a "domain" is the set of all items making up a particular subject matter, such as General Chemistry. A learner is considered to have mastered the domain when that learner can solve problems corresponding to all the items in the domain.

What is a "knowledge state"?

[**Sec. 9.2.2**] In Knowledge Space theory, a "knowledge state" is the set of items belonging to a domain that a learner has mastered at some point in time. We speak of knowledge states in relation to a particular learner and a particular domain. Obviously, a learner's knowledge changes in time, and the goal of learning is that the knowledge state should eventually include (correspond to) the entire domain.

What is the "outer fringe" of a knowledge state?

[**Sec. 9.2.4**] In Knowledge Space theory, a learner's "outer fringe" is the set of items, any one of which can be added to the current knowledge state to make a new, feasible knowledge state. These are the items that the student is considered most "ready to learn." Progress is made from one state to another through one of the items in the first state's "outer fringe."

What is the "inner fringe" of a knowledge state?

[**Sec. 9.2.4**] In Knowledge Space theory, a learner's "inner fringe" is the set of items, any one of which can be taken away from the current knowledge state to make a new, feasible knowledge state. These are the items that the student may have learned recently, and thus whose knowledge might need reinforcement.

What is a "knowledge structure"? What is a "knowledge space"?

[**Sec. 9.2.3**] In Knowledge Space theory, "knowledge structure" or "knowledge space" (the two concepts differ in a technical way) refers to the collection of feasible knowledge states for a particular domain. It is a key point that not all sets of items from the domain (subsets of the domain) are feasible knowledge states. For instance, in mathematics there can be no knowledge state containing the item "finding the square root of an integer" that does not contain the item "addition of two-digit numbers without carry," since no one will master the first without having mastered the second.

How was the structure created?

The knowledge structures (or, briefly, "structures") used by ALEKS are created by analysis of the subject matter and refined on the basis of data obtained from students' learning experiences. When ALEKS assesses a student, it is actually searching the structure for knowledge states that match the student's present competence.

What is the educational philosophy behind ALEKS?

The educational use of ALEKS is not tied to any particular theory of education or knowledge acquisition. A key insight underlying ALEKS is the existence of a vast multiplicity of diverse "learning paths" or sequences of topics by which a field can be mastered. Based on an inventory of knowledge states that numbers in the tens of thousands (for the subjects currently covered by ALEKS), the specialized tools of Knowledge Space theory make it possible for the system to accommodate literally billions of possible individual learning paths implied by the relations among states.

ALEKS does not embody a particular philosophy of teaching chemistry; it is compatible with any pedagogical approach.

10.4 Assessments and Reports

Much of the power of ALEKS comes from its capacity for accurately and efficiently assessing the current state of a learner's knowledge.

What is an ALEKS assessment?

[Chapter 4] An assessment by the ALEKS system consists of a sequence of problems posed to the student. The answers are in the form of chemical expressions and constructions produced by the system's input tools (no multiple choice). The student can answer "I don't know" where necessary. During an ALEKS assessment, the student is not told whether answers are correct or incorrect. The assessment is adaptive. Each question after the first is chosen on the basis of answers previously submitted. Assessment problems (like practice problems) are algorithmically generated, with random parameters. The length of the assessment is variable, between 15 and 35 questions. There are no time constraints, but some assessments can take less than a half-hour and a few more than an hour and a half. Students taking an assessment need to have paper and pencil. Calculators are not permitted in some areas in ALEKS, but a basic calculator is part of ALEKS.

No help whatsoever should be given to students taking an assessment, not even rephrasing problems. Outside help can easily lead to false assessment results and hinder subsequent work in the ALEKS Learning Mode.

Students are always assessed when they first register with ALEKS. It is advisable that all assessments from which the instructor uses data for grading or a similar purpose take place under the instructor's supervision. At a minimum, the Initial Assessment should be supervised.

How does the ALEKS assessment work?

[Sec. 9.2.5] In assessing a student's knowledge, the system is in fact determining which of the feasible knowledge states for that subject correspond to the student's current knowledge. The assessment is probabilistic, so it is not fooled by odd careless errors. (Lucky guesses are very rare, because multiple choice answers are not used.) Likelihood values (values for the likelihood that the student is in a particular knowledge state) are spread out over the states belonging to the structure. With each correct answer, the likelihood of states containing the item for which a correct answer was given is raised and that of states not containing the item lowered. The reverse occurs for incorrect answers or "I don't know." At each step of the assessment, the system attempts to choose an item for which it estimates, based on current likelihood values, that the student has about a fifty-fifty chance of success; such questions are maximally informative. When the likelihood values of a few states are extremely high and those of all the rest are extremely low—in technical terms, when the entropy of the structure is lower than a certain threshold value—the assessment ends and results are produced.

If a student makes a careless error or lucky guess, this will appear inconsistent with the general tendency of the student's responses, and the system will "probe"

that area of knowledge until it is sure. For this reason, inconsistent assessments may require more questions.

How should I interpret the assessment report?

[Sec. 4.6] The results of an ALEKS assessment are shown in the form of a color-keyed pie chart. A pie chart corresponds to a subject matter (domain) or to the curriculum of a particular class. Each slice of the pie corresponds to a general topic. The degree to which the slice is filled in with solid color shows how close the student is to mastering that area.

An extremely important aspect of the pie chart is its indication of what a student is currently most "ready to learn" (that is, the "outer fringe" of the student's current knowledge state). These items are listed beneath the pie chart in an Assessment Report and are also given through the pie chart itself. When the mouse pointer is placed over a slice of the pie, a list expands out of the pie, showing the concepts that the student is most "ready to learn" in that part of the curriculum. Clicking on any of these concepts takes the student into the Learning Mode.

The pie chart is displayed following assessments, after a concept has been worked on in the Learning Mode, or when a student clicks on "MyPie" to change topics. At any given time, a student can only choose to work on concepts that the student is currently "ready to learn." This number may vary between two and a few dozen, depending on what part of the structure is involved.

10.5 Learning Mode

Students spend by far the greatest part of their time in ALEKS in the Learning Mode. The features of the Learning Mode are designed to provide a maximum of support to the student's growing mastery of course materials.

What is the Learning Mode?

[Chapter 5] The Learning Mode in ALEKS contains features to help students practice and master specific chemical concepts and skills. In the Learning Mode, students are always working on a specific concept that they have chosen and that, in the system's estimation, they are fully prepared to master. If the learner successfully solves an appropriate number of problems based on that concept, the system will tentatively determine that it has been mastered and offer a new choice of topics. If the student has difficulty, the system will attempt to diagnose and interpret the student's errors. It will also provide explanations of how to solve problems and definitions of chemical terms. It may suggest the name of a classmate who can help. If the student is unable to master the concept right now, or if the student wishes to change topics, a new choice of topics will be offered. After a certain amount of time has been spent in the Learning Mode, or after a certain amount of progress has been made, the student will automatically be reassessed.

What is the relationship between the Assessment Mode and the Learning Mode in ALEKS?

The Assessment and Learning Modes work together in a cyclical fashion, beginning with the Initial Assessment. A student is assessed, and the results of the assessment serve as a basis for the student's entry into the Learning Mode (the student works on concepts that the assessment showed that student most "ready to learn"). After a certain time in the Learning Mode, during which the results of the previous assessment are tentatively updated according to whether the student masters or fails to master new concepts, the student is reassessed and the cycle begins again. In this sense, ALEKS is an interactive learning system guided and powered by ongoing diagnostic assessment.

10.6 Educational Use

ALEKS also provides a full range of features for successful integration into a variety of teaching styles and class plans.

What is the best way to use ALEKS with my class?

The greatest factor in successful use of ALEKS is regular, structured use, with close monitoring of student progress by the instructor. We recommend scheduling regular lab sessions with ALEKS, totalling at least three hours per week, as part of your class requirements. Not every lab session need be supervised by the instructor, but the Initial Assessment should be. Any other interim and concluding assessments scheduled specially by the instructor normally should also be supervised.

There has been successful use of ALEKS in a very wide variety of contexts and structures, including independent study. ALEKS Corporation is happy to consult with instructors on the best way to use ALEKS with their students. Also, extensive materials on implementation strategies in ALEKS are available on the ALEKS website.

Can ALEKS be used with handicapped and learning-disability students? Is ALEKS a remedial tool?

ALEKS is designed to help all students who can read sufficiently to understand what is being displayed on the screen, and who can use a computer. It has been used successfully with students exhibiting a range of learning disabilities. Students with reading difficulties can also use it, provided that there is someone on hand to help them as needed. The system does not currently contain facilities for audio output.

What burden will ALEKS place on our computer lab and Lab Director/LAN Administrator?

Normally ALEKS requires very little support from local computer technicians, given the automatic installation and maintenance of the ALEKS plug-in. Most of the time, however, the lab administrator will need to assist with installation in

order to overcome security obstacles (college computer labs often prevent students from installing their own software). In some cases, the presence of a "firewall" or other security measures may require some action on the technician's part for successful installation. Again, ALEKS Corporation stands ready to assist with problems of this nature.

Does ALEKS need to be used with a particular textbook or curriculum?

ALEKS is designed to be used with any syllabus, curriculum, or textbook. The system may also be referenced or linked to a textbook or online applications for particular classes. The fundamental idea of the ALEKS system is to allow students to pursue individualized paths to mastery of the subject matter. For this reason instructors may often find their students learning material that has not yet been covered in the class.

Does ALEKS have special features for educators?

[**Chapters 6, 7**] Students' use of ALEKS and their progress toward mastery can be monitored using the facilities of the Instructor Module. The Instructor Module also enables instructors and administrators to establish the syllabi and standards used by ALEKS, to configure accounts, to find statistics on multi-campus college system use, and to exchange messages. An instructor or administrator who has been registered with ALEKS enters the Instructor Module immediately upon login.

How can I contact ALEKS Corporation Customer Support?

[**Sec. 11**] You can contact ALEKS Corporation using the information in Chapter 12 of this manual. Students should approach their instructor first with any questions or problems regarding the use of ALEKS. Questions the instructor cannot answer should be brought to our attention.

Chapter 11

Support

NOTE. Troubleshooting information is found in Appendix A.9 of this Instructor's Manual. Most problems can be resolved using this brief reference.

Current information on ALEKS is available at the ALEKS website:

http://www.aleks.com

Technical support and consultation on the effective use of ALEKS is provided to educators by ALEKS Corporation. Please contact the support group via the web:

http://support.aleks.com

by telephone:

(714) 619-7090

or by fax:

(714) 245-7190

NOTE. We ask that students using ALEKS not contact us directly, but approach their instructors first. It is hoped that the information in this Instructor's Manual will enable instructors to answer many of their students' questions.

We also welcome any and all comments and feedback on ALEKS. Here is our mailing address:

ALEKS Corporation Customer Support
15460 Laguna Canyon Road
Irvine, CA 92618

Appendix A

ALEKS Student User's Guide

A.1 Preface

Welcome to ALEKS, one of the most powerful educational tools available for learning chemistry.

ALEKS combines advanced learning technology with the flexibility of the Internet, and provides an interactive system with unmatched features and capabilities. ALEKS was developed with support from the National Science Foundation. It is based on a field of Mathematical Cognitive Science called "Knowledge Spaces," which models human knowledge for precise assessment and efficient learning in interactive computer programs.

Based on your assessment results, ALEKS will understand what you know, what you don't know, and most importantly, what you are ready to learn. ALEKS provides individualized, one-on-one instruction that fits your exact knowledge state and helps you select the ideal topics to work on next. That way you will learn concepts in the order that's best for you. As you learn, ALEKS constantly challenges you and supplies extensive feedback on what you have accomplished.

Since ALEKS is available on the Internet, it fits any busy schedule. To get started immediately, you may refer to the Quick Start Instructions below. More detail is provided in the subsequent sections.

Also, your instructor can help you register and begin using ALEKS. ALEKS includes online instructions and feedback and is designed for use without help from a manual. If you need additional information, please refer to this booklet or contact ALEKS Customer Support.

NOTE. Two or more students cannot use the same ALEKS account. ALEKS will regard them as a single person and give incorrect guidance.

A.2 Quick Start Instructions

1. **System Requirements**

   (a) PCs must have at least 64 MB of RAM and Windows. Compatible browsers are Internet Explorer 7.0 or higher, Firefox 3 or higher, and Chrome 4 or higher.

   (b) PowerMacs or iMacs must have at least 64 MB of RAM and operating system Mac 0S 10.4 or higher. Compatible browsers are Safari 4 or higher and Firefox 3 or higher.

2. **Internet Access Requirements**

   (a) ALEKS is used over the Internet. It functions well with a connection of at least 56K.

3. **Java Installation**

   (a) Java must be installed and enabled in order for ALEKS to function. For best performance, there should be a single installation of a recent version of Java.

4. **The ALEKS Plug-in**

   (a) The ALEKS plug-in is required for the use of ALEKS. It is normally installed as an automatic part of the registration or login process. The ALEKS plug-in can also be downloaded from the ALEKS website by clicking on "DOWNLOADS."

5. **The ALEKS Tutorial**

   (a) The ALEKS Tutorial shows how to input answers in ALEKS. Taking the time to learn this is important in order to use ALEKS efficiently.

6. **Initial Assessment**

   (a) Your first ALEKS assessment will determine what topics you already know, the topics that you don't yet know, and, most importantly, those you are ready to learn.

   (b) Here is some additional information about the assessment:

      i. It consists of about 20-30 open-response questions (not multiple choice).

      ii. It has no time limit. You may take breaks or stop the assessment and return to ALEKS at another time.

      iii. You should have a pencil and paper with you in order to work through the problems.

   (c) You should not seek or receive any help during assessments. If you receive help, ALEKS will get a wrong idea of what you are most ready to learn, and will present you with material you are not ready to learn. This will hold up your progress in ALEKS.

   (d) You should do your best on all questions. Do not click the "I don't know" button when answering a question unless you truly have no idea how to do the problem. When you click the "I don't know" button, ALEKS assumes that you don't know how to do the problem type and possibly some of its prerequisite topics.

(e) You should **not** use your browser's "Back" and "Forward" buttons while logged on to ALEKS. Doing so will not help you make progress and may cause temporary software errors.

(f) ALEKS will not provide feedback when you are taking the Initial Assessment in ALEKS. No messages will be displayed indicating whether you answered correctly or incorrectly during any of the assessment questions in ALEKS.

(g) External calculators should not be used; the ALEKS Calculator button will become active when calculator use is appropriate.

7. **Assessment Results**

(a) Assessment results are presented in the form of a color-coded pie chart.

(b) Slices of the pie chart correspond to parts of the syllabus.

(c) The relative size of the slices reflects the importance of each topic area for the syllabus.

(d) The darker part of each slice indicates the portion of the topics already mastered. The lighter part of each slice indicates the portion of topics still to be learned.

(e) The topics that you are ready to learn will be listed as you place the mouse pointer over each slice.

(f) Not all slices will contain available concepts at any given time. They may have been mastered already, or work may need to be done in other slices before they become available.

(g) You may choose any topic listed and begin learning.

8. **Learning Mode**

(a) Clicking on the "MyPie" icon, in the upper left corner of your screen, will display your pie chart and allow you work in the ALEKS Learning Mode. Topics you are ready to learn will appear in the pie slices.

(b) It is possible your ALEKS class will include chapters/Objectives that should be completed by a specific date. The chapter/Objective will include topics in your pie chart indicated by white dotted lines in some or all of your pie slices. ALEKS will display a message under your pie chart indicating how many topics you have remaining in the chapter/Objective and when it is due.

(c) If you complete a(n) chapter/Objective completion assessment before the next one begins you will have the added benefit of having your pie chart unlocked. Topics in the pie chart will be available for you to work on, (provided the topic is in your ready to learn list), even if the topic is in a future chapter/Objective. All, or nearly all, of the previously un-mastered items should also appear in the unlocked pie. The pie will remain unlocked until the current deadline expires, at which time your learning will be limited to topics in the next chapter/Objective.

9. **Guidelines for Effective Use**

(a) You should have pencil and paper ready for all assessments and for use in the Learning Mode.

(b) The basic calculator included in ALEKS will only become active and available for use when appropriate.

(c) To maximize successful learning, ALEKS should be used regularly, and for at least three hours per week.

A.3 Registration and Installation

In order to register as an ALEKS user, you need a **Student Access Code** (20 characters), which may be purchased through your campus bookstore, online as part of the ALEKS registration process, or in some other way. If this booklet was purchased through the bookstore, the Student Access Code may be inside its back cover. You also need a **Class Code** (10 characters) provided by your instructor. When you register with ALEKS, your name is entered into the database, and records of your progress are kept. If the ALEKS plug-in has not been installed on the computer being used for registration, it will be installed automatically as part of this procedure.

1. Go to the ALEKS website:

   http://www.aleks.com

   When entering this URL, pay careful attention to the spelling "aleks."

Figure A.1: The ALEKS Website

2. Click on "SIGN UP NOW!" on the left of the page, under the space for Registered Users (Fig. A.1).

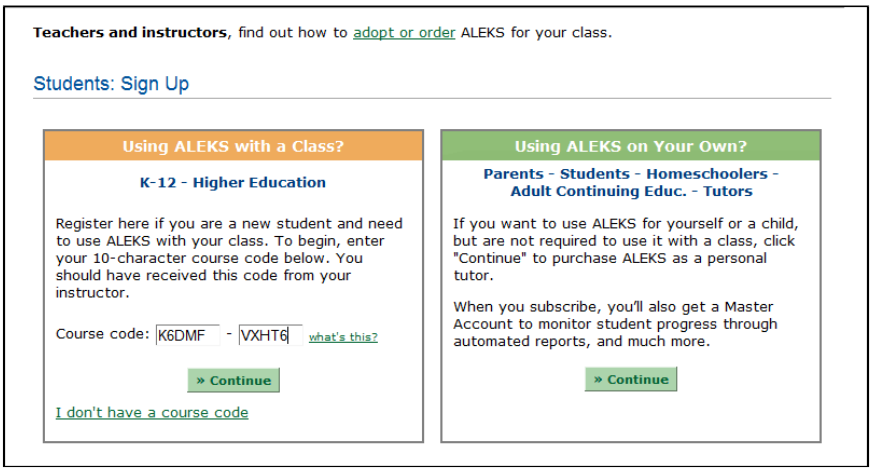


Figure A.2: Class Code

3. At the beginning of Registration you will be asked for your **Class Code**. The Class Code is supplied by your instructor. Enter this in the spaces provided, on the **left-hand side** of the window, and click on "Continue" (Fig. A.2).
4. Next, ALEKS will check whether you have ever used ALEKS before. Check the appropriate response and click on "Continue." If you have used ALEKS before, you will be prompted to enter in your ALEKS login name and password before moving on.

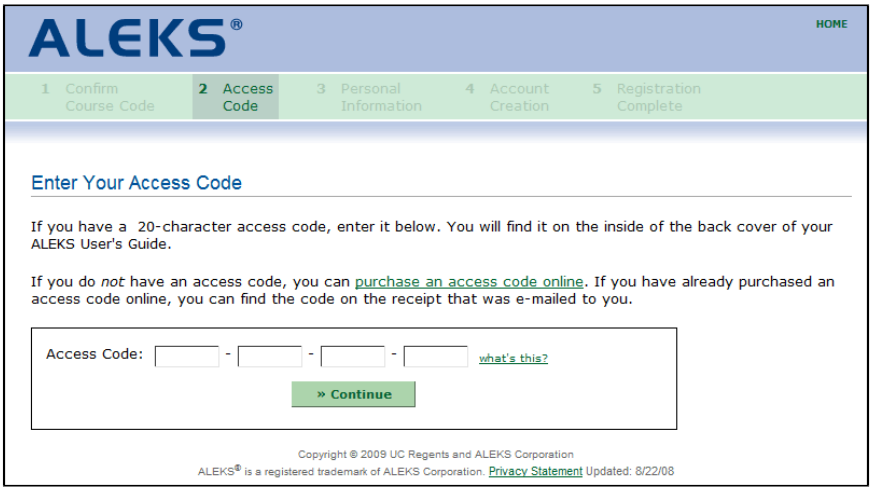


Figure A.3: Access Code

5. To continue your registration you will be asked for your **Student Access Code**. It may be packaged with the textbook, or can be purchased directly from ALEKS Corporation by using the link on this page ("purchase an access code online"). Enter the Student Access Code in the spaces provided and click on "Continue"

(Fig. A.3).

6. Enter your personal information and choose a Password. Supplying this information enables your site administrator to help you with problems more quickly. You will also be able to enter your Student ID number.
7. At the end of registration you will be given a Login Name. You will need the ALEKS Login Name and your Password to return to ALEKS. You can change your Password at any time (Sec. A.6.5).

   Your Login Name and Password can be typed with upper- or lower-case letters. Neither may contain spaces or punctuation. If you forget your Password, click on the link "Forgot your login info?" located underneath the Password field on the ALEKS home page.
8. When you enter your Login Name and Password on the ALEKS home page, ALEKS will check to see if the ALEKS plug-in is installed. If you do not have a plug-in, one will be installed. Do not interrupt this process until a message appears saying that the installation is complete. Then you will need to quit your web browser ("Exit," "Close," or "Quit" under the "File" menu), open your web browser again, and go back to the ALEKS website (use your Bookmark/Favorite).

A.4 Student Account Home

After completing the registration process, you will be taken to the Student Account Home. The Student Account Home groups all ALEKS student accounts for a single student under the same umbrella account. This allows students to manage and add more ALEKS classes to their umbrella account rather than creating separate accounts for each ALEKS class. Students will also only need to remember one Login Name and Password.

The Student Account Home lists your current and post ALEKS classes, and includes options to sign up for new classes, switch classes, suspend classes, extend access to classes, and remove classes from the Student Account Home.

A.4.1 Account Management

When you log in to your ALEKS account, you will arrive at the Student Account Home main screen and have the following options available to you:

Account Settings

To access the account settings, you can click on your name in the upper right corner of the Student Account Home main screen. The account settings display information for both the umbrella account and the college that you attend. This information includes your name, the Login Name for the umbrella account, the account Password (hidden), and the email address

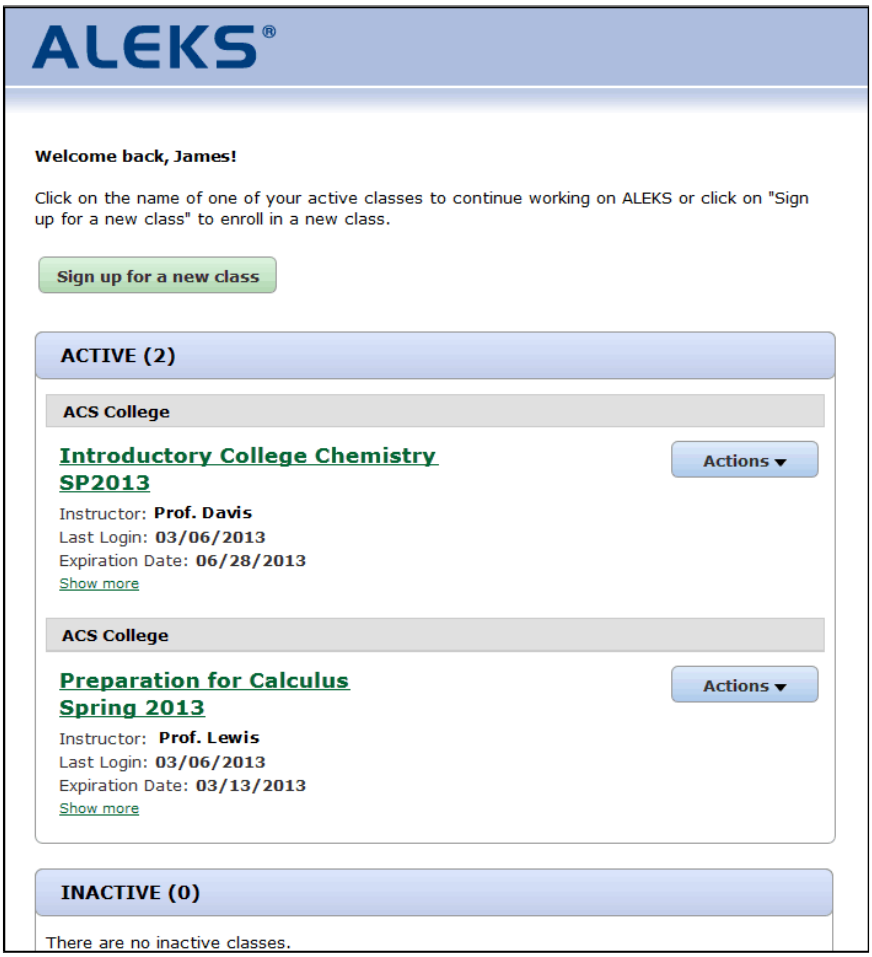


Figure A.4: Student Account Home Main Screen

linked to the account. You can edit certain entries by clicking on the "Edit" link to the right. To return to the main screen, click on the "Done" button.

Adding a New Class

You can add a new class by clicking on the button "Sign up for a new class" (Fig. A.4). You will be prompted to enter in the class code for the new class and then purchase a new access code. Once the new class has been added, it will be displayed in the ACTIVE section on the Student Account Home main page, along with any other active courses.

Active Classes

All classes in which you have an active account will be listed here. You will see the name of the class, the name of the instructor, the date you last logged in to the account, and the date your access to the class will expire. Additional information can be accessed by clicking on the "Show more" link, including the Class Code, the Reference ID for the account, the date the account was started, the amount of time spent in the class, and the current level of progress.

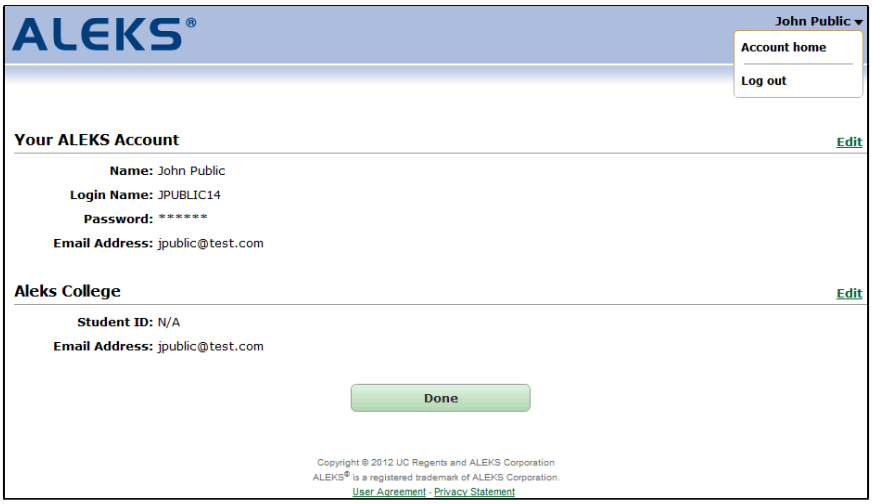


Figure A.5: Student Account Home Settings

Inactive Classes

The INACTIVE section will display a list of your classes that are no longer active. The same class information that is displayed in the ACTIVE courses is available here.

Accessing a Class

You can access an active class by clicking on the class name. You will be taken to your pie chart for that class and will be able to work on topics. To return to the Student Account Home main screen, you can click on your name in the upper right corner and select the "Account home" option. To completely log out, choose the "Log out" option after clicking on your name.

A.4.2 Class Management

ACTIVE Class Options

The following options are available for ACTIVE classes by clicking on the Actions button:

Switch to a new class. You can switch to a new class by entering in a new class code. When you do this, the new course will become active and the previously active course may appear under "INACTIVE" (see below).

Suspend Access to this Class. This option will only appear when your subscription meets the eligibility requirements for suspension (Sec. A.4.4). Once suspended, an account appears under the ON-HOLD section.

Extend Access to this Class. You can extend access to your class by selecting the Extend option and entering a new 20-character access code.

ON-HOLD Class Options

The following options are available for ON-HOLD classes by clicking on the Actions button:

Reactivate Accounts. You can click on the Reactivate button when you are ready to reactivate a class that was suspended or placed on hold by a Leave of Absence (Sec. A.4.4 and Sec. A.4.5).

INACTIVE Class Options

The following options are available for INACTIVE classes by clicking on the Actions button:

Download Progress (PDF). This allows you to view a Progress Report for an inactive class.

Renew access to this class. This option allows you to renew access to an account by entering a new 20-character access code. The course will then appear under "ACTIVE."

Delete from my account. Inactive class accounts may be deleted; they will then no longer be displayed in the Student Account Home.

A.4.3 Switching to a New Class

If you need to move an account into a new class, ALEKS will behave differently depending on the Start Date entered by the instructor for the classes, not on the amount of time the student has been enrolled in the class.

If you switch into a new class when the difference between the Start Date of the two classs is less than or equal to 30 days and both ALEKS classs are the same:

- Your new class will appear in the ACTIVE section
- Your old class will no longer appear (not even in the INACTIVE section)
- Any progress you made in the old class will not appear to the instructor in the old class
- Any progress made in the old class will be carried forward to the new class, you will not be requried to take another Initial Assessment

If you switch into a new class when the difference between the Start Date of the two classs is greater than 30 days or both ALEKS classs are different:

- Your new class will appear in the ACTIVE section
- Your old class will appear in the INACTIVE section
- Any progress made in the old class will remain visible in the old class and will not be carried forward.
- You will be required to take a new Initial Assessment

A.4.4 Suspend Account

This feature is intended to provide additional flexibility in the student's access to an already purchased subscription with ALEKS. The "Suspend access to this class" feature is used when a student has already purchased an access code and registered with ALEKS, but then decides to drop the course with the intention of taking it again at the next opportunity.

This feature can be used within a limited time after the student activates their account.

- 6-week access codes can be suspended within 7 days of activation **OR** if the account has less than 5 hours of use, whichever comes first.
- 11-week access codes can be suspended within 14 days of activation **OR** if the account has less than 8 hours of use, whichever comes first.
- 18-week, 2-semester, 3-quarter, and 52-week access codes can be suspended within 30 days of activation **OR** if the account has less than 10 hours of use, whichever comes first.

To suspend access to their class, students choose the action "Suspend access to this class" from the Actions drop-down menu.

After students select this option, they will be asked to confirm whether or not they wish to suspend the account. Once this feature has been activated, the system will suspend the account for a period of time equal to the length of the access code they purchased (6 weeks, 11, weeks, 18 weeks, etc.). At the end of this period the account will be reactivated automatically, and its time will begin to run. Once the account is reactivated, the student will have the full subscription length originally purchased.

Cancel Suspension. Should the student suspend their account and then need it to be reactivated, they will need to contact ALEKS Customer Support. If the suspension is cancelled, the time remaining for the access code will be recalculated from the original start date. Note that the Suspend feature can only be used once per account.

A.4.5 Leave of Absence

In contrast to the Suspend feature, the Leave of Absence feature applies only to 2-semester (40 week), 3-quarter (also 40 weeks), and 52-week access codes; it takes effect automatically after a certain number of weeks have passed since the access code was activated.

First notification. 20 weeks after the access code was used to activate the account, students will see a warning message informing them that their first 21 weeks of use will expire on a specified date. The leave will begin automatically 21 weeks after the account is activated.

Second notification. When students log in after the 21st week, they will see another message informing them that the account is on hold and the date on which the account will automatically resume, if not manually reactivated.

If students choose to resume using the account prior to the specified automatic reactivation date, they will be asked to confirm the reactivation. Once confirmed, students will be given access for the appropriate length of time remaining on the access code.

A.5 Tutorial

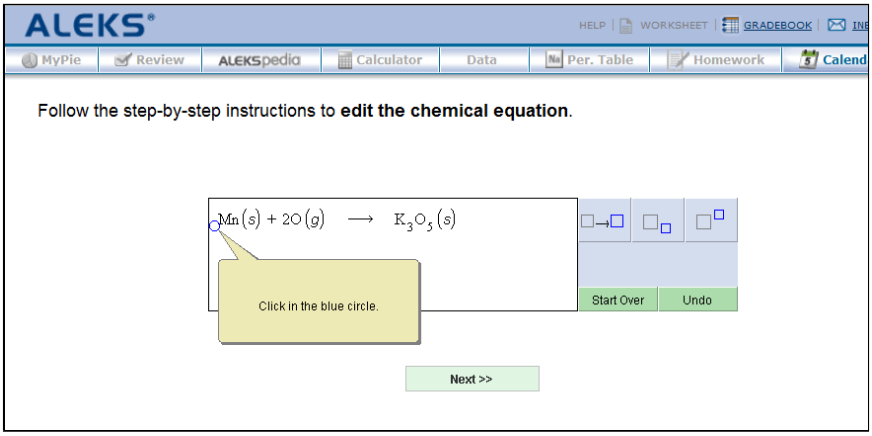


Figure A.6: The Answer Editor (Tutorial)

After Registration, the ALEKS Tutorial will teach you how to enter your answers in ALEKS (Fig. A.6). There is plenty of feedback to help you complete it successfully. The Tutorial is not intended to teach chemistry. It just trains you to use the ALEKS input tool (called the "Answer Editor"). Online help is also available while you are using ALEKS; just click the "Help" button, which gives you access to the sections of the Tutorial.

A.6 Assessments and Learning

A.6.1 Assessments

Instruction through ALEKS is guided by precise understanding of your knowledge of the subject. This information is obtained by assessments in which ALEKS asks you to solve a series of problems. (ALEKS's estimate of your knowledge is also updated when you make progress in the Learning Mode.) Your first assessment occurs immediately after the Tutorial.

NOTE. Your instructor may require that the first assessment be taken under supervision. **Don't try to begin your Initial Assessment at home until you find out where your instructor wants you to take it.** Additional assessments may be scheduled for you by the instructor. These may or may not need to be supervised, depending on the instructor's preference. ALEKS also prompts automatic re-assessments when you have spent a certain amount of time in ALEKS or have made a certain amount of progress.

A.6.2 Results

Assessment results are presented in the form of a color-coded pie chart. Slices of the pie chart correspond to parts of the syllabus. The solidly colored part of a slice indicates how close you are to mastering that part of the syllabus; the lighter portion represents the material you have left to master.

A.6.3 Learning Mode

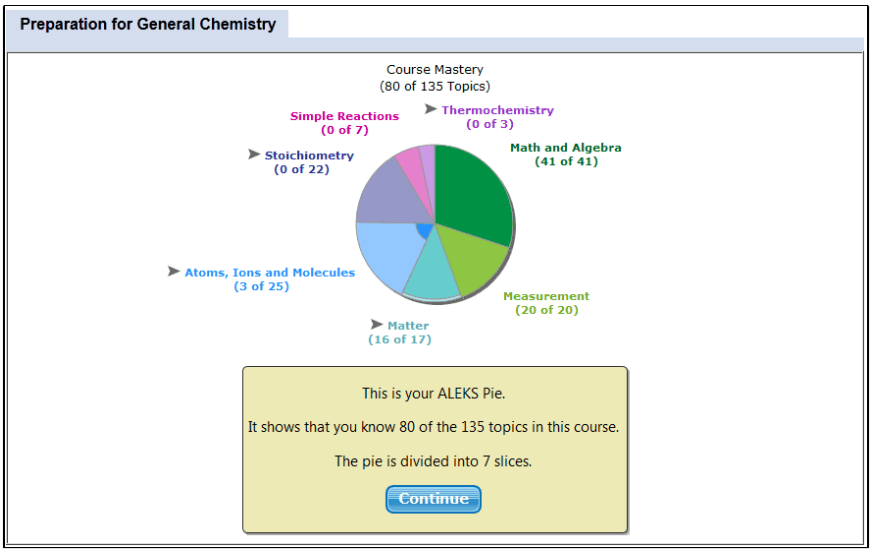


Figure A.7: Assessment Report

Following the presentation of assessment results, ALEKS will introduce you to a pie chart navigation tool ("MyPie") (Fig. A.7). By placing the mouse pointer over slices of the pie, you can see which concepts you are now most ready to learn. Not all slices will contain concepts at any given time. They may have been mastered already, or work may need to be done in other slices before they become available. The concept you click on becomes your entry into the Learning Mode. ALEKS will help you to master that concept and add it to your pie.

A.6.4 Progress in the Learning Mode

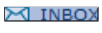
In the Learning Mode, you are given problems based on the chosen topic. Additionally, you have access to explanations of how to solve the particular kind of problem and to the ALEKSpedia. Underlined terms are links to the ALEKSpedia. Click on any term to get a complete definition and additional information on the given topic. By entering the ALEKSpedia, you have the ability to go backward within the material and read or review the information leading to where you are now. There are also a number of interactive boxes illustrating certain topic ideas. ALEKS will require a number of correct answers before it assumes that you have mastered the concept. When the topic is mastered, ALEKS will add the topic to your pie. At that point, a revised pie chart will be shown reflecting your new knowledge. You will be able to choose a new concept to begin. If you make mistakes, more correct answers may be required. If you tire of the topic and wish to choose another, you can click on "MyPie" near the top of the window. If you make repeated errors on a concept, the system will conclude that the concept was not mastered, and will offer you a new choice of other concepts.

A.6.5 Additional Features

All buttons described below are available in the Learning Mode. In the Assessment Mode, certain buttons may be temporarily inactive.

For online help with the use of the Answer Editor, click "Help."

To print out an individualized homework sheet based on your most recent work in ALEKS, use the "Worksheet" button.



Your instructor can send you messages via ALEKS. You see new messages when you log on. You can also check for messages by clicking on "Inbox" (Sec. A.6.6). ALEKS provides a way to send your instructor a specific problem you are working on in ALEKS. Your instructor can choose to let you reply to messages as well.

Any time you wish to look at your assessment reports, click on "Report." Choose any date from the drop-down menu and click "OK."

This page gives you the options to participate in "Ask a Friend" or forward your ALEKS messages to your email account. This page also shows the total number of hours you have spent using ALEKS.

To access any special resources posted to your class by your instructor, click on the "Resources" button.

To end your ALEKS session and exit, click on your name (top right), and select "Log out" from the drop-down menu.

Clicking "MyPie" gives you a pie chart summarizing your current mastery. You can use this pie chart to choose a new concept.

To review past material, use the "Review" button.

To search the online ALEKSpedia and enter the ALEKSpedia, click "ALEKSpedia." You can also click on hyperlinked terms in the ALEKS interface to access the ALEKSpedia.

To access the online ALEKS Calculator, use the Calculator button. This button will be inactive for material where the use of a calculator is not appropriate. When this button is inactive, do not use any calculator.

This button gives access to a brief reference page for useful chemistry information, including formulas, constants, and other data. Click on the plus sign ("[+]") preceding any category to see the information available under that category.

This button opens a page with the complete Periodic Table of the Elements. Clicking on any element symbol opens a window with essential information about that element.

To see the results of assignments you have taken in ALEKS or to begin a pending assignment, use the "Assignments" button. If assignments are currently available, you will see an orange burst on the "Assignments" button.

To access the Gradebook for your class, click on the "Gradebook" button.

To access the Calendar for your class, click on the "Calendar" button.

A.6.6 ALEKS Inbox

The Inbox allows you to send messages to your instructor if you need assistance with a topic or problem in ALEKS. To compose a message, click "Compose." There is an option to include mathematical notation in your messages.

To include mathematical notation and illustrations:

1. Click the "math" symbol at the right end of the tool bar. This switches you to the "Enhanced message editor," with a robust set of math input tools.
2. Included in the Math input tools are a "Chemical equation button" and "Advanced" tab with additional graphing features.

While working in the Learning Mode, you can send a specific problem type to your instructor for assistance. This will include a link in the message, showing a screenshot of the practice problem that you see on your screen.

To attach a specific problem, make sure the practice problem is still on the screen, then:

1. Click on the "Inbox" link. This will take you into the ALEKS Message Center.
2. Click on the "Compose" button.
3. Below the body message section, check the box next to "Attach Page."
4. Click on the "Send" button to send the message.

You also have an option to include attachments in your messages. The attachments can be up to 2MB in size.

A.7 Guidelines for Effective Use

Please take note of the following important suggestions for successful use of ALEKS.

Supplementary Materials

You should have pencil and paper ready for all assessments and for use in the Learning Mode. Basic calculators should be used only when you are instructed to do so. (A basic calculator is part of ALEKS.)

Assessments

You should not ask for any help during assessments. Even explanations or rephrasing of problems are not permitted. If you receive help, ALEKS will get a wrong idea of what you are most ready to learn, and this will hold up your progress. If you are sure you don't know the answer, click "I don't know."

Learning Mode

You should learn to use the special features of the Learning Mode, especially the explanations and the ALEKSpedia. A button marked "Ask a Friend" may also appear from time to time. Clicking on this button will prompt ALEKS to suggest the name of a classmate who has recently mastered the concept.

Review

Whenever ALEKS suggests topics for you to review, you should review them. Spending a few minutes daily on such review will help you retain what you have learned and do well on reassessments.

Regular Use

Nothing is more important to your progress than regular use of ALEKS. Three hours per week is a recommended minimum; five or more are normal in many cases.

A.8 Frequently Asked Questions

For further information on any of these questions, follow the references provided to other sections of this Guide.

What are the rules for taking an assessment in ALEKS?

[**Sec. A.7**] You must have paper and pencil when taking an assessment in ALEKS. For Prep for General Chemistry, a simple calculator is permitted. A basic calculator may be provided for some questions. No help whatsoever is permitted, not even rephrasing a problem.

Cheating is not an issue, since each student is given different problem-types in different sequences. Even if, by chance, two students sitting next to one another were to get the same problem-type at the same time, the actual problems would almost certainly have different numerical values and require different answers.

During the assessment, you will not be given feedback about your answers. **The assessment is not a test.** Its main purpose is to determine what you are most ready to learn and help you make the best possible progress toward mastery.

How do I add concepts to my pie?

[**Sec. A.6.4**] You fill in your pie and achieve mastery in the subject matter by working in the Learning Mode on concepts and skills that the assessment has determined you are most "ready to learn." When you master a concept in the Learning Mode by successfully solving an appropriate number of problems, you will see that your pie chart has been changed by the addition of that concept. The goal is to fill the pie in completely.

Why is it that I mastered all the concepts in the Learning Mode, but my assessment still says I have concepts to learn?

In the Learning Mode, you are always working on one concept at a time, whereas assessments are cumulative and evaluate you on everything in the given subject matter. It may be more difficult to show mastery of concepts you have recently worked on, when you are being quizzed on many different topics at the same time. For this reason, your assessment results may not exactly match what you had mastered in the Learning Mode. This is normal and simply means that you should keep working in the system. (Sometimes the opposite also occurs, and progress in the assessment turns out to be faster than in the Learning Mode.)

Why doesn't my pie chart show any concepts from a slice if I haven't filled in that slice yet?

[**Sec. A.6.3**] You are completely "ready to learn" a set of concepts or skills when you have mastered all the prerequisite concepts or skills for them. For example, in order to learn "addition of two-digit numbers with carry" you might have to first learn "addition of two-digit numbers without carry" and nothing else.

Your pie chart will not offer you concepts to work on if you are not ideally ready to begin learning them, that is, if they have prerequisites you have not yet mastered. For this reason, your pie chart may show that you have mastered only 8 out of 10 concepts for a particular slice of the pie (a particular part of the curriculum), but the pie chart says you have no concepts available from that slice to work on. This means that the concepts left to master have prerequisites in other areas of the curriculum that you must master first. Keep working in the other slices, and eventually the concepts in that slice will "open up."

How can I best use the Learning Mode to help me learn?

[**Sec. A.6.4**] In the Learning Mode, you should do your best to solve the problems that are offered to you. You should not change topics casually or stop before the system tells you that you are done.

The Learning Mode will always tell you if your answer is correct or not. In many cases it will provide information on the kind of error you may have made. You should pay attention to this feedback and be sure to understand it.

At the bottom of the Explanation page you have the "Practice" button, and sometimes other options for more detailed explanations and help. The Explanation page may also contain a link or reference to a textbook used with the class. If you click the "Practice" button following an explanation, you are offered a different problem of the same type, not the one whose solution was explained. In order to master the concept and add it to your pie, you must successfully solve a certain number of practice problems. If you wish to choose a new concept, you can click the "MyPie" button on the ALEKS menu bar.

You should **not** use your browser's "Back" and "Forward" buttons while logged on to ALEKS. Doing so will not help you make progress and may cause temporary software errors.

Keep in mind that ALEKS is always giving you material that, in its estimation, you are ideally ready to learn. It does not offer material you have already mastered, except in the Review mode. To go back to concepts you have already worked on, click the "Review" button on the ALEKS menu bar.

How does ALEKS create problems?

ALEKS creates problems in both Assessment and Learning Mode by means of computer algorithms, based on the definition of a particular concept or skill to be mastered. Thus, a particular concept or problem-type may serve as the basis for a very large number of specific problems, each with different numerical values and sometimes (as in application problems) differing in other ways as well.

Why do I need to take the Tutorial to use ALEKS?

[**Sec. A.5**] The Tutorial is a brief interactive training program that teaches you to use the ALEKS input tools, or "Answer Editor." ALEKS avoids multiple-choice

questions. It almost always requires that answers be given in the form of complete expressions. The Answer Editor is a flexible set of tools enabling you to provide such answers. Although the Answer Editor is easy to use, the Tutorial will make sure you are completely proficient with it before beginning the ALEKS system. The Tutorial guides you through every step of learning to use the Answer Editor.

What can I do if I make a mistake entering an answer?

If you make an error entering an answer with the Answer Editor, you should click on "Undo" to go back one step, or on "Clear" to start over. You can also use the "Backspace" key on your keyboard in the usual way.

NOTE. You cannot use "Undo" or the "Back" button on your browser to go back if you have submitted an answer by clicking on "Next." If you realize that the answer you submitted is incorrect, don't be concerned; the system will most likely recognize this as a careless error based on your other answers and make allowances for it.

What are the icon buttons for?

They are used to enter symbols and to create forms for chemical expressions.

How do I get help on using ALEKS?

[**Sec. A.6.5**] You can get help using the Answer Editor by clicking the "Help" button on the ALEKS menu bar.

Can my instructor or friend help me (or can I use a calculator) in the Learning Mode?

[**Sec. A.7**] Help and collaboration are allowed in the Learning Mode. Keep in mind, however, that if you get too much help, the system will start giving you problems that you are not prepared to solve.

You need paper and pencil for the Learning Mode, just as you did for the assessment. ALEKS provides a calculator when appropriate; when the Calculator button is active, the use of the calculator is permitted.

Why are some of the words I see hyperlinked?

[**Sec. A.6.5**] Underlined words in the Learning Mode are links to the online ALEKSpedia. You can click on any hyperlinked word to see its definition. You can also access the ALEKSpedia by clicking the "ALEKSpedia" button on the ALEKS menu bar. The ALEKSpedia is not available during assessment.

Note that the ALEKSpedia is opened in a new window. When you are finished reading the definition, you can close or minimize the window, and you will see the previous screen.

What is the "Ask a Friend" button for?

[**Sec. A.7**] The "Ask a Friend" button sometimes appears when you are having difficulty with a particular concept. When you click on the button, the system suggests the name of a classmate who has recently mastered the concept and may be able to help you.

How can I change my Password?

[**Sec. A.4.1**] You can change your Password by clicking your name in the upper right corner of your screen and selecting the "Account Settings" option, followed by the "Edit" link.

How can I review material I have already worked on?

[**Sec. A.6.5**] You can click on the "Review" button to work on material you have already spent time on.

How can I choose a new topic to work on?

[**Sec. A.6.5**] To see your current pie chart and choose a new concept in the Learning Mode, click on "MyPie" (on the ALEKS menu bar), move your pointer over the pie, and choose a new concept from one of the slices.

How can I print something in ALEKS?

[**Sec. A.9**] To print the contents of the screen, you can click on the "Print" icon in the upper part of the ALEKS window. This produces a new, printable window (the ALEKS display is not normally printable). Depending on your browser, you may also have to click the browser's "Print" button. When you are done, you can close the new window.

What should I do if it's taking too long for a new page to load (or if the program freezes)?

[**Sec. A.9**] It shouldn't take more than a few seconds for ALEKS to respond when you click on any button. If you experience delay, freezing, or crashing, you can click your browser's "Reload" or "Refresh" button. If this doesn't work, you can close your browser and restart it. In extreme cases, use Ctrl-Alt-Delete (Cmd-Opt-Esc on Macintosh) and end the task. You will come back to the exact place you left off when you log back on to ALEKS.

How do I exit the ALEKS program?

To leave ALEKS, you can click your name (top right) and select "Log out" or simply close your browser. ALEKS always remembers where you left off.

What if I have a question or problem using ALEKS?

If you have a question or problem using ALEKS that is not answered here, please contact your instructor. Your instructor has been provided with extensive information on the operation of ALEKS and should be able to answer most questions you may have.

What if I forget my Login Name or Password?

If you forget your Login Name or Password, you can use the link on the ALEKS home page marked "Forgot your login info?" If you entered an email address at registration time, a link to reset your password will be sent to you by email. Otherwise, please contact your instructor.

How do I extend or renew my ALEKS account?

You will need to purchase a 20-character Student Access Code to renew your registration (this can be done online at the time of renewal). When your account

expires, you will be unable to access your account; instead, you will get a message indicating that the account has expired. On this page, click on the **left-hand** button. (Do **not** use the right-hand button.) Enter the 10-character Class Code and other information as prompted. You will now be able to continue using your ALEKS account.

A.9 Troubleshooting

Difficulties in using ALEKS can often be resolved by following the suggestions given in this section.

Login Not Successful

Be careful to type your Login Name and Password correctly, with no spaces or punctuation. If you forget your Login Name or Password, you can use the link on the ALEKS home page marked "Forgot your login info?" If you entered an email address at registration time, a link to reset your password will be sent to you by email. Otherwise, please contact your instructor.

Mixed Number Difficulties

Mixed numbers **must** be entered using the Mixed Number icon, **not** by entering the whole part and then using the Fraction icon.

Freezing and Slow Response

If you are logged on to ALEKS and the program is either not responding or taking too long to load a new page, try the following:

1. Click on your browser's "Reload" (or "Refresh") button;
2. Close the browser and log on again (the system will bring you back to where you left off); if you cannot close the browser, use Ctrl-Alt-Delete (PC) or Cmd-Opt-Esc (Macintosh) and end the task (or reboot if necessary).

Open applications, other than the web browser that you are using to access ALEKS, are another cause of slowness. Closing these applications may correct the problem.

If slowness persists, it is most likely due to a problem in the local network. Bring this to the attention of your instructor.

Lengthy Assessment

It is not possible to know exactly how many questions will be asked in an assessment. The number of questions asked does not reflect your knowledge of the subject matter.

Loss of topics from Pie Chart

You may observe a loss of concepts in your pie chart following an assessment. This is not a malfunction in the system, but results from errors made by you on material you had previously mastered. Don't worry: that is the way the system works. In

particular, it is not unusual to have a "bad" assessment, one that, for external reasons (distractions, etc.), does not reflect your actual knowledge. ALEKS will quickly bring you back to where you belong.

Printing Problems

To print ALEKS output (for instance, the pie chart Report) you must press the ALEKS "Print" button (on the ALEKS menu bar). This opens a new browser window containing the contents of the previous window in the form of a "Print Preview." When this page has been printed, it should be closed to return to the normal ALEKS interface.

Appendix B

Syllabi in ALEKS

B.1 Introductory College Chemistry

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation
alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form

alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder

Measurement

arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation
unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements

Matter

atom015 Distinguishing elements and compounds
atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
atom033 Distinguishing solid, liquid and gas phases of a pure substance
atom001 Names and symbols of important elements
atom002 Reading a Periodic Table entry
atom042 Understanding periods and groups of the Periodic Table
atom003 Organization of the Periodic Table
atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements

Atoms, Ions and Molecules

atom039 Identifying the parts of an atom
atom063 Counting the number of protons and electrons in a neutral atom
atom006 Counting protons and electrons in atoms and atomic ions
atom029 Finding isoprotonic atoms
atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
atom062 Counting valence electrons in a neutral atom

atom019 Counting valence electrons in an atomic ion
atom020 Drawing the Lewis dot diagram of a main group atom or common atomic ion
atom048 Counting the electron shells in a neutral atom
stoich006 Counting the number of atoms in a formula unit
atom060 Writing a chemical formula given a molecular model
atom061 Writing a chemical formula given a chemical structure
atom045 Understanding the prefixes used in naming binary compounds
atom014 Naming binary covalent compounds
ochem001 Identifying organic compounds
ochem008 Naming normal alkanes
atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements
atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions
atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Stoichiometry

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements
stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
rxn001 Identifying combination, decomposition, single and double displacement reactions
stoich012 Stoichiometric coefficients
stoich013 Balancing chemical equations with noninterfering coefficients
stoich014 Balancing chemical equations with interfering coefficients
rxn002 Writing a chemical equation from a description of the reaction
rxn004 Writing the net equation for a sequence of reactions
stoich015 Solving for a reactant using a chemical equation
stoich016 Identifying the limiting reactant in a drawing of a mixture
stoich017 Limiting reactants
stoich018 Percent yield of chemical reactions
stoich020 Calculating molarity using solute moles
stoich028 Using molarity to find solute moles and solution volume
stoich029 Calculating molarity using solute mass
stoich030 Using molarity to find solute mass and solution volume
stoich021 Dilution
stoich037 Solving for a reactant in solution
stoich038 Solving limiting reactant problems in solution
stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction

Simple Reactions

soln001 Predicting the products of dissolution
soln002 Writing net ionic equations
soln003 Predicting precipitation
rxn006 Identifying precipitation, combustion and acid-base reactions
acid002 Identifying acids and bases by their chemical formula
acid011 Predicting the products of a neutralization reaction
acid001 Identifying acids and bases by their reaction with water
acid003 Naming inorganic acids
acid004 Deducing the formulae of inorganic acids from their names
acid005 Naming acid salts
acid006 Recognizing common acids and bases
redox001 Assigning oxidation numbers
redox002 Recognizing reduction and oxidation
redox003 Identifying oxidizing and reducing agents
redox004 Identifying oxidized and reduced reactants in a metal-nonmetal reaction
redox005 Identifying oxidized and reduced reactants in a single-displacement reaction
redox011 Predicting whether simple electrochemical reactions happen
redox006 Writing a simple half-reaction from its description
redox007 Writing the half-reactions of a metal-nonmetal reaction
redox008 Writing the half-reactions of a single-displacement reaction

Thermochemistry

thermo001 Understanding how kinetic energy scales with mass and speed
thermo002 Understanding how electrostatic potential energy scales with charge and separation
thermo003 Using conservation of energy to predict the qualitative exchange of kinetic and potential energy
thermo005 Calculating pressure-volume work
thermo006 Understanding the definitions of heat and work
thermo007 Understanding the definition of enthalpy
thermo008 Interconverting calories and joules
thermo011 Calculating specific heat capacity
thermo009 Using specific heat capacity to find heat
thermo010 Using specific heat capacity to find temperature change
thermo020 Using the general properties of reaction enthalpy
thermo014 Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant
thermo021 Using Hess's Law to calculate net reaction enthalpy
thermo022 Writing a standard formation reaction
thermo023 Calculating a molar heat of reaction from formation enthalpies
thermo018 Calculating the heat of reaction from bond energies

Electronic Structure

atom051 Understanding the meaning of a de Broglie wavelength
atom052 Interpreting the radial probability distribution of an orbital
atom053 Interpreting the angular probability distribution of an orbital
atom054 Recognizing s and p orbitals
atom055 Deducing n and l from a subshell label
atom056 Deciding the relative energy of electron subshells
atom021 Deducing the allowed quantum numbers of an atomic electron
atom024 Calculating the capacity of electron subshells
atom031 Calculating the capacity of electron shells
atom057 Drawing a box diagram of the electron configuration of an atom
atom025 Interpreting the electron configuration of an atom or atomic ion
atom026 Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
atom027 Writing the electron configuration of an atom or atomic ion with s and p electrons only
atom022 Writing the electron configuration of an atom using the Periodic Table
atom023 Identifying quantum mechanics errors in electron configurations
atom059 Identifying the electron added or removed to form an ion

atom065 Identifying s, p, d and f block elements
atom066 Identifying elements with a similar valence electron configuration
atom067 Understanding the definitions of ionization energy and electron affinity
atom068 Predicting the relative ionization energy of elements
atom069 Deducing valence electron configuration from trends in successive ionization energies
atom070 Ranking the screening efficacy of atomic orbitals
atom071 Understanding periodic trends in effective nuclear charge
atom072 Deducing the block of an element from an electron configuration
atom046 Understanding periodic trends in atomic size
atom047 Understanding periodic trends in atomic ionizability
atom041 Understanding the organization of the electromagnetic spectrum
atom040 Interconverting the wavelength and frequency of electromagnetic radiation
atom043 Interconverting wavelength, frequency and photon energy
atom044 Calculating the wavelength of a spectral line from an energy diagram
atom049 Predicting the qualitative features of a line spectrum
atom050 Calculating the wavelength of a line in the spectrum of hydrogen

Gases

gas001 Interconverting pressure and force
gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
gas004 Understanding Boyle's Law
gas005 Solving applications of Boyle's Law
gas006 Using Charles's Law
gas007 Using the ideal equation of state
gas008 Interconverting molar mass and density of ideal gases
gas009 Calculating mole fraction in a gas mixture
gas010 Calculating partial pressure in a gas mixture
gas011 Solving for a gaseous reactant
gas012 Understanding how average molecular kinetic energy scales with temperature
gas013 Understanding how average molecular speed scales with temperature and molar mass
gas014 Interpreting a graph of molecular speed distribution
gas015 Predicting how molecular speed distribution changes with temperature and molar mass
gas016 Calculating average molecular speed
gas017 Understanding how molecular collision rate scales with temperature and volume
gas018 Using relative effusion rates to find an unknown molar mass

Advanced Material

thermo017 Using heat of fusion or vaporization to find the heat needed to melt or boil a substance
thermo019 Relating vapor pressure to vaporization
thermo040 Using a phase diagram to predict phase at a given temperature and pressure
thermo041 Labeling a typical simple phase diagram
thermo042 Using a phase diagram to find a phase transition temperature or pressure
soln013 Understanding conceptual components of the enthalpy of solution
soln010 Using Henry's Law to calculate the solubility of a gas
soln005 Predicting relative boiling point elevations and freezing point depressions
soln007 Using osmotic pressure to find molar mass
soln009 Using Raoult's Law to calculate the vapor pressure of a component
equi009 Predicting how reaction rate varies with pressure, concentration and temperature
equi012 Calculating the reaction rate of one reactant from that of another
equi032 Calculating average and instantaneous reaction rate from a graph of concentration versus time
equi019 Using a rate law
equi020 Using reactant reaction order to predict changes in initial rate
equi021 Deducing a rate law from initial reaction rate data
equi023 Calculating the change in concentration after a whole number of half-lives of a first-order reaction
equi022 Using an integrated rate law for a first-order reaction

equi027 Using a second-order integrated rate law to find concentration change
equi028 Using first- and second-order integrated rate laws
equi029 Deducing a rate law from the change in concentration over time
equi030 Finding half life and rate constant from a graph of concentration versus time
equi010 Interpreting a reaction energy diagram
equi011 Relating activation energy to reaction rate
equi013 Drawing the reaction energy diagram of a catalyzed reaction
equi024 Understanding the qualitative predictions of the Arrhenius equation
equi025 Using the Arrhenius equation to calculate k at one temperature from k at another
equi026 Using the Arrhenius equation to calculate Ea from k versus T data
equi033 Identifying the molecularity of an elementary reaction
equi034 Identifying intermediates in a reaction mechanism
equi035 Writing a plausible missing step for a simple reaction mechanism
equi036 Writing the rate law of an elementary reaction
equi037 Writing the rate law implied by a simple mechanism with an initial slow step
equi038 Expressing the concentration of an intermediate in terms of the concentration of reactants
equi039 Writing the rate law implied by a simple mechanism
equi040 Deducing information about reaction mechanisms from a reaction energy diagram
equi003 Understanding why no reaction goes to 100equi004 Predicting relative forward and reverse rates of reaction in a dynamic equilibrium
equi005 Using Le Chatelier's Principle to predict the result of changing concentration or volume
equi006 Using Le Chatelier's Principle to predict the result of changing temperature
equi007 Writing an equilibrium constant expression
equi014 Writing an equilibrium constant expression for a heterogeneous equilibrium
equi008 Using an equilibrium constant to predict the direction of spontaneous reaction
equi015 Using the general properties of equilibrium constants
equi016 Setting up a reaction table
equi017 Calculating equilibrium composition from an equilibrium constant
acid007 Predicting the major species in acid solutions
acid008 Identifying Bronsted-Lowry acids and bases
acid009 Finding the conjugate of an acid or base
acid010 Predicting the products of the reaction of a strong acid with water
acid032 Predicting the qualitative acid-base properties of salts
acid016 Interconverting pH and hydronium ion concentration
acid017 Using the ion product of water
acid018 Making qualitative estimates of pH change
acid019 Calculating the pH of a strong acid solution
acid020 Calculating the pH of a strong base solution
acid021 Diluting a strong acid solution to a given pH
acid022 Preparing a strong base solution with a given pH
acid026 Writing an acid dissociation constant expression
acid027 Calculating the Ka of a weak acid from pH
acid028 Calculating the pH of a weak acid solution
acid029 Writing a base protonation constant expression
acid030 Calculating the pH of a weak base solution
acid031 Deriving Kb from Ka
acid042 Interconverting Ka and pKa
acid048 Calculating the pH of a salt solution
acid044 Predicting the relative acidity of binary acids
acid045 Understanding the effect of induction on acidity
acid046 Predicting the qualitative acid-base properties of metal cations
acid047 Identifying Lewis acids and bases in reactions
acid049 Predicting the acid-base properties of a binary oxide in water
acid035 Identifying the major species in weak acid or weak base equilibria
acid036 Setting up a reaction table for a pH calculation with a common ion
acid037 Calculating the pH of a buffer
acid038 Calculating the composition of a buffer of a given pH
acid023 Determining the volume of base needed to titrate a given mass of acid
acid024 Determining the molar mass of an acid by titration
acid025 Standardizing a base solution by titration
acid040 Calculating the pH of a weak acid titrated with a strong base
acid041 Calculating the pH of a weak base titrated with a strong acid

acid043 Calculating the pH at equivalence of a titration
soln014 Writing a solubility product (Ksp) expression
soln015 Using Ksp to calculate the solubility of a compound
soln016 Using the solubility of a compound to calculate Ksp
soln017 Calculating the solubility of an ionic compound when a common ion is present
soln018 Understanding the effect of pH on the solubility of ionic compounds
thermo024 Calculating entropy change from reversible heat flow
thermo026 Calculating absolute entropy using the Boltzmann hypothesis
thermo027 Calculating entropy change using the Boltzmann hypothesis
thermo028 Predicting qualitatively how entropy changes with temperature and volume
thermo029 Predicting qualitatively how entropy changes with mixing and separation
thermo030 Qualitatively predicting reaction entropy
thermo031 Calculating reaction entropy using the standard molar entropies of reactants
thermo032 Using the general properties of Gibbs free energy
thermo033 Calculating dG from dH and dS
thermo034 Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
thermo035 Calculating standard reaction free energy from standard free energies of formation
thermo037 Estimating a phase transition temperature from standard thermodynamic data
thermo038 Calculating reaction free energy under nonstandard conditions
thermo039 Using reaction free energy to predict equilibrium composition
redox009 Writing and balancing complex half-reactions in acidic solution
redox010 Writing and balancing complex half-reactions in basic solution
redox013 Balancing a complex redox equation in acidic or basic solution
redox014 Writing the half-reactions of a complex redox reaction in acidic or basic solution
redox012 Designing a galvanic cell from a single-displacement redox reaction
redox016 Designing a galvanic cell from two half-reactions
redox017 Analyzing a galvanic cell
redox018 Picking a reduction or oxidation that will make a galvanic cell work
redox019 Ranking the strength of oxidizing and reducing agents using standard reduction potentials
redox020 Calculating standard reaction free energy from standard reduction potentials
redox021 Using the Nernst equation to calculate nonstandard cell voltage
redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential
nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation
nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes
ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols

ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.2 Preparation for General Chemistry

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
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alge604 Distributive property: Advanced
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alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
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alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
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geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder

Measurement

arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation

scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation
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unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
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unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
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unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
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sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements

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atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
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atom042 Understanding periods and groups of the Periodic Table
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atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements

Atoms, Ions and Molecules

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atom006 Counting protons and electrons in atoms and atomic ions
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atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
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atom019 Counting valence electrons in an atomic ion
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atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements

atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions
atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Stoichiometry

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements
stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
rxn001 Identifying combination, decomposition, single and double displacement reactions
stoich012 Stoichiometric coefficients
stoich013 Balancing chemical equations with noninterfering coefficients
stoich014 Balancing chemical equations with interfering coefficients
rxn002 Writing a chemical equation from a description of the reaction
rxn004 Writing the net equation for a sequence of reactions
stoich015 Solving for a reactant using a chemical equation
stoich016 Identifying the limiting reactant in a drawing of a mixture
stoich017 Limiting reactants
stoich018 Percent yield of chemical reactions
stoich020 Calculating molarity using solute moles
stoich028 Using molarity to find solute moles and solution volume
stoich029 Calculating molarity using solute mass
stoich030 Using molarity to find solute mass and solution volume
stoich021 Dilution
stoich037 Solving for a reactant in solution
stoich038 Solving limiting reactant problems in solution
stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction

Simple Reactions

soln001 Predicting the products of dissolution
soln002 Writing net ionic equations
soln003 Predicting precipitation
rxn006 Identifying precipitation, combustion and acid-base reactions
acid002 Identifying acids and bases by their chemical formula
acid011 Predicting the products of a neutralization reaction
acid001 Identifying acids and bases by their reaction with water
acid003 Naming inorganic acids
acid004 Deducing the formulae of inorganic acids from their names
acid005 Naming acid salts
acid006 Recognizing common acids and bases
redox001 Assigning oxidation numbers
redox002 Recognizing reduction and oxidation
redox003 Identifying oxidizing and reducing agents

redox004 Identifying oxidized and reduced reactants in a metal-nonmetal reaction
redox005 Identifying oxidized and reduced reactants in a single-displacement reaction
redox011 Predicting whether simple electrochemical reactions happen
redox006 Writing a simple half-reaction from its description
redox007 Writing the half-reactions of a metal-nonmetal reaction
redox008 Writing the half-reactions of a single-displacement reaction

Thermochemistry

thermo001 Understanding how kinetic energy scales with mass and speed
thermo002 Understanding how electrostatic potential energy scales with charge and separation
thermo003 Using conservation of energy to predict the qualitative exchange of kinetic and potential energy
thermo005 Calculating pressure-volume work
thermo006 Understanding the definitions of heat and work
thermo007 Understanding the definition of enthalpy
thermo008 Interconverting calories and joules
thermo011 Calculating specific heat capacity
thermo009 Using specific heat capacity to find heat
thermo010 Using specific heat capacity to find temperature change
thermo020 Using the general properties of reaction enthalpy
thermo014 Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant
thermo021 Using Hess's Law to calculate net reaction enthalpy
thermo022 Writing a standard formation reaction
thermo023 Calculating a molar heat of reaction from formation enthalpies
thermo018 Calculating the heat of reaction from bond energies

Electronic Structure

atom051 Understanding the meaning of a de Broglie wavelength
atom052 Interpreting the radial probability distribution of an orbital
atom053 Interpreting the angular probability distribution of an orbital
atom054 Recognizing s and p orbitals
atom055 Deducing n and l from a subshell label
atom056 Deciding the relative energy of electron subshells
atom021 Deducing the allowed quantum numbers of an atomic electron
atom024 Calculating the capacity of electron subshells
atom031 Calculating the capacity of electron shells
atom057 Drawing a box diagram of the electron configuration of an atom
atom025 Interpreting the electron configuration of an atom or atomic ion
atom026 Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
atom027 Writing the electron configuration of an atom or atomic ion with s and p electrons only
atom022 Writing the electron configuration of an atom using the Periodic Table
atom023 Identifying quantum mechanics errors in electron configurations
atom059 Identifying the electron added or removed to form an ion
atom065 Identifying s, p, d and f block elements
atom066 Identifying elements with a similar valence electron configuration
atom067 Understanding the definitions of ionization energy and electron affinity
atom068 Predicting the relative ionization energy of elements
atom069 Deducing valence electron configuration from trends in successive ionization energies
atom070 Ranking the screening efficacy of atomic orbitals
atom071 Understanding periodic trends in effective nuclear charge
atom072 Deducing the block of an element from an electron configuration
atom046 Understanding periodic trends in atomic size
atom047 Understanding periodic trends in atomic ionizability
atom041 Understanding the organization of the electromagnetic spectrum
atom040 Interconverting the wavelength and frequency of electromagnetic radiation
atom043 Interconverting wavelength, frequency and photon energy
atom044 Calculating the wavelength of a spectral line from an energy diagram

atom049 Predicting the qualitative features of a line spectrum
atom050 Calculating the wavelength of a line in the spectrum of hydrogen

Gases

gas001 Interconverting pressure and force
gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
gas004 Understanding Boyle's Law
gas005 Solving applications of Boyle's Law
gas006 Using Charles's Law
gas007 Using the ideal equation of state
gas008 Interconverting molar mass and density of ideal gases
gas009 Calculating mole fraction in a gas mixture
gas010 Calculating partial pressure in a gas mixture
gas011 Solving for a gaseous reactant
gas012 Understanding how average molecular kinetic energy scales with temperature
gas013 Understanding how average molecular speed scales with temperature and molar mass
gas014 Interpreting a graph of molecular speed distribution
gas015 Predicting how molecular speed distribution changes with temperature and molar mass
gas016 Calculating average molecular speed
gas017 Understanding how molecular collision rate scales with temperature and volume
gas018 Using relative effusion rates to find an unknown molar mass

Advanced Material

thermo017 Using heat of fusion or vaporization to find the heat needed to melt or boil a substance
thermo019 Relating vapor pressure to vaporization
thermo040 Using a phase diagram to predict phase at a given temperature and pressure
thermo041 Labeling a typical simple phase diagram
thermo042 Using a phase diagram to find a phase transition temperature or pressure
soln013 Understanding conceptual components of the enthalpy of solution
soln010 Using Henry's Law to calculate the solubility of a gas
soln005 Predicting relative boiling point elevations and freezing point depressions
soln007 Using osmotic pressure to find molar mass
soln009 Using Raoult's Law to calculate the vapor pressure of a component
equi009 Predicting how reaction rate varies with pressure, concentration and temperature
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equi020 Using reactant reaction order to predict changes in initial rate
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equi023 Calculating the change in concentration after a whole number of half-lives of a first-order reaction
equi022 Using an integrated rate law for a first-order reaction
equi027 Using a second-order integrated rate law to find concentration change
equi028 Using first- and second-order integrated rate laws
equi029 Deducing a rate law from the change in concentration over time
equi030 Finding half life and rate constant from a graph of concentration versus time
equi010 Interpreting a reaction energy diagram
equi011 Relating activation energy to reaction rate
equi013 Drawing the reaction energy diagram of a catalyzed reaction
equi024 Understanding the qualitative predictions of the Arrhenius equation
equi025 Using the Arrhenius equation to calculate k at one temperature from k at another
equi026 Using the Arrhenius equation to calculate Ea from k versus T data
equi033 Identifying the molecularity of an elementary reaction
equi034 Identifying intermediates in a reaction mechanism
equi035 Writing a plausible missing step for a simple reaction mechanism
equi036 Writing the rate law of an elementary reaction

equi037 Writing the rate law implied by a simple mechanism with an initial slow step
equi038 Expressing the concentration of an intermediate in terms of the concentration of reactants
equi039 Writing the rate law implied by a simple mechanism
equi040 Deducing information about reaction mechanisms from a reaction energy diagram
equi003 Understanding why no reaction goes to 100equi004 Predicting relative forward and reverse rates of reaction in a dynamic equilibrium
equi005 Using Le Chatelier's Principle to predict the result of changing concentration or volume
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equi007 Writing an equilibrium constant expression
equi014 Writing an equilibrium constant expression for a heterogeneous equilibrium
equi008 Using an equilibrium constant to predict the direction of spontaneous reaction
equi015 Using the general properties of equilibrium constants
equi016 Setting up a reaction table
equi017 Calculating equilibrium composition from an equilibrium constant
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acid008 Identifying Bronsted-Lowry acids and bases
acid009 Finding the conjugate of an acid or base
acid010 Predicting the products of the reaction of a strong acid with water
acid032 Predicting the qualitative acid-base properties of salts
acid016 Interconverting pH and hydronium ion concentration
acid017 Using the ion product of water
acid018 Making qualitative estimates of pH change
acid019 Calculating the pH of a strong acid solution
acid020 Calculating the pH of a strong base solution
acid021 Diluting a strong acid solution to a given pH
acid022 Preparing a strong base solution with a given pH
acid026 Writing an acid dissociation constant expression
acid027 Calculating the Ka of a weak acid from pH
acid028 Calculating the pH of a weak acid solution
acid029 Writing a base protonation constant expression
acid030 Calculating the pH of a weak base solution
acid031 Deriving Kb from Ka
acid042 Interconverting Ka and pKa
acid048 Calculating the pH of a salt solution
acid044 Predicting the relative acidity of binary acids
acid045 Understanding the effect of induction on acidity
acid046 Predicting the qualitative acid-base properties of metal cations
acid047 Identifying Lewis acids and bases in reactions
acid049 Predicting the acid-base properties of a binary oxide in water
acid035 Identifying the major species in weak acid or weak base equilibria
acid036 Setting up a reaction table for a pH calculation with a common ion
acid037 Calculating the pH of a buffer
acid038 Calculating the composition of a buffer of a given pH
acid023 Determining the volume of base needed to titrate a given mass of acid
acid024 Determining the molar mass of an acid by titration
acid025 Standardizing a base solution by titration
acid040 Calculating the pH of a weak acid titrated with a strong base
acid041 Calculating the pH of a weak base titrated with a strong acid
acid043 Calculating the pH at equivalence of a titration
soln014 Writing a solubility product (Ksp) expression
soln015 Using Ksp to calculate the solubility of a compound
soln016 Using the solubility of a compound to calculate Ksp
soln017 Calculating the solubility of an ionic compound when a common ion is present
soln018 Understanding the effect of pH on the solubility of ionic compounds
thermo024 Calculating entropy change from reversible heat flow
thermo026 Calculating absolute entropy using the Boltzmann hypothesis
thermo027 Calculating entropy change using the Boltzmann hypothesis
thermo028 Predicting qualitatively how entropy changes with temperature and volume
thermo029 Predicting qualitatively how entropy changes with mixing and separation
thermo030 Qualitatively predicting reaction entropy
thermo031 Calculating reaction entropy using the standard molar entropies of reactants
thermo032 Using the general properties of Gibbs free energy

thermo033 Calculating dG from dH and dS
thermo034 Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
thermo035 Calculating standard reaction free energy from standard free energies of formation
thermo037 Estimating a phase transition temperature from standard thermodynamic data
thermo038 Calculating reaction free energy under nonstandard conditions
thermo039 Using reaction free energy to predict equilibrium composition
redox009 Writing and balancing complex half-reactions in acidic solution
redox010 Writing and balancing complex half-reactions in basic solution
redox013 Balancing a complex redox equation in acidic or basic solution
redox014 Writing the half-reactions of a complex redox reaction in acidic or basic solution
redox012 Designing a galvanic cell from a single-displacement redox reaction
redox016 Designing a galvanic cell from two half-reactions
redox017 Analyzing a galvanic cell
redox018 Picking a reduction or oxidation that will make a galvanic cell work
redox019 Ranking the strength of oxidizing and reducing agents using standard reduction potentials
redox020 Calculating standard reaction free energy from standard reduction potentials
redox021 Using the Nernst equation to calculate nonstandard cell voltage
redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential
nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation
nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes
ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols
ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.3 General Chemistry (First Semester)

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions

arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation
alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder

Measurement

arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation
unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit

sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements

Matter

atom015 Distinguishing elements and compounds
atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
atom033 Distinguishing solid, liquid and gas phases of a pure substance
atom001 Names and symbols of important elements
atom002 Reading a Periodic Table entry
atom042 Understanding periods and groups of the Periodic Table
atom003 Organization of the Periodic Table
atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements

Atoms, Ions and Molecules

atom039 Identifying the parts of an atom
atom063 Counting the number of protons and electrons in a neutral atom
atom006 Counting protons and electrons in atoms and atomic ions
atom029 Finding isoprotonic atoms
atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
atom062 Counting valence electrons in a neutral atom
atom019 Counting valence electrons in an atomic ion
atom020 Drawing the Lewis dot diagram of a main group atom or common atomic ion
atom048 Counting the electron shells in a neutral atom
stoich006 Counting the number of atoms in a formula unit
atom060 Writing a chemical formula given a molecular model
atom061 Writing a chemical formula given a chemical structure
atom045 Understanding the prefixes used in naming binary compounds
atom014 Naming binary covalent compounds
ochem001 Identifying organic compounds
ochem008 Naming normal alkanes
atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements
atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions
atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Stoichiometry

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements

stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
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stoich029 Calculating molarity using solute mass
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stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction

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Gases

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gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
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gas005 Solving applications of Boyle's Law
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redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential
nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation
nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes
ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols
ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.4 General Chemistry (Second Semester)

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation

alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder
arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation

Measurement and Matter

unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements
atom015 Distinguishing elements and compounds
atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
atom033 Distinguishing solid, liquid and gas phases of a pure substance
atom001 Names and symbols of important elements
atom002 Reading a Periodic Table entry
atom042 Understanding periods and groups of the Periodic Table
atom003 Organization of the Periodic Table
atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements
atom039 Identifying the parts of an atom

atom063 Counting the number of protons and electrons in a neutral atom
atom006 Counting protons and electrons in atoms and atomic ions
atom029 Finding isoprotonic atoms
atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
atom062 Counting valence electrons in a neutral atom
atom019 Counting valence electrons in an atomic ion
atom020 Drawing the Lewis dot diagram of a main group atom or common atomic ion
atom048 Counting the electron shells in a neutral atom
stoich006 Counting the number of atoms in a formula unit
atom060 Writing a chemical formula given a molecular model
atom061 Writing a chemical formula given a chemical structure
atom045 Understanding the prefixes used in naming binary compounds
atom014 Naming binary covalent compounds
atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements
atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions
atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Chemical Reactions

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements
stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
rxn001 Identifying combination, decomposition, single and double displacement reactions
stoich012 Stoichiometric coefficients
stoich013 Balancing chemical equations with noninterfering coefficients
stoich014 Balancing chemical equations with interfering coefficients
rxn002 Writing a chemical equation from a description of the reaction
rxn004 Writing the net equation for a sequence of reactions
stoich015 Solving for a reactant using a chemical equation
stoich016 Identifying the limiting reactant in a drawing of a mixture
stoich017 Limiting reactants
stoich018 Percent yield of chemical reactions
stoich020 Calculating molarity using solute moles
stoich028 Using molarity to find solute moles and solution volume
stoich029 Calculating molarity using solute mass
stoich030 Using molarity to find solute mass and solution volume
stoich021 Dilution
stoich037 Solving for a reactant in solution
stoich038 Solving limiting reactant problems in solution
soln001 Predicting the products of dissolution
soln002 Writing net ionic equations

soln003 Predicting precipitation
rxn006 Identifying precipitation, combustion and acid-base reactions
acid002 Identifying acids and bases by their chemical formula
acid011 Predicting the products of a neutralization reaction
redox001 Assigning oxidation numbers
redox002 Recognizing reduction and oxidation
redox003 Identifying oxidizing and reducing agents
redox004 Identifying oxidized and reduced reactants in a metal-nonmetal reaction
redox005 Identifying oxidized and reduced reactants in a single-displacement reaction
redox011 Predicting whether simple electrochemical reactions happen
thermo001 Understanding how kinetic energy scales with mass and speed
thermo002 Understanding how electrostatic potential energy scales with charge and separation
thermo003 Using conservation of energy to predict the qualitative exchange of kinetic and potential energy
thermo005 Calculating pressure-volume work
thermo006 Understanding the definitions of heat and work
thermo007 Understanding the definition of enthalpy
thermo008 Interconverting calories and joules
thermo011 Calculating specific heat capacity
thermo009 Using specific heat capacity to find heat
thermo010 Using specific heat capacity to find temperature change
thermo020 Using the general properties of reaction enthalpy
thermo014 Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant
thermo021 Using Hess's Law to calculate net reaction enthalpy
thermo022 Writing a standard formation reaction
thermo023 Calculating a molar heat of reaction from formation enthalpies
thermo018 Calculating the heat of reaction from bond energies

Structure and Bonding

atom051 Understanding the meaning of a de Broglie wavelength
atom052 Interpreting the radial probability distribution of an orbital
atom053 Interpreting the angular probability distribution of an orbital
atom054 Recognizing s and p orbitals
atom055 Deducing n and l from a subshell label
atom056 Deciding the relative energy of electron subshells
atom021 Deducing the allowed quantum numbers of an atomic electron
atom024 Calculating the capacity of electron subshells
atom031 Calculating the capacity of electron shells
atom057 Drawing a box diagram of the electron configuration of an atom
atom025 Interpreting the electron configuration of an atom or atomic ion
atom026 Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
atom027 Writing the electron configuration of an atom or atomic ion with s and p electrons only
atom022 Writing the electron configuration of an atom using the Periodic Table
atom023 Identifying quantum mechanics errors in electron configurations
atom059 Identifying the electron added or removed to form an ion
atom065 Identifying s, p, d and f block elements
atom066 Identifying elements with a similar valence electron configuration
atom067 Understanding the definitions of ionization energy and electron affinity
atom068 Predicting the relative ionization energy of elements
atom069 Deducing valence electron configuration from trends in successive ionization energies
atom070 Ranking the screening efficacy of atomic orbitals
atom071 Understanding periodic trends in effective nuclear charge
atom072 Deducing the block of an element from an electron configuration
atom046 Understanding periodic trends in atomic size
atom047 Understanding periodic trends in atomic ionizability
atom041 Understanding the organization of the electromagnetic spectrum
atom040 Interconverting the wavelength and frequency of electromagnetic radiation
atom043 Interconverting wavelength, frequency and photon energy
atom044 Calculating the wavelength of a spectral line from an energy diagram
atom049 Predicting the qualitative features of a line spectrum

atom050 Calculating the wavelength of a line in the spectrum of hydrogen
gas001 Interconverting pressure and force
gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
gas004 Understanding Boyle's Law
gas005 Solving applications of Boyle's Law
gas006 Using Charles's Law
gas007 Using the ideal equation of state
gas008 Interconverting molar mass and density of ideal gases
gas009 Calculating mole fraction in a gas mixture
gas010 Calculating partial pressure in a gas mixture
gas011 Solving for a gaseous reactant

Gases, Liquids and Solids

gas012 Understanding how average molecular kinetic energy scales with temperature
gas013 Understanding how average molecular speed scales with temperature and molar mass
gas014 Interpreting a graph of molecular speed distribution
gas015 Predicting how molecular speed distribution changes with temperature and molar mass
gas016 Calculating average molecular speed
gas017 Understanding how molecular collision rate scales with temperature and volume
gas018 Using relative effusion rates to find an unknown molar mass
thermo017 Using heat of fusion or vaporization to find the heat needed to melt or boil a substance
thermo019 Relating vapor pressure to vaporization
thermo040 Using a phase diagram to predict phase at a given temperature and pressure
thermo041 Labeling a typical simple phase diagram
thermo042 Using a phase diagram to find a phase transition temperature or pressure

Solutions

stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction
soln013 Understanding conceptual components of the enthalpy of solution
soln010 Using Henry's Law to calculate the solubility of a gas
soln005 Predicting relative boiling point elevations and freezing point depressions
soln007 Using osmotic pressure to find molar mass
soln009 Using Raoult's Law to calculate the vapor pressure of a component

Kinetics and Equilibrium

equi009 Predicting how reaction rate varies with pressure, concentration and temperature
equi012 Calculating the reaction rate of one reactant from that of another
equi032 Calculating average and instantaneous reaction rate from a graph of concentration versus time
equi019 Using a rate law
equi020 Using reactant reaction order to predict changes in initial rate
equi021 Deducing a rate law from initial reaction rate data
equi023 Calculating the change in concentration after a whole number of half-lives of a first-order reaction
equi022 Using an integrated rate law for a first-order reaction
equi027 Using a second-order integrated rate law to find concentration change
equi028 Using first- and second-order integrated rate laws
equi029 Deducing a rate law from the change in concentration over time
equi030 Finding half life and rate constant from a graph of concentration versus time
equi010 Interpreting a reaction energy diagram

equi011 Relating activation energy to reaction rate
equi013 Drawing the reaction energy diagram of a catalyzed reaction
equi024 Understanding the qualitative predictions of the Arrhenius equation
equi025 Using the Arrhenius equation to calculate k at one temperature from k at another
equi026 Using the Arrhenius equation to calculate Ea from k versus T data
equi033 Identifying the molecularity of an elementary reaction
equi034 Identifying intermediates in a reaction mechanism
equi035 Writing a plausible missing step for a simple reaction mechanism
equi036 Writing the rate law of an elementary reaction
equi037 Writing the rate law implied by a simple mechanism with an initial slow step
equi038 Expressing the concentration of an intermediate in terms of the concentration of reactants
equi039 Writing the rate law implied by a simple mechanism
equi040 Deducing information about reaction mechanisms from a reaction energy diagram
equi003 Understanding why no reaction goes to 100equi004 Predicting relative forward and reverse rates of reaction in a dynamic equilibrium
equi005 Using Le Chatelier's Principle to predict the result of changing concentration or volume
equi006 Using Le Chatelier's Principle to predict the result of changing temperature
equi007 Writing an equilibrium constant expression
equi014 Writing an equilibrium constant expression for a heterogeneous equilibrium
equi008 Using an equilibrium constant to predict the direction of spontaneous reaction
equi015 Using the general properties of equilibrium constants
equi016 Setting up a reaction table
equi017 Calculating equilibrium composition from an equilibrium constant

Acids and Bases

acid001 Identifying acids and bases by their reaction with water
acid007 Predicting the major species in acid solutions
acid008 Identifying Bronsted-Lowry acids and bases
acid009 Finding the conjugate of an acid or base
acid010 Predicting the products of the reaction of a strong acid with water
acid032 Predicting the qualitative acid-base properties of salts
acid003 Naming inorganic acids
acid004 Deducing the formulae of inorganic acids from their names
acid005 Naming acid salts
acid006 Recognizing common acids and bases
acid016 Interconverting pH and hydronium ion concentration
acid017 Using the ion product of water
acid018 Making qualitative estimates of pH change
acid019 Calculating the pH of a strong acid solution
acid020 Calculating the pH of a strong base solution
acid021 Diluting a strong acid solution to a given pH
acid022 Preparing a strong base solution with a given pH
acid026 Writing an acid dissociation constant expression
acid027 Calculating the Ka of a weak acid from pH
acid028 Calculating the pH of a weak acid solution
acid029 Writing a base protonation constant expression
acid030 Calculating the pH of a weak base solution
acid031 Deriving Kb from Ka
acid042 Interconverting Ka and pKa
acid048 Calculating the pH of a salt solution
acid044 Predicting the relative acidity of binary acids
acid045 Understanding the effect of induction on acidity
acid046 Predicting the qualitative acid-base properties of metal cations
acid047 Identifying Lewis acids and bases in reactions
acid049 Predicting the acid-base properties of a binary oxide in water
acid035 Identifying the major species in weak acid or weak base equilibria
acid036 Setting up a reaction table for a pH calculation with a common ion
acid037 Calculating the pH of a buffer
acid038 Calculating the composition of a buffer of a given pH

acid023 Determining the volume of base needed to titrate a given mass of acid
acid024 Determining the molar mass of an acid by titration
acid025 Standardizing a base solution by titration
acid040 Calculating the pH of a weak acid titrated with a strong base
acid041 Calculating the pH of a weak base titrated with a strong acid
acid043 Calculating the pH at equivalence of a titration
soln014 Writing a solubility product (Ksp) expression
soln015 Using Ksp to calculate the solubility of a compound
soln016 Using the solubility of a compound to calculate Ksp
soln017 Calculating the solubility of an ionic compound when a common ion is present
soln018 Understanding the effect of pH on the solubility of ionic compounds

Entropy and Free Energy

thermo024 Calculating entropy change from reversible heat flow
thermo026 Calculating absolute entropy using the Boltzmann hypothesis
thermo027 Calculating entropy change using the Boltzmann hypothesis
thermo028 Predicting qualitatively how entropy changes with temperature and volume
thermo029 Predicting qualitatively how entropy changes with mixing and separation
thermo030 Qualitatively predicting reaction entropy
thermo031 Calculating reaction entropy using the standard molar entropies of reactants
thermo032 Using the general properties of Gibbs free energy
thermo033 Calculating dG from dH and dS
thermo034 Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
thermo035 Calculating standard reaction free energy from standard free energies of formation
thermo037 Estimating a phase transition temperature from standard thermodynamic data
thermo038 Calculating reaction free energy under nonstandard conditions
thermo039 Using reaction free energy to predict equilibrium composition

Electrochemistry

redox006 Writing a simple half-reaction from its description
redox007 Writing the half-reactions of a metal-nonmetal reaction
redox008 Writing the half-reactions of a single-displacement reaction
redox009 Writing and balancing complex half-reactions in acidic solution
redox010 Writing and balancing complex half-reactions in basic solution
redox013 Balancing a complex redox equation in acidic or basic solution
redox014 Writing the half-reactions of a complex redox reaction in acidic or basic solution
redox012 Designing a galvanic cell from a single-displacement redox reaction
redox016 Designing a galvanic cell from two half-reactions
redox017 Analyzing a galvanic cell
redox018 Picking a reduction or oxidation that will make a galvanic cell work
redox019 Ranking the strength of oxidizing and reducing agents using standard reduction potentials
redox020 Calculating standard reaction free energy from standard reduction potentials
redox021 Using the Nernst equation to calculate nonstandard cell voltage
redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential

Nuclear and Organic Chemistry

nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation

nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem001 Identifying organic compounds
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes
ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem008 Naming normal alkanes
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols
ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.5 General Chemistry (First Quarter)

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation
alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1

alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder

Measurement

arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation
unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements

Matter

atom015 Distinguishing elements and compounds
atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
atom033 Distinguishing solid, liquid and gas phases of a pure substance
atom001 Names and symbols of important elements
atom002 Reading a Periodic Table entry
atom042 Understanding periods and groups of the Periodic Table
atom003 Organization of the Periodic Table
atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements

Atoms, Ions and Molecules

atom039 Identifying the parts of an atom
atom063 Counting the number of protons and electrons in a neutral atom
atom006 Counting protons and electrons in atoms and atomic ions
atom029 Finding isoprotonic atoms
atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
atom062 Counting valence electrons in a neutral atom
atom019 Counting valence electrons in an atomic ion
atom020 Drawing the Lewis dot diagram of a main group atom or common atomic ion
atom048 Counting the electron shells in a neutral atom
stoich006 Counting the number of atoms in a formula unit
atom060 Writing a chemical formula given a molecular model
atom061 Writing a chemical formula given a chemical structure
atom045 Understanding the prefixes used in naming binary compounds
atom014 Naming binary covalent compounds
ochem001 Identifying organic compounds
ochem008 Naming normal alkanes
atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements
atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions
atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Stoichiometry

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements
stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
rxn001 Identifying combination, decomposition, single and double displacement reactions
stoich012 Stoichiometric coefficients
stoich013 Balancing chemical equations with noninterfering coefficients
stoich014 Balancing chemical equations with interfering coefficients
rxn002 Writing a chemical equation from a description of the reaction
rxn004 Writing the net equation for a sequence of reactions
stoich015 Solving for a reactant using a chemical equation
stoich016 Identifying the limiting reactant in a drawing of a mixture
stoich017 Limiting reactants
stoich018 Percent yield of chemical reactions
stoich020 Calculating molarity using solute moles
stoich028 Using molarity to find solute moles and solution volume
stoich029 Calculating molarity using solute mass
stoich030 Using molarity to find solute mass and solution volume
stoich021 Dilution
stoich037 Solving for a reactant in solution

stoich038 Solving limiting reactant problems in solution
stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction

Simple Reactions

soln001 Predicting the products of dissolution
soln002 Writing net ionic equations
soln003 Predicting precipitation
rxn006 Identifying precipitation, combustion and acid-base reactions
acid002 Identifying acids and bases by their chemical formula
acid011 Predicting the products of a neutralization reaction
acid001 Identifying acids and bases by their reaction with water
acid003 Naming inorganic acids
acid004 Deducing the formulae of inorganic acids from their names
acid005 Naming acid salts
acid006 Recognizing common acids and bases
redox001 Assigning oxidation numbers
redox002 Recognizing reduction and oxidation
redox003 Identifying oxidizing and reducing agents
redox004 Identifying oxidized and reduced reactants in a metal-nonmetal reaction
redox005 Identifying oxidized and reduced reactants in a single-displacement reaction
redox011 Predicting whether simple electrochemical reactions happen
redox006 Writing a simple half-reaction from its description
redox007 Writing the half-reactions of a metal-nonmetal reaction
redox008 Writing the half-reactions of a single-displacement reaction

Thermochemistry

thermo001 Understanding how kinetic energy scales with mass and speed
thermo002 Understanding how electrostatic potential energy scales with charge and separation
thermo003 Using conservation of energy to predict the qualitative exchange of kinetic and potential energy
thermo005 Calculating pressure-volume work
thermo006 Understanding the definitions of heat and work
thermo007 Understanding the definition of enthalpy
thermo008 Interconverting calories and joules
thermo011 Calculating specific heat capacity
thermo009 Using specific heat capacity to find heat
thermo010 Using specific heat capacity to find temperature change
thermo020 Using the general properties of reaction enthalpy
thermo014 Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant
thermo021 Using Hess's Law to calculate net reaction enthalpy
thermo022 Writing a standard formation reaction
thermo023 Calculating a molar heat of reaction from formation enthalpies
thermo018 Calculating the heat of reaction from bond energies

Electronic Structure

atom051 Understanding the meaning of a de Broglie wavelength
atom052 Interpreting the radial probability distribution of an orbital
atom053 Interpreting the angular probability distribution of an orbital
atom054 Recognizing s and p orbitals
atom055 Deducing n and l from a subshell label

atom056 Deciding the relative energy of electron subshells
atom021 Deducing the allowed quantum numbers of an atomic electron
atom024 Calculating the capacity of electron subshells
atom031 Calculating the capacity of electron shells
atom057 Drawing a box diagram of the electron configuration of an atom
atom025 Interpreting the electron configuration of an atom or atomic ion
atom026 Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
atom027 Writing the electron configuration of an atom or atomic ion with s and p electrons only
atom022 Writing the electron configuration of an atom using the Periodic Table
atom023 Identifying quantum mechanics errors in electron configurations
atom059 Identifying the electron added or removed to form an ion
atom065 Identifying s, p, d and f block elements
atom066 Identifying elements with a similar valence electron configuration
atom067 Understanding the definitions of ionization energy and electron affinity
atom068 Predicting the relative ionization energy of elements
atom069 Deducing valence electron configuration from trends in successive ionization energies
atom070 Ranking the screening efficacy of atomic orbitals
atom071 Understanding periodic trends in effective nuclear charge
atom072 Deducing the block of an element from an electron configuration
atom046 Understanding periodic trends in atomic size
atom047 Understanding periodic trends in atomic ionizability
atom041 Understanding the organization of the electromagnetic spectrum
atom040 Interconverting the wavelength and frequency of electromagnetic radiation
atom043 Interconverting wavelength, frequency and photon energy
atom044 Calculating the wavelength of a spectral line from an energy diagram
atom049 Predicting the qualitative features of a line spectrum
atom050 Calculating the wavelength of a line in the spectrum of hydrogen

Gases

gas001 Interconverting pressure and force
gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
gas004 Understanding Boyle's Law
gas005 Solving applications of Boyle's Law
gas006 Using Charles's Law
gas007 Using the ideal equation of state
gas008 Interconverting molar mass and density of ideal gases
gas009 Calculating mole fraction in a gas mixture
gas010 Calculating partial pressure in a gas mixture
gas011 Solving for a gaseous reactant
gas012 Understanding how average molecular kinetic energy scales with temperature
gas013 Understanding how average molecular speed scales with temperature and molar mass
gas014 Interpreting a graph of molecular speed distribution
gas015 Predicting how molecular speed distribution changes with temperature and molar mass
gas016 Calculating average molecular speed
gas017 Understanding how molecular collision rate scales with temperature and volume
gas018 Using relative effusion rates to find an unknown molar mass

Advanced Material

thermo017 Using heat of fusion or vaporization to find the heat needed to melt or boil a substance
thermo019 Relating vapor pressure to vaporization
thermo040 Using a phase diagram to predict phase at a given temperature and pressure
thermo041 Labeling a typical simple phase diagram
thermo042 Using a phase diagram to find a phase transition temperature or pressure
soln013 Understanding conceptual components of the enthalpy of solution
soln010 Using Henry's Law to calculate the solubility of a gas

soln005 Predicting relative boiling point elevations and freezing point depressions
soln007 Using osmotic pressure to find molar mass
soln009 Using Raoult's Law to calculate the vapor pressure of a component
equi009 Predicting how reaction rate varies with pressure, concentration and temperature
equi012 Calculating the reaction rate of one reactant from that of another
equi032 Calculating average and instantaneous reaction rate from a graph of concentration versus time
equi019 Using a rate law
equi020 Using reactant reaction order to predict changes in initial rate
equi021 Deducing a rate law from initial reaction rate data
equi023 Calculating the change in concentration after a whole number of half-lives of a first-order reaction
equi022 Using an integrated rate law for a first-order reaction
equi027 Using a second-order integrated rate law to find concentration change
equi028 Using first- and second-order integrated rate laws
equi029 Deducing a rate law from the change in concentration over time
equi030 Finding half life and rate constant from a graph of concentration versus time
equi010 Interpreting a reaction energy diagram
equi011 Relating activation energy to reaction rate
equi013 Drawing the reaction energy diagram of a catalyzed reaction
equi024 Understanding the qualitative predictions of the Arrhenius equation
equi025 Using the Arrhenius equation to calculate k at one temperature from k at another
equi026 Using the Arrhenius equation to calculate Ea from k versus T data
equi033 Identifying the molecularity of an elementary reaction
equi034 Identifying intermediates in a reaction mechanism
equi035 Writing a plausible missing step for a simple reaction mechanism
equi036 Writing the rate law of an elementary reaction
equi037 Writing the rate law implied by a simple mechanism with an initial slow step
equi038 Expressing the concentration of an intermediate in terms of the concentration of reactants
equi039 Writing the rate law implied by a simple mechanism
equi040 Deducing information about reaction mechanisms from a reaction energy diagram
equi003 Understanding why no reaction goes to 100equi004 Predicting relative forward and reverse rates of reaction in a dynamic equilibrium
equi005 Using Le Chatelier's Principle to predict the result of changing concentration or volume
equi006 Using Le Chatelier's Principle to predict the result of changing temperature
equi007 Writing an equilibrium constant expression
equi014 Writing an equilibrium constant expression for a heterogeneous equilibrium
equi008 Using an equilibrium constant to predict the direction of spontaneous reaction
equi015 Using the general properties of equilibrium constants
equi016 Setting up a reaction table
equi017 Calculating equilibrium composition from an equilibrium constant
acid007 Predicting the major species in acid solutions
acid008 Identifying Bronsted-Lowry acids and bases
acid009 Finding the conjugate of an acid or base
acid010 Predicting the products of the reaction of a strong acid with water
acid032 Predicting the qualitative acid-base properties of salts
acid016 Interconverting pH and hydronium ion concentration
acid017 Using the ion product of water
acid018 Making qualitative estimates of pH change
acid019 Calculating the pH of a strong acid solution
acid020 Calculating the pH of a strong base solution
acid021 Diluting a strong acid solution to a given pH
acid022 Preparing a strong base solution with a given pH
acid026 Writing an acid dissociation constant expression
acid027 Calculating the Ka of a weak acid from pH
acid028 Calculating the pH of a weak acid solution
acid029 Writing a base protonation constant expression
acid030 Calculating the pH of a weak base solution
acid031 Deriving Kb from Ka
acid042 Interconverting Ka and pKa
acid048 Calculating the pH of a salt solution
acid044 Predicting the relative acidity of binary acids
acid045 Understanding the effect of induction on acidity
acid046 Predicting the qualitative acid-base properties of metal cations

acid047 Identifying Lewis acids and bases in reactions
acid049 Predicting the acid-base properties of a binary oxide in water
acid035 Identifying the major species in weak acid or weak base equilibria
acid036 Setting up a reaction table for a pH calculation with a common ion
acid037 Calculating the pH of a buffer
acid038 Calculating the composition of a buffer of a given pH
acid023 Determining the volume of base needed to titrate a given mass of acid
acid024 Determining the molar mass of an acid by titration
acid025 Standardizing a base solution by titration
acid040 Calculating the pH of a weak acid titrated with a strong base
acid041 Calculating the pH of a weak base titrated with a strong acid
acid043 Calculating the pH at equivalence of a titration
soln014 Writing a solubility product (Ksp) expression
soln015 Using Ksp to calculate the solubility of a compound
soln016 Using the solubility of a compound to calculate Ksp
soln017 Calculating the solubility of an ionic compound when a common ion is present
soln018 Understanding the effect of pH on the solubility of ionic compounds
thermo024 Calculating entropy change from reversible heat flow
thermo026 Calculating absolute entropy using the Boltzmann hypothesis
thermo027 Calculating entropy change using the Boltzmann hypothesis
thermo028 Predicting qualitatively how entropy changes with temperature and volume
thermo029 Predicting qualitatively how entropy changes with mixing and separation
thermo030 Qualitatively predicting reaction entropy
thermo031 Calculating reaction entropy using the standard molar entropies of reactants
thermo032 Using the general properties of Gibbs free energy
thermo033 Calculating dG from dH and dS
thermo034 Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
thermo035 Calculating standard reaction free energy from standard free energies of formation
thermo037 Estimating a phase transition temperature from standard thermodynamic data
thermo038 Calculating reaction free energy under nonstandard conditions
thermo039 Using reaction free energy to predict equilibrium composition
redox009 Writing and balancing complex half-reactions in acidic solution
redox010 Writing and balancing complex half-reactions in basic solution
redox013 Balancing a complex redox equation in acidic or basic solution
redox014 Writing the half-reactions of a complex redox reaction in acidic or basic solution
redox012 Designing a galvanic cell from a single-displacement redox reaction
redox016 Designing a galvanic cell from two half-reactions
redox017 Analyzing a galvanic cell
redox018 Picking a reduction or oxidation that will make a galvanic cell work
redox019 Ranking the strength of oxidizing and reducing agents using standard reduction potentials
redox020 Calculating standard reaction free energy from standard reduction potentials
redox021 Using the Nernst equation to calculate nonstandard cell voltage
redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential
nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation
nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes

ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols
ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.6 General Chemistry (Second Quarter)

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation
alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere

unit029 Volume of a cylinder
arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation

Measurement and Matter

unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements
atom015 Distinguishing elements and compounds
atom016 Distinguishing compounds and mixtures
atom034 Distinguishing chemical and physical change
atom033 Distinguishing solid, liquid and gas phases of a pure substance
atom001 Names and symbols of important elements
atom002 Reading a Periodic Table entry
atom042 Understanding periods and groups of the Periodic Table
atom003 Organization of the Periodic Table
atom005 Standard chemical and physical states of the elements
atom038 Using the Periodic Table to identify similar elements
atom039 Identifying the parts of an atom
atom063 Counting the number of protons and electrons in a neutral atom
atom006 Counting protons and electrons in atoms and atomic ions
atom029 Finding isoprotonic atoms
atom030 Finding isoelectronic atoms
atom012 Predicting the ions formed by common main-group elements
atom004 Isotopes
atom058 Finding atomic mass from isotope mass and natural abundance
atom062 Counting valence electrons in a neutral atom
atom019 Counting valence electrons in an atomic ion
atom020 Drawing the Lewis dot diagram of a main group atom or common atomic ion
atom048 Counting the electron shells in a neutral atom
stoich006 Counting the number of atoms in a formula unit
atom060 Writing a chemical formula given a molecular model
atom061 Writing a chemical formula given a chemical structure
atom045 Understanding the prefixes used in naming binary compounds
atom014 Naming binary covalent compounds
atom017 Predicting whether a compound is ionic or molecular
atom007 Predicting the formula of binary ionic compounds
atom008 Naming binary ionic compounds
atom028 Deducing the ions in a binary ionic compound from its empirical formula
atom064 Predicting ionic compounds formed by two elements
atom013 Predicting and naming ionic compounds formed by two elements
atom036 Identifying common polyatomic ions

atom011 Predicting the formula of ionic compounds with common polyatomic ions
atom009 Naming ionic compounds with common polyatomic ions
atom035 Deducing the ions in an ionic compound from its empirical formula
atom037 Identifying oxoanions
atom010 Naming ionic compounds with common oxoanions

Chemical Reactions

stoich002 Using the Avogadro Number
stoich003 Calculating and using the molar mass of elements
stoich004 Calculating and using the molar mass of diatomic elements
stoich005 Calculating and using the molar mass of heterodiatomic compounds
stoich007 Finding mole ratios from chemical formulae
stoich008 Finding chemical formulae from a mole ratio
stoich009 Finding molar mass from chemical formulae
stoich010 Finding mass percent from chemical formulae
stoich011 Elemental analysis
stoich024 Finding a molecular formula from molar mass and elemental analysis
rxn001 Identifying combination, decomposition, single and double displacement reactions
stoich012 Stoichiometric coefficients
stoich013 Balancing chemical equations with noninterfering coefficients
stoich014 Balancing chemical equations with interfering coefficients
rxn002 Writing a chemical equation from a description of the reaction
rxn004 Writing the net equation for a sequence of reactions
stoich015 Solving for a reactant using a chemical equation
stoich016 Identifying the limiting reactant in a drawing of a mixture
stoich017 Limiting reactants
stoich018 Percent yield of chemical reactions
stoich020 Calculating molarity using solute moles
stoich028 Using molarity to find solute moles and solution volume
stoich029 Calculating molarity using solute mass
stoich030 Using molarity to find solute mass and solution volume
stoich021 Dilution
stoich037 Solving for a reactant in solution
stoich038 Solving limiting reactant problems in solution
soln001 Predicting the products of dissolution
soln002 Writing net ionic equations
soln003 Predicting precipitation
rxn006 Identifying precipitation, combustion and acid-base reactions
acid002 Identifying acids and bases by their chemical formula
acid011 Predicting the products of a neutralization reaction
redox001 Assigning oxidation numbers
redox002 Recognizing reduction and oxidation
redox003 Identifying oxidizing and reducing agents
redox004 Identifying oxidized and reduced reactants in a metal-nonmetal reaction
redox005 Identifying oxidized and reduced reactants in a single-displacement reaction
redox011 Predicting whether simple electrochemical reactions happen
thermo001 Understanding how kinetic energy scales with mass and speed
thermo002 Understanding how electrostatic potential energy scales with charge and separation
thermo003 Using conservation of energy to predict the qualitative exchange of kinetic and potential energy
thermo005 Calculating pressure-volume work
thermo006 Understanding the definitions of heat and work
thermo007 Understanding the definition of enthalpy
thermo008 Interconverting calories and joules
thermo011 Calculating specific heat capacity
thermo009 Using specific heat capacity to find heat
thermo010 Using specific heat capacity to find temperature change
thermo020 Using the general properties of reaction enthalpy
thermo014 Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant
thermo021 Using Hess's Law to calculate net reaction enthalpy

thermo022 Writing a standard formation reaction
thermo023 Calculating a molar heat of reaction from formation enthalpies
thermo018 Calculating the heat of reaction from bond energies

Structure and Bonding

atom051 Understanding the meaning of a de Broglie wavelength
atom052 Interpreting the radial probability distribution of an orbital
atom053 Interpreting the angular probability distribution of an orbital
atom054 Recognizing s and p orbitals
atom055 Deducing n and l from a subshell label
atom056 Deciding the relative energy of electron subshells
atom021 Deducing the allowed quantum numbers of an atomic electron
atom024 Calculating the capacity of electron subshells
atom031 Calculating the capacity of electron shells
atom057 Drawing a box diagram of the electron configuration of an atom
atom025 Interpreting the electron configuration of an atom or atomic ion
atom026 Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
atom027 Writing the electron configuration of an atom or atomic ion with s and p electrons only
atom022 Writing the electron configuration of an atom using the Periodic Table
atom023 Identifying quantum mechanics errors in electron configurations
atom059 Identifying the electron added or removed to form an ion
atom065 Identifying s, p, d and f block elements
atom066 Identifying elements with a similar valence electron configuration
atom067 Understanding the definitions of ionization energy and electron affinity
atom068 Predicting the relative ionization energy of elements
atom069 Deducing valence electron configuration from trends in successive ionization energies
atom070 Ranking the screening efficacy of atomic orbitals
atom071 Understanding periodic trends in effective nuclear charge
atom072 Deducing the block of an element from an electron configuration
atom046 Understanding periodic trends in atomic size
atom047 Understanding periodic trends in atomic ionizability
atom041 Understanding the organization of the electromagnetic spectrum
atom040 Interconverting the wavelength and frequency of electromagnetic radiation
atom043 Interconverting wavelength, frequency and photon energy
atom044 Calculating the wavelength of a spectral line from an energy diagram
atom049 Predicting the qualitative features of a line spectrum
atom050 Calculating the wavelength of a line in the spectrum of hydrogen
gas001 Interconverting pressure and force
gas002 Measuring pressure in non-SI units
gas003 Understanding pressure equilibrium and atmospheric pressure
gas004 Understanding Boyle's Law
gas005 Solving applications of Boyle's Law
gas006 Using Charles's Law
gas007 Using the ideal equation of state
gas008 Interconverting molar mass and density of ideal gases
gas009 Calculating mole fraction in a gas mixture
gas010 Calculating partial pressure in a gas mixture
gas011 Solving for a gaseous reactant

Gases, Liquids and Solids

gas012 Understanding how average molecular kinetic energy scales with temperature
gas013 Understanding how average molecular speed scales with temperature and molar mass
gas014 Interpreting a graph of molecular speed distribution
gas015 Predicting how molecular speed distribution changes with temperature and molar mass
gas016 Calculating average molecular speed
gas017 Understanding how molecular collision rate scales with temperature and volume

gas018 Using relative effusion rates to find an unknown molar mass
thermo017 Using heat of fusion or vaporization to find the heat needed to melt or boil a substance
thermo019 Relating vapor pressure to vaporization
thermo040 Using a phase diagram to predict phase at a given temperature and pressure
thermo041 Labeling a typical simple phase diagram
thermo042 Using a phase diagram to find a phase transition temperature or pressure

Solutions

stoich022 Calculating mass percent composition
stoich032 Using mass percent composition to find solution volume
soln006 Calculating molality
soln008 Calculating mole fraction
soln013 Understanding conceptual components of the enthalpy of solution
soln010 Using Henry's Law to calculate the solubility of a gas
soln005 Predicting relative boiling point elevations and freezing point depressions
soln007 Using osmotic pressure to find molar mass
soln009 Using Raoult's Law to calculate the vapor pressure of a component

Kinetics and Equilibrium

equi009 Predicting how reaction rate varies with pressure, concentration and temperature
equi012 Calculating the reaction rate of one reactant from that of another
equi032 Calculating average and instantaneous reaction rate from a graph of concentration versus time
equi019 Using a rate law
equi020 Using reactant reaction order to predict changes in initial rate
equi021 Deducing a rate law from initial reaction rate data
equi023 Calculating the change in concentration after a whole number of half-lives of a first-order reaction
equi022 Using an integrated rate law for a first-order reaction
equi027 Using a second-order integrated rate law to find concentration change
equi028 Using first- and second-order integrated rate laws
equi029 Deducing a rate law from the change in concentration over time
equi030 Finding half life and rate constant from a graph of concentration versus time
equi010 Interpreting a reaction energy diagram
equi011 Relating activation energy to reaction rate
equi013 Drawing the reaction energy diagram of a catalyzed reaction
equi024 Understanding the qualitative predictions of the Arrhenius equation
equi025 Using the Arrhenius equation to calculate k at one temperature from k at another
equi026 Using the Arrhenius equation to calculate Ea from k versus T data
equi033 Identifying the molecularity of an elementary reaction
equi034 Identifying intermediates in a reaction mechanism
equi035 Writing a plausible missing step for a simple reaction mechanism
equi036 Writing the rate law of an elementary reaction
equi037 Writing the rate law implied by a simple mechanism with an initial slow step
equi038 Expressing the concentration of an intermediate in terms of the concentration of reactants
equi039 Writing the rate law implied by a simple mechanism
equi040 Deducing information about reaction mechanisms from a reaction energy diagram
equi003 Understanding why no reaction goes to 100equi004 Predicting relative forward and reverse rates of reaction in a dynamic equilibrium
equi005 Using Le Chatelier's Principle to predict the result of changing concentration or volume
equi006 Using Le Chatelier's Principle to predict the result of changing temperature
equi007 Writing an equilibrium constant expression
equi014 Writing an equilibrium constant expression for a heterogeneous equilibrium
equi008 Using an equilibrium constant to predict the direction of spontaneous reaction
equi015 Using the general properties of equilibrium constants
equi016 Setting up a reaction table
equi017 Calculating equilibrium composition from an equilibrium constant

Acids and Bases

acid001 Identifying acids and bases by their reaction with water
acid007 Predicting the major species in acid solutions
acid008 Identifying Bronsted-Lowry acids and bases
acid009 Finding the conjugate of an acid or base
acid010 Predicting the products of the reaction of a strong acid with water
acid032 Predicting the qualitative acid-base properties of salts
acid003 Naming inorganic acids
acid004 Deducing the formulae of inorganic acids from their names
acid005 Naming acid salts
acid006 Recognizing common acids and bases
acid016 Interconverting pH and hydronium ion concentration
acid017 Using the ion product of water
acid018 Making qualitative estimates of pH change
acid019 Calculating the pH of a strong acid solution
acid020 Calculating the pH of a strong base solution
acid021 Diluting a strong acid solution to a given pH
acid022 Preparing a strong base solution with a given pH
acid026 Writing an acid dissociation constant expression
acid027 Calculating the Ka of a weak acid from pH
acid028 Calculating the pH of a weak acid solution
acid029 Writing a base protonation constant expression
acid030 Calculating the pH of a weak base solution
acid031 Deriving Kb from Ka
acid042 Interconverting Ka and pKa
acid048 Calculating the pH of a salt solution
acid044 Predicting the relative acidity of binary acids
acid045 Understanding the effect of induction on acidity
acid046 Predicting the qualitative acid-base properties of metal cations
acid047 Identifying Lewis acids and bases in reactions
acid049 Predicting the acid-base properties of a binary oxide in water
acid035 Identifying the major species in weak acid or weak base equilibria
acid036 Setting up a reaction table for a pH calculation with a common ion
acid037 Calculating the pH of a buffer
acid038 Calculating the composition of a buffer of a given pH
acid023 Determining the volume of base needed to titrate a given mass of acid
acid024 Determining the molar mass of an acid by titration
acid025 Standardizing a base solution by titration
acid040 Calculating the pH of a weak acid titrated with a strong base
acid041 Calculating the pH of a weak base titrated with a strong acid
acid043 Calculating the pH at equivalence of a titration
soln014 Writing a solubility product (Ksp) expression
soln015 Using Ksp to calculate the solubility of a compound
soln016 Using the solubility of a compound to calculate Ksp
soln017 Calculating the solubility of an ionic compound when a common ion is present
soln018 Understanding the effect of pH on the solubility of ionic compounds

Entropy and Free Energy

thermo024 Calculating entropy change from reversible heat flow
thermo026 Calculating absolute entropy using the Boltzmann hypothesis
thermo027 Calculating entropy change using the Boltzmann hypothesis
thermo028 Predicting qualitatively how entropy changes with temperature and volume
thermo029 Predicting qualitatively how entropy changes with mixing and separation
thermo030 Qualitatively predicting reaction entropy
thermo031 Calculating reaction entropy using the standard molar entropies of reactants
thermo032 Using the general properties of Gibbs free energy
thermo033 Calculating dG from dH and dS

thermo034 Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
thermo035 Calculating standard reaction free energy from standard free energies of formation
thermo037 Estimating a phase transition temperature from standard thermodynamic data
thermo038 Calculating reaction free energy under nonstandard conditions
thermo039 Using reaction free energy to predict equilibrium composition

Electrochemistry

redox006 Writing a simple half-reaction from its description
redox007 Writing the half-reactions of a metal-nonmetal reaction
redox008 Writing the half-reactions of a single-displacement reaction
redox009 Writing and balancing complex half-reactions in acidic solution
redox010 Writing and balancing complex half-reactions in basic solution
redox013 Balancing a complex redox equation in acidic or basic solution
redox014 Writing the half-reactions of a complex redox reaction in acidic or basic solution
redox012 Designing a galvanic cell from a single-displacement redox reaction
redox016 Designing a galvanic cell from two half-reactions
redox017 Analyzing a galvanic cell
redox018 Picking a reduction or oxidation that will make a galvanic cell work
redox019 Ranking the strength of oxidizing and reducing agents using standard reduction potentials
redox020 Calculating standard reaction free energy from standard reduction potentials
redox021 Using the Nernst equation to calculate nonstandard cell voltage
redox022 Using the relationship between charge, current and time
redox023 Using the Faraday constant
redox024 Analyzing the electrolysis of molten salt
redox025 Calculating the mass of an electrolysis product from the applied current
redox026 Recognizing consistency among equilibrium constant, free energy, and cell potential

Nuclear and Organic Chemistry

nchem001 Interpreting the symbol for a nuclide
nchem002 Writing the symbols in a nuclear chemical equation
nchem003 Balancing a nuclear chemical equation
nchem006 Writing the equation for a typical radioactive decay
nchem008 Calculating the energy change in a nuclear reaction from the mass change
nchem004 Knowing the properties of the common types of nuclear radiation
nchem005 Understanding the common modes of radioactive decay
nchem009 Understanding radioactive half life
nchem010 Interconverting amount of radioactive decay and half life
nchem011 Calculating radioactive activity from half life
nchem012 Using isotope ratios to radiodate
nchem013 Using activity to radiodate
ochem001 Identifying organic compounds
ochem003 Interpreting condensed chemical structures
ochem004 Identifying organic functional groups
ochem005 Identifying the main chain of branched alkanes
ochem006 Numbering the main chain of branched alkanes
ochem007 Interpreting condensed chemical structures with benzene rings
ochem008 Naming normal alkanes
ochem009 Using family suffixes to name organic compounds
ochem010 Using locants in the names of organic compounds
ochem011 Naming alkyl side chains
ochem012 Naming branched alkanes
ochem013 Using multiplying affixes in the names of branched alkanes
ochem016 Naming unbranched alkenes and alkynes
ochem017 Naming alkenes and alkynes
ochem018 Naming alkyl halides
ochem019 Naming alcohols

ochem020 Naming aldehydes and acids
ochem021 Naming benzene derivatives

B.7 General Chemistry (Third Quarter)

Math and Algebra

arith231 Integer multiplication and division
arith067 Simplifying a fraction
arith212 Equivalent fractions
arith105 Signed fraction multiplication: Advanced
arith234 Signed decimal addition
arith030 Percentage of a whole number
arith047 Evaluating expressions with exponents: Problem type 1
arith029 Ordering numbers with positive exponents
arith024 Ordering numbers with negative exponents
alge024 Product rule of exponents
alge026 Quotients of expressions involving exponents
alge004 Evaluating a quadratic expression in one variable
alge606 Distributive property: Basic
alge604 Distributive property: Advanced
alge607 Combining like terms: Basic
alge663 Combining like terms: Advanced
alge160 Algebraic symbol manipulation
alge027 Power rule with positive exponents
alge025 Power rule with negative exponents: Problem type 1
alge029 Simplifying a polynomial expression
alge030 Multiplying monomials
alge033 Multiplying binomials: Problem type 1
alge032 Squaring a binomial
alge180 Multiplying polynomials
alge053 Multiplying rational expressions: Problem type 1
alge006 Solving a two-step equation with integers
alge200 Solving an equation to find the value of an expression
alge060 Solving a rational equation that simplifies to a linear equation: Problem type 1
alge212 Solving a rational equation that simplifies to a quadratic equation: Problem type 1
alge062 Solving a rational equation that simplifies to a quadratic equation: Problem type 2
alge214 Discriminant of a quadratic equation
alge095 Solving a quadratic equation using the quadratic formula
alge194 Graphing a line given its equation in slope-intercept form
alge196 Graphing a line through a given point with a given slope
alge637 Determining the slope of a line given its graph
alge210 Finding x- and y-intercepts of a line given the equation in standard form
alge070 Writing an equation of a line given the y-intercept and a point
unit041 Volume of a cube or a rectangular prism
geom802 Circumference and area of a circle
unit841 Volume of a sphere
unit029 Volume of a cylinder
arith082 Multiplication of a decimal by a power of ten
arith083 Division of a decimal by a power of ten
scinot101 Converting between decimal numbers and numbers written in scientific notation
scinot102 Multiplying and dividing numbers written in scientific notation
scinot103 Calculating positive powers of scientific notation
scinot007 Finding negative powers of scientific notation

Measurement and Matter

unit043 Knowing the dimension of common simple SI units
unit044 Understanding the purpose of SI prefixes
unit045 Knowing the value of an SI prefix as a power of 10
unit014 Interconversion of prefixed and base SI units
unit015 Interconversion of prefixed SI units
unit047 Interconverting compound SI units
unit032 Interconverting temperatures in Celsius and Kelvins
unit033 Interconverting temperatures in Celsius and Fahrenheit
unit048 Addition and subtraction of measurements
unit049 Simplifying unit expressions
unit051 Multiplication and division of measurements
sigfig001 Counting significant digits
sigfig002 Rounding to a given significant digit
sigfig003 Counting significant digits when measurements are added or subtracted
sigfig004 Counting significant digits when measurements are multiplied or divided
sigfig005 Adding or subtracting and multiplying or dividing measurements
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