# ALEKS®

# Teacher's Guide

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**ALEKS** *Teacher's Guide*, Version 3.3.6.

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# Preface

Congratulations on your interest in **ALEKS**! This is an online educational system like none you have encountered before, whose use of computer technology to promote math learning is pedagogically sound and cutting-edge.

The **features** of **ALEKS** make it a self-contained tool, opening new horizons for educators and learners alike in any educational context. The **ALEKS** Class Management System enables teachers and administrators to oversee and monitor their students' progress, communicate with them, track usage levels, and focus instruction. By 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. Assessment and practice problems are algorithmically generated, so the students cannot predict them. The course objectives used in **ALEKS** are customizable, letting you add or subtract topics from your course with a click of the mouse. Since it is accessed over the World Wide Web using standard browsers, no complicated technical preparation is needed—and your students can work at any time, from home or from the classroom! It's a personal tutor for each of your students, at a fraction of what such services normally cost.

The **benefits** of using **ALEKS** are striking. Students work in a dynamic, interactive learning environment on precisely those materials that they are individually ready to learn, building momentum toward mastery. 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. Once you purchase **ALEKS**, you will receive a Teacher Access Code. Using this Teacher Access Code, you can register as a teacher with the **ALEKS** system at the **ALEKS** K-12 website. In this process, you will obtain one or more Class Codes, which your students can use to register.

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

*ALEKS: A Teacher's Video*, packaged with this *Teacher's Guide*, prepares you to use **ALEKS**. In the video, you will meet the cognitive scientist, Jean-Claude Falmagne, who co-developed Knowledge Space theory and tapped its potential for developmental math instruction. To help you understand how **ALEKS** works—from both the student's and teacher's perspectives—you will see a thorough demonstration of its Assessment and Learning Modes and Teacher Module. Finally, you will hear math teachers discuss how **ALEKS** may be used in the classroom—whether in a traditional classroom or in a self-directed or distance-learning environment. The video is approximately 30 minutes in length. It is recommended that any teacher who will be assisting or instructing students using **ALEKS** take the time to watch the video.

# Chapter 1

# Introduction

## 1.1 What is ALEKS?

**ALEKS** is an online system for the assessment and individualized teaching of mathematics. It is accessed over the World Wide Web on any suitable computer and is designed to allow the monitoring and management of entire classes and schools. The core of the system is an efficient, adaptive assessment engine which determines quickly and precisely what an individual student knows. Based on that assessment data, the system is able to offer material that the student is best able to learn at a given time. The **ALEKS** Learning Mode includes explanations and algorithmically generated practice problems, ongoing assessment of student knowledge, an online math dictionary, and facilities for review and collaborative help. It can be used on an independent basis or as a supplement to classroom instruction.

The **ALEKS** system is the product of years of cutting-edge research into the mathematical modeling of human knowledge (See Chapter 9). The creators of **ALEKS** are cognitive scientists, software engineers, and university professors in the mathematical disciplines. In designing **ALEKS**, their goals were to achieve the utmost simplicity of use without compromising the depth, rigor, or richness of mathematics instruction at its inspirational best. **ALEKS** is a tool to empower both teachers and learners of math: it opens doors and windows 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 math learning is experienced.

## 1.2 The ALEKS Teacher's Guide

The purpose of the **ALEKS** *Teacher's Guide* is to give teachers using **ALEKS** information on the operation of the system that is as complete as possible. The

system is not complex. **ALEKS** can be and often is used with no documentation whatsoever. At the same time, we wish to offer teachers a clear idea of everything **ALEKS** does, how it works, and where to find answers to their students' questions.

**ALEKS is designed to be used without help from the Teacher's Guide. Feel free to use the system now. If questions arise, or if you want to learn more about ALEKS, this Teacher's Guide 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 turned to by teachers using **ALEKS** for the first time. Chapter 2, "Quick Start," contains a concise checklist for beginning to use **ALEKS**. Chapter 3, "Setup Guide for Teachers," provides all of the information necessary for preparing to use **ALEKS** with one or more classes. This ranges from technical requirements and installation through the students' first **ALEKS** session (which typically involves registration, tutorial, initial assessment, and entry into the Learning Mode). (Much of the information is the same as that in Appendix A.)
- Chapters 4 through 8 contain descriptions of the principal parts of the **ALEKS** system: Assessment Mode, Learning Mode, and Teacher Module. The Teacher Module is discussed in three chapters. Chapter 6 presents the Teacher Module generally, and is followed by treatments of the more specialized capacities of the Advanced Teacher Module. Chapter 7 covers Results & Progress, the facility for monitoring student use of **ALEKS** and managing accounts. Chapter 8 covers Standards & Course Objectives, the facility for reviewing and modifying the curricular information used by **ALEKS** for a particular school or class.
- Chapters 9 through 11 provide additional information that may be necessary or of interest to teachers 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.

  **NOTE. Teachers who need technical or other support in the use of ALEKS should turn to the form at the end of Chapter 11 (See Sec. 11.1).**
- Appendix A contains the complete text of the **ALEKS** Student User Guide. For a complete list of course objectives for Arithmetic, Algebra 1, and Algebra 2, as well as a correlation to Glencoe Mathematics textbooks, see Appendix B.

# 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. You give this code to the students in your class; they will use this Class Code to register. The Class Code is all your students need to register with **ALEKS**. When they register they will receive a Login Name and Password; after this they will no longer need the Class Code. Students should not use the Class Code to register a second time, as doing so will create a new account in their name, unconnected with the first.

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, without any unwanted effect on their work or records (moving a student to a class using a new domain in **ALEKS** will trigger a new assessment). **To obtain the Class Code for any class, log on to your teacher account, click on "Class Admin," and then on "View all your classes and class codes" (See Sec. 6.2).** Or, in the Advanced Teacher Module, simply select the name of the class and click "Edit." The Code will appear in the upper right-hand part of the screen (See Sec. 7.18).

If you are creating a new school or district account in **ALEKS**, you must first obtain a Teacher Access Code from Glencoe/McGraw-Hill. If someone else has registered you as a teacher with **ALEKS**, you do not need a Teacher Access Code. If no one has done this for you, here is how you register as a teacher.

1. Go to the **ALEKS** website for K-12.

   http://www.k12.aleks.com

2. Click on the yellow button, "Register with ALEKS."
3. Enter your Teacher Access Code when prompted.
4. Enter other information requested.
5. Record your Login Name and Password. You may change your Password if you wish.
6. Take the Teacher Tutorial to familiarize yourself with the features of the Teacher Module.

If someone else has registered you with **ALEKS**, you will already have a teacher Login Name and Password. In this case also, we strongly advise that you take the Teacher Tutorial to familiarize yourself with the features of the Teacher Module. Once you are logged on to **ALEKS** as a teacher, you can create one or more classes as follows.

1. Click on the button "New Class."
2. Enter all necessary information about your new class in the spaces provided.
3. Click "Save."

The Class Code for your class will be visible when you create the class. You can see this code again at any time by selecting the name of the class and clicking "Edit."

## 2.2 Registering Students

Students should use the following steps to register.

1. Go to the **ALEKS** website for K-12.

   http://www.k12.aleks.com

2. Click on the button for "Register with ALEKS." (This is the only time they will click on that button.)
3. Enter the Class Code when prompted.
4. Enter other information as requested (students in high school are asked for their full names, those below high school only for their first name and last initial).
5. Record their Login Name and Password, provided by the system. (Students can change their Password now or later if they wish.)

6. Wait for the teacher to authorize their registration. They can log off at this point and log back in later, using the Login Name and Password provided. As soon as the teacher authorizes their registration it will be complete.
7. 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.

**NOTE.** For a complete description of how teachers authorize the registration of their students, see Sec. 3.9.

# Chapter 3

# Setup Guide for Teachers

## 3.1 Teacher Preparation

It is important that teachers using **ALEKS** with their classes clearly understand the system's functioning and the ideas that underlie it. Time should be taken to study all materials provided, including this Teacher's Guide, and to try out the system thoroughly. The school administrator for **ALEKS** can contact ALEKS Corporation for consultation at any time, and preferably well in advance of the first session (See Sec. 11.).

## 3.2 Technical Requirements

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

| | PC | Macintosh |
|---|---|---|
| Operating System | Windows 95/98/2000/ME/XP/NT4.0+ | MacOS 7.6.1+ |
| Processor | Pentium 133+ MHz (166+ preferred), Pentium II+ | |
| RAM Memory | 32+ MB | 32+ MB |
| Browser | Netscape 4.5-4.8, 6.0+, Explorer 4.0+ | Netscape 4.5-4.8 (6.0+, Explorer 5.2+ OS X only) |
| Modem Speed | 28+ kbps | 28+ kbps |

Figure 3.1: Technical Requirements

Your browser should be configured with Java enabled. Both Netscape and Internet Explorer usually ship with Java. You can also install Sun Microsystems' Java® VM, version 1.4.1+, which can be obtained from Sun.


Figure 3.2: The **ALEKS** Website for K-12 Education

Note that any of the kinds of direct connection (cable, ISDN, DSL) that are 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 LAN administrator, system administrator, or lab technician to install the **ALEKS** plugin.

A student using America Online 4.0 will need to upgrade to America Online 5.0 or higher to use **ALEKS**. This can be done from AOL.

## 3.3 Installation

Installation of the **ALEKS** plugin takes place from the **ALEKS** website for K-12 Education (See Figure 3.2):

http://www.k12.aleks.com

**NOTE.** You must use this URL to access **ALEKS**. Although there are other **ALEKS** websites you may find using an Internet search engine, only this one contains your registration data as a licensed **ALEKS** teacher. It is advisable 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** plugin is automatic. If you attempt to use the system directly by clicking on "Be our Guest" or on "Register with ALEKS" it will automatically check to see whether your computer has the most recent plugin currently installed. If it does not, it will download the plugin and ask for your permission to install. (This is not a high-risk operation for your computer. The **ALEKS** plugin 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 available on that computer. ALEKS Corporation Customer Support will be happy to answer any questions about the plugin.) When you grant permission, it will install. Following installation you must close and reopen your browser application. Installation is automatic for registered users as well.

If you need to download and install the plugin when this does not occur automatically, click on "Download the ALEKS plugin."

## 3.4 Registering as a Teacher

**If you have been provided with your account information by ALEKS Corporation, as is usual for instructors using ALEKS with their classes, please skip this section. You are already registered and should not do so again.**

**Before You Begin.** In order to register as an **ALEKS** teacher you need your Teacher Access Code. Contact your school's **ALEKS** Administrator to receive your Teacher Access Code.

**Step 1.** Go to the **ALEKS** website for K-12 Education (use your Bookmark/Favorite, if you made one; see Sec. 3.3):

http://www.k12.aleks.com

**Step 2.** Click on "Register with ALEKS" (See Figure 3.2).

**Step 3.** You will see instructions for teachers registering with **ALEKS**. Click on "Register."

**NOTE.** If you do not have a current plugin the download and installation process

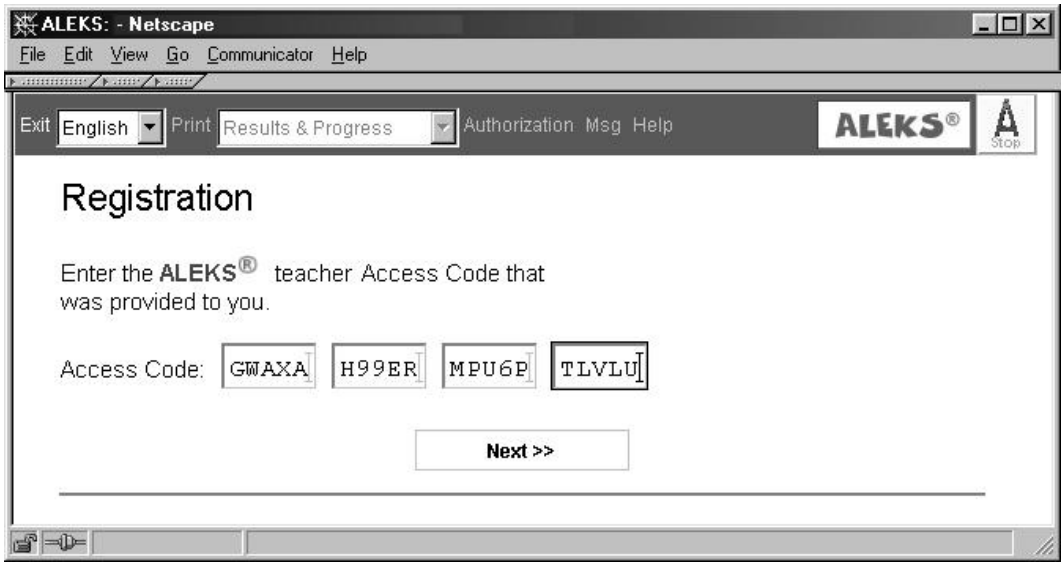


Figure 3.3: Teacher Access Code

will begin here (See Sec. 3.3). When it is finished, 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 for K-12 Education (use your Bookmark/Favorite for the **ALEKS** website). Return to Step 1, above, to begin registration.

**Step 4.** At the beginning of registration, you will be asked for your Teacher Access Code. Enter this in the spaces provided and click on "Next" (See Figure 3.3). Answer the questions to complete your registration. Among other questions, you will be asked to provide complete information on the class you are teaching with **ALEKS**. Following your registration as a teacher you will be able to use the Teacher Module to create additional classes if needed (See Sec. 7.17).

**Step 5.** In the course of registration, you will be given a Login Name and Password. Write these down and keep them in a safe place, since you will need them to return to the system. Your Login Name is not the same as your name, but usually consists of the first letter of your first name plus your last name in its entirety, with no spaces or punctuation. Thus "Jane Smith" may have the Login Name "jsmith"; if there is more than one "Smith" in the database whose first name begins with "J," a numeral will be appended, as "jsmith2." You can change your Password at any time.

**NOTE.** Login Name and Password can be typed with upper- or lower-case letters. Neither may contain spaces or punctuation.

**Step 6.** Following Registration you are also given the Class Code for the class you

are teaching. Record and file this information carefully. This code must be supplied to your students when they first log on and register with **ALEKS** (See Sec. 3.8).

## 3.5 Teacher Module

When Registration is complete, the teacher enters the **ALEKS** Teacher Module; she or he can return to the Teacher Module by logging on to **ALEKS** with the Teacher Login Name and Password provided (See above). The Teacher Module is an extremely important component of the **ALEKS** system permitting teachers to monitor and manage their **ALEKS** classes. The Teacher Module is designed for the utmost 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 Teacher Module.

After the teacher is familiar with the features of the Teacher Module, he or she may wish to try the Advanced Teacher Module, which is somewhat more complex than the standard interface but offers greater efficiency in some operations. There is a Tutorial in **ALEKS** explaining the use and features of the Advanced Teacher Module (See below).

## 3.6 Lab Check

To ensure the best possible experience of **ALEKS** for your students, we recommend that teachers check the computer lab in which **ALEKS** will be used in advance of the first session. This means installing and testing the plugin 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 plugin. To install and test, simply log on to **ALEKS** through "Be Our Guest" on each computer or use your teacher login to enter your account. Installation will occur automatically. Following installation, restart the browsers and attempt login again. This time you should access **ALEKS**.

If the **ALEKS** plugin is not preinstalled 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 far better to catch and resolve it before the students arrive.

## 3.7 Student Orientation

It is strongly recommended that the first **ALEKS** session be conducted under supervision, with one or more teachers on hand to help the students get started. Teachers may also choose to schedule supervised assessments at regular intervals and at the end of the course. It is not generally necessary to schedule a separate orientation meeting before the students actually begin using the system, although in some cases there may be reasons for doing so. It is also advisable to emphasize the few requirements for assessments in **ALEKS**: paper and pencil are needed, simple calculators without graphic or symbolic functions are permitted for Algebra only, and no help whatsoever can be received by students being assessed. A basic calculator is part of **ALEKS**. Remind them that help is not allowed during the assessment because if the student being assessed does not do their own work, the assessment results may not be accurate, and this will hinder that student's progress in the Learning Mode.

If at all possible, the students' first session with **ALEKS** should be long enough for them to complete their assessments and begin work in the Learning Mode. One hour may be considered a reasonable period of time. If the students cannot finish their assessments during this time, **ALEKS** will automatically keep their place, and they will resume next time where they had left off. No work will be lost.

## 3.8 Registration

Students register with **ALEKS** by going to the **ALEKS** website for K-12 Education and clicking on "Register with ALEKS." This will be expedited if the browsers used by the students have Bookmarks or Favorites pointing to the website (See Sec. 3.3).

**NOTE.** In order to register, all students must have the Class Code for the class that you are teaching. The Class Code is sent to the teacher by ALEKS Corporation or obtained by the teacher at the time of registration (See Sec. 3.4). You are responsible for giving this code to the students at the time of the first session.

**To obtain the Class Code for any class, log on to your teacher account, click on "Class Admin," and then on "View all your classes and class codes" (See Sec. 6.2).** Or, in the Advanced Teacher Module, simply select the name of the class and click "Edit." The Code will appear in the upper right-hand part of the screen (See Sec. 7.18).

The student registration process is described in detail in the Student User Guide (See Appendix A). There are complete online instructions for every step of this simple procedure. Among other information, students are asked to supply their email address (so they can be helped more promptly in case of difficulties) and their Student ID number (if the teacher wishes to have this in the system). Special care

should be taken in entering the latter, as the system cannot detect mistyping. Both email and Student ID are optional information.

**NOTE.** You may use the master at the back of this Teacher's Guide to create Student ID cards.

Near the conclusion of Registration students receive a Login Name and Password. These should be noted carefully, as they will be essential for all further work with **ALEKS**. You may wish to advise the students to change their Passwords at the earliest opportunity. They should use a Password they will remember easily, but which 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.

At the end of Registration, students are asked to wait for their teacher's authorization. For a complete description of how teachers authorize the registration of their students, see Sec. 3.9. The students can log off at this point and log back in later, using the Login Name and Password provided. As soon as the teacher authorizes their registration it will be complete.

## 3.9 Teacher Authorization of Student Registration

The following is a more detailed description of the student registration process, highlighting the actions by which students' registration is authorized by their teacher.

A student wishing to register with **ALEKS** begins on the **ALEKS** home page by clicking on the yellow button marked "Register with **ALEKS**," located to upper left of the large **ALEKS** logo (See Figure 3.2).

On the page that follows, the student should click the left-hand "Register" button (the right-hand "Register" button is for teachers). Above the left-hand (student) button is a note that the teacher will need to authorize the student's registration (See Figure 3.4).

Next the student is asked to enter the Class Code which has been provided by the teacher (See Figure A.2). Since each Class Code is assigned to a class defined by grade level, the Class Code entered by the student tells **ALEKS** the grade level at which the student is seeking to register. The steps by which the student completes registration follow two paths, one for students below High School, and another for students in High School.

Following entry of the Class Code, the student is given information on the class selected and on the process of beginning to use **ALEKS**.

Subsequently, if the student is in 8th grade or below, **ALEKS** asks for the student's first name and last initial (See Figure 3.5). **ALEKS** does not ask for the student's

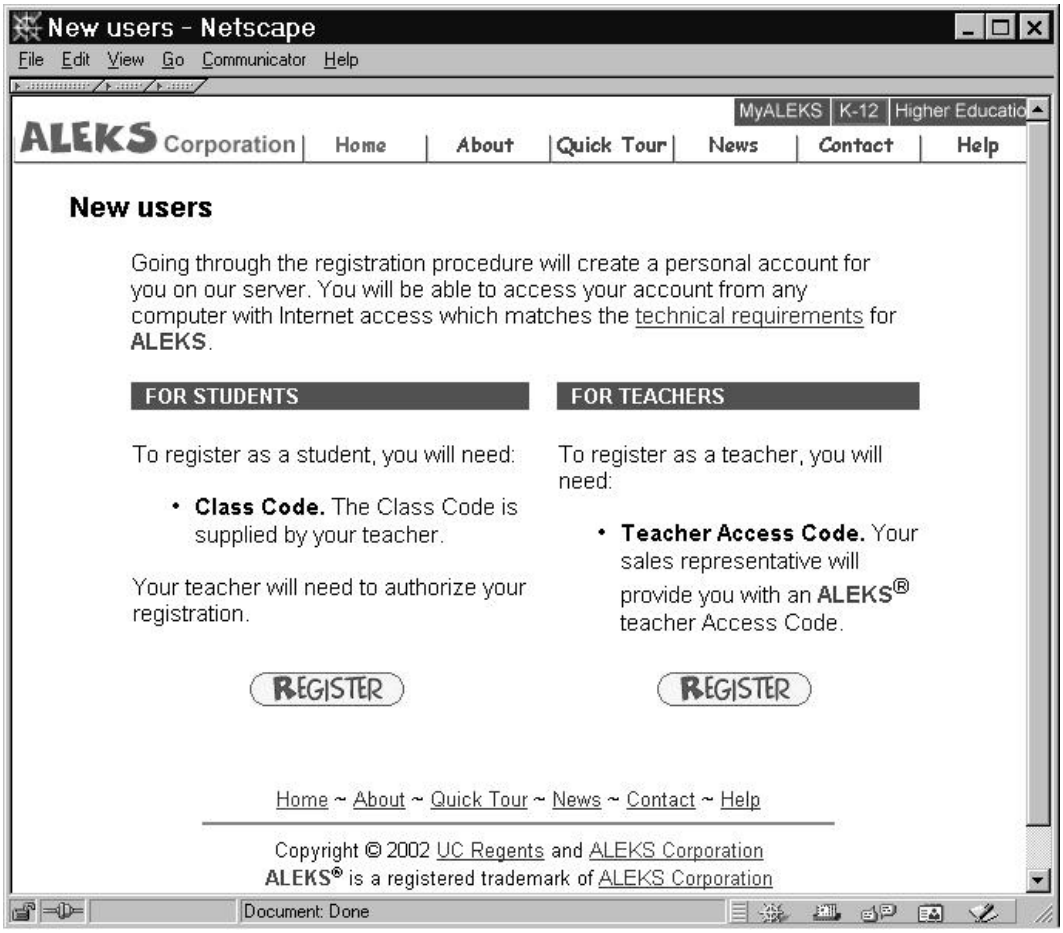


Figure 3.4: Registration (continued)

full last name so that there is no personally identifying information in the system for students in 8th grade or below. The student is then provided with a Login Name consisting of the student's first name, last initial, and possibly a number. If the student is beyond the 8th grade, **ALEKS** asks for full first and last names, and then provides a Login Name consisting of the student's first initial, last name, and possibly a number (See Figure 3.5). The student is also provided with a password, which can be changed at this time or later, as the student desires.

Students above the 8th grade have the opportunity to enter an email address and a Student ID number. No students are required to provide this information; students in the 8th grade and below are never asked for it or given any way to provide it.

At this point the student is told that authorization is needed from the teacher before registration can be completed (See Figure 3.6). Until the teacher logs onto **ALEKS** and provides authorization, the student will not be able to get further than this

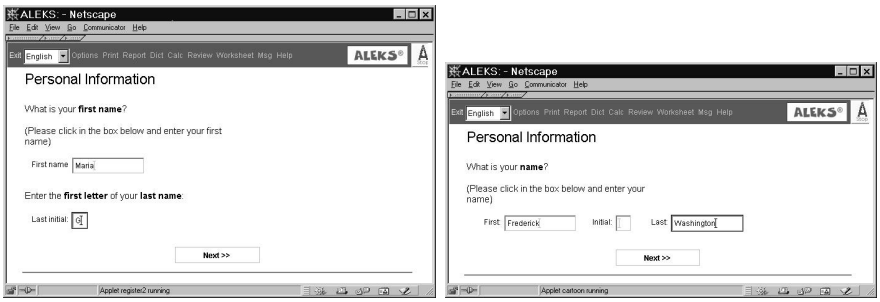


Figure 3.5: Registration


Figure 3.6: Registration (continued)

page. Once authorization is provided, the student will be able to click "Next" and begin using **ALEKS**. If the teacher cannot authorize immediately, the student is able to log off at this point and log back on at a later time using the Login Name and Password provided; if the teacher has authorized registration by then, the student will be able to begin using **ALEKS**.

In order to authorize registration, the teacher of this class must log onto her or his teacher account using the Login Name and Password received at registration or from ALEKS Corporation. If there are students in the class awaiting registration, the teacher will come to the Authorization page with instructions and a list of students needing authorization (See Figure 3.7). If the teacher simply wishes to authorize all students, there is a checkbox at the top of the list to do this; otherwise each student can be authorized individually by clicking the checkbox opposite his or her name ("Authorize"). There is also a checkbox for deleting the account of a student who has initiated registration ("Delete"). Checking this checkbox will remove the account.

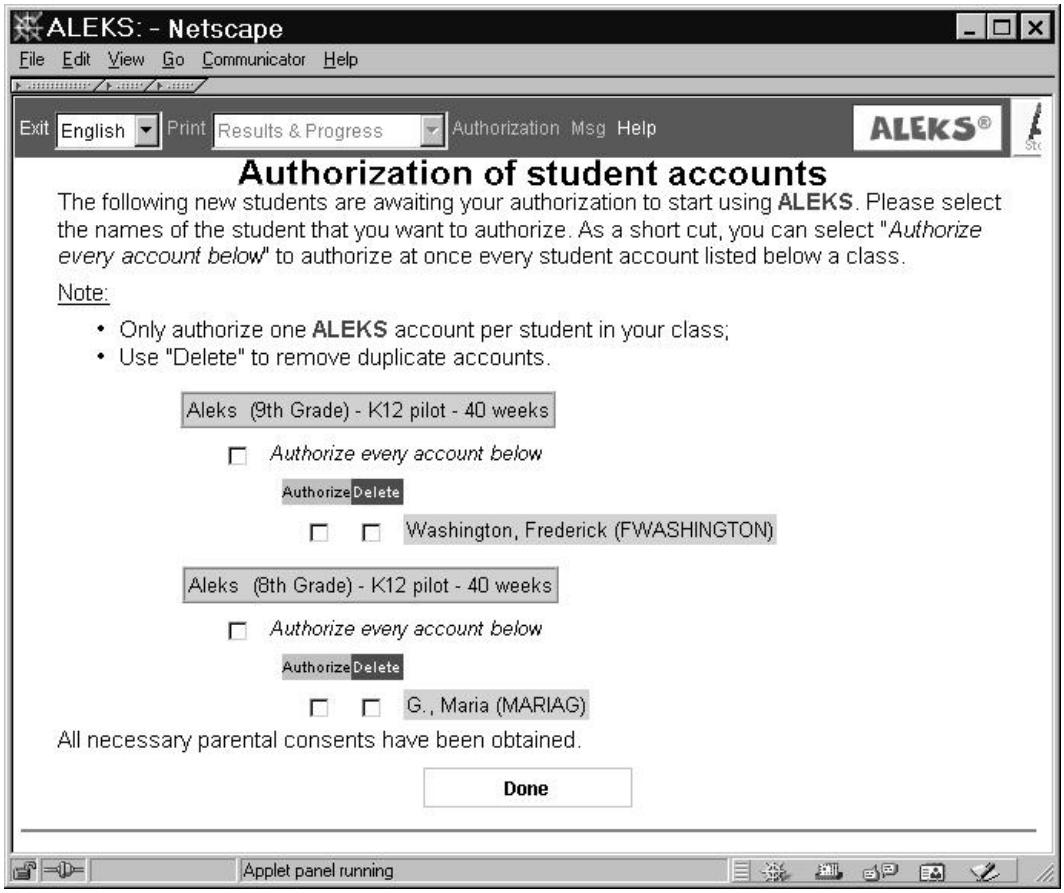


Figure 3.7: Registration (continued)

**It is noted on the Authorization page that authorizing registration for students in Grade 8 or below constitutes assurance by the teacher that all necessary parental consents have been obtained for the students' use of ALEKS.**

Some students may initiate registration more than once due to misunderstanding. This will be evident from the repetition of names in the list. (Occasionally there may be more than one student in the class with the same combination of first name and last initial; presumably the teacher will take this into account.) When there is repetition, the teacher will wish to "Authorize" only one account for each student and "Delete" any others, to prevent unnecessary use of purchased licenses.

When all necessary boxes have been clicked, the teacher can then click "Done"; a summary of authorizations and current licensing status will be shown, and the teacher can continue to work in the Teacher Module. It is also possible to defer authorization simply by clicking "Done" on the Authorization page, without either

authorizing or deleting all or any of the students. The teacher can return to the Authorization page later by clicking "Authorization" on the **ALEKS** menu bar.

**NOTE.** When the Authorization page is shown for classes higher than the 8th grade, there is a note advising the teacher that students under the age of 13 should *not* be authorized in this way. When students under the age of 13 wish to register in **ALEKS** for a class higher than the 8th grade, the teacher should contact ALEKS Corporation for assistance.

## 3.10 Tutorial

Following Registration, the students enter a brief tutorial on the use of **ALEKS** input tools, also called the **Answer Editor Tutorial** (See Sec. 4.5). There are separate Tutorials for different subjects since the specific tools for them differ somewhat. If the class covers more than one subject, all necessary Tutorials will be taken. The **ALEKS** Tutorial provides ample feedback to ensure that students complete it successfully.

**NOTE.** The Tutorial is not intended to teach mathematical knowledge, but rather to train students in using the system tools and to avoid multiple choice problems. The correct input is always shown, and students simply enter what they see. If students need a "refresher" on use of the system tools, it is always possible to click on the "Help" button, which gives access to the sections of the Tutorial (See Sec. 5.2.11).

## 3.11 First Assessment

Students proceed directly from the Tutorial to their first assessment (See Chapter 4). To reiterate, no help of any kind should be given to students being assessed, not even rephrasing a problem. Students need to have paper and pencil. Simple calculators without graphic or symbolic functions may be used for Algebra. A basic calculator is part of **ALEKS**. No calculators are used for Arithmetic.

In classes combining more than one subject there will be an assessment for each domain. The **ALEKS** assessment is adaptive and variable in length. Some students will have very short assessments, whereas others will have assessments that are considerably longer. Consistency of effort and concentration is the factor most likely to influence the length of an assessment.

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

## 3.12 Report Tutorial

At the conclusion of each assessment, the student is given a brief Tutorial on how to interpret the Assessment Report. This will be in the form of one or more color-coded pie charts, with accompanying textual information (See Sec. 4.6). It is extremely important that the students know how to interpret these pie charts correctly. Some teachers have found it worth the effort to sit with each student individually as they conclude their assessments. They can then make sure the students understand the parts of the report and help them choose topics for entry into the Learning Mode.

Explain to students that subsequent assessments will produce only the pie charts. The pie charts also appear 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 also be accessed by means of the "MyPie" button.

## 3.13 Beginning the Learning Mode

Students enter the Learning Mode by clicking on one of the topics contained in their pie chart (topics they are completely "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, ideally, begin to "add concepts to their pie." If they have this experience, their interest in using **ALEKS** is likely to be more favorable. The teacher should also be present to answer questions regarding the Learning Mode and to assist the students in familiarizing themselves with its varied features. This is particularly important in cases where their subsequent use of **ALEKS** will be unsupervised.

# Chapter 4

# Assessment Mode

The Assessment Mode is the heart of the **ALEKS** system. Its ability to quickly and accurately determine a student's knowledge enables **ALEKS** to continuously make available the material the student can most readily employ, and thus efficiently guide individual learning paths. The Assessment and Learning Modes work together closely. 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). It is an adaptive assessment; that is, 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 numerical values (as is also the case in the Learning Mode). Thus, one cannot "learn the assessment" or "teach to the assessment," and cheating is almost 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 numerical values would almost certainly be different, and so would the correct answer. Despite this, certain assessments must be supervised, such as the initial, interim, 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. This point is critical where assessment results are used for purposes other than those internal to the system. (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.)

As noted, the student takes an initial assessment immediately following completion of the Tutorial (See Sec. 3.11). When an assessment begins, the student is clearly

informed it has begun. Next a series of mathematical 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 the Assessment Mode, the system does not inform the student whether the answer just given was correct or not. The assessment continues until the system has determined the student's precise knowledge of the domain, 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 consistency of effort and attention seem to contribute to shorter assessments.

## 4.2 Rules for Assessments

Assessment in **ALEKS** is an important and serious event. It is essential that assessments be conducted according to certain guidelines and in the proper spirit. If there is an atmosphere permitting disturbances or distractions, students will not obtain the benefits the system is capable of providing. 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 teacher's supervision (See Sec. 3.11).

All students being assessed need paper and pencil. No calculators are permitted in assessments for Arithmetic, but simple calculators without symbolic or graphing functions should be available for students being assessed in Algebra. A basic calculator is part of **ALEKS**. Most important, no assistance may be given—not even to the extent of explaining or rephrasing a problem. Students should be encouraged to use the "I don't know" button when they do not know what to do.

## 4.3 Scheduling of Assessments

**Initial Assessment.** The initial assessment takes place at the outset of students' use of **ALEKS**, immediately after Registration and Tutorial (See Sec. 3.11). We strongly recommend that this initial assessment, which has the character of an orientation to the system for student users, take place in a supervised computer lab setting to ensure that students do not receive help or collaborate. In creating or editing a class account, the teacher can stipulate that the initial assessment be allowed only from school (See Sec. 7.17.).

**Automatic Assessments.** Additional assessments are scheduled automatically by the system based on two factors: overall time spent in the Learning Mode (called "Login Time Assessment") and progress made while there (called "Progress Assessment"). By default, a new assessment is triggered after 20 new items have been

learned (but no sooner than 5 **ALEKS** hours after the last assessment) or after 10 hours have been spent in Learning Mode since the last assessment or after 60 days have passed since the last assessment. Some modification of these parameters is possible; please contact ALEKS Corporation Customer Support for assistance if you would like to do this. The Learning Mode itself updates students' assessment results as it goes along, periodically displaying new pie charts and new choices of concepts they are completely "ready to learn." The automatic assessments, however, provide a firmer basis for such guidance.

**Completion Assessments. ALEKS** also assesses students automatically when they complete the syllabus for a course. If the assessment does not confirm the student's mastery of the syllabus materials, they will return to the Learning Mode. More than one Completion Assessment is thus possible, but as a rule **ALEKS** will not reassess the student if only a small number of topics need to be relearned.

**Requested Assessments.** Assessments can also be requested by the teacher for individual students or for entire classes. For example, the teacher, department, or school may wish to have "interim" assessments under supervision to guarantee sound results. **ALEKS** allows the teacher to schedule the assessment for a particular date and time (See Sec. 6.5). Students logging on to **ALEKS** within the time period specified for the assessment will automatically enter Assessment Mode.

The teacher simply announces the assessment for a certain time and place. Just prior to this time the teacher prompts the class assessment in the Teacher Module (See Secs. 7.9–7.10). The next time students log on they will automatically enter the assessment.

## 4.4 Buttons

The Assessment Mode (See Figure 4.1) has a reduced set of active menu buttons enabling the student being assessed to leave the system ("Exit") or get help on use of the Answer Editor ("Help"). Other buttons appear, but they are disabled. All of the **ALEKS** menu buttons are enabled in the Learning Mode (See 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.

## 4.5 Answer Editor

Input to the **ALEKS** system is always in the form of proper mathematicalexpressions and constructions, never multiple choice. A critical reason for this is to prevent substantial inaccuracies which arise from students' guessing and trying out the different choices. Another purpose of this approach is to train students in the same

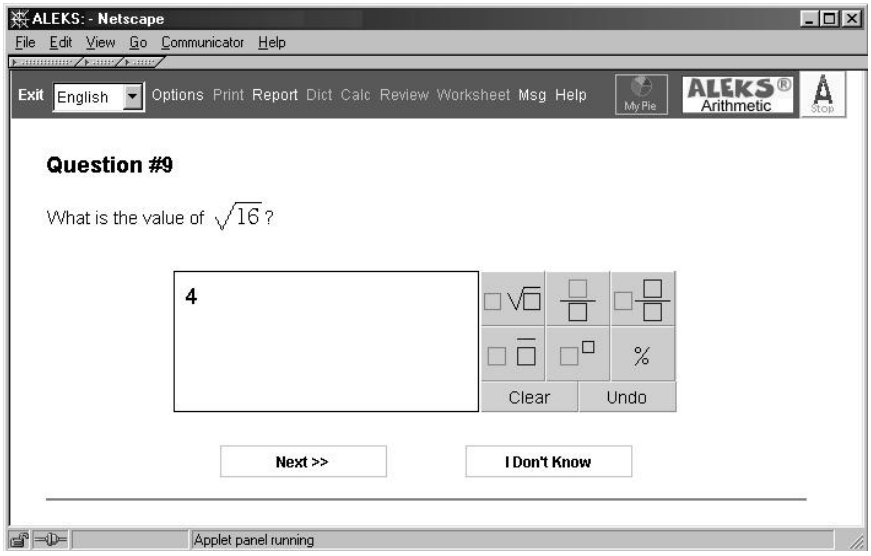


Figure 4.1: The Answer Editor for Mathematical Expressions (Assessment)

skills that are necessary for conventional, paper-and-pencil communication of solutions and results. At the same time, the sophistication of the **ALEKS** input tools provides certain advantages. The presentation of results is always neat and clear. Manual dexterity plays a reduced role in, say, drawing an accurate graph or geometrical construction. Immediate feedback is provided on the formal completeness of solutions.

The general term for the input tools used in **ALEKS** is the "Answer Editor." This encompasses a variety of actual modes for user input: an Answer Editor for mathematical expressions, an Answer Editor for the number line, an Answer Editor for graphing in the Cartesian plane (with $x$ and $y$ coordinate axes), and an Answer Editor for histograms (in Statistics). A student beginning to use **ALEKS** is thoroughly trained in all features of the Answer Editor that are relevant to the subject being studied during the Tutorial (See Sec. 3.10).

In much of what follows, emphasis is on the "Answer Editor for mathematical expressions," as this is the section which involves the greatest degree of interplay between mouse, keyboard, and on-screen buttons and icons.

### 4.5.1 Manipulators for Mathematical Expressions

**The Answer Editor for Mathematical Expressions**

The Answer Editor for mathematical expressions consists of two parts: a rectangular field into which mathematical expressions are entered (the "entry field") is to the left, and a "keypad"

| Expression | Answer Editor keypad button | Keyboard equivalent |
|---|---|---|
| Square Root | $[\ ]\sqrt{[\ ]}$ | (none) |
| Fraction | $\frac{[\ ]}{[\ ]}$ | / |
| Mixed Number | $[\ ]\frac{[\ ]}{[\ ]}$ | (none) |
| Repeating Decimal | $[\ ]\overline{[\ ]}$ | (none) |
| Absolute Value | $[\ ]\ \|[\ ]\|$ | (none) |
| List of Expressions | $[\ ],[\ ],\ldots$ | , |
| Exponent | $[\ ]^{[\ ]}$ | $\wedge$ (before exponent) |
| Multiplication Expression | $[\ ] \times [\ ]$ | * |
| Percentage | % | % |
| Greater-Than | $[\ ] > [\ ]$ | $>$ |
| Less-Than | $[\ ] < [\ ]$ | $<$ |
| Greater-Than-Or-Equal-To | $[\ ] \geq [\ ]$ | (none) |
| Less-Than-Or-Equal-To | $[\ ] \leq [\ ]$ | (none) |
| Equal-To | $[\ ] = [\ ]$ | $=$ |
| Not-Equal-To | $[\ ] \neq [\ ]$ | (none) |
| AND | $AND$ | (none) |
| OR | $OR$ | (none) |

Figure 4.2: Mathematical Expressions Produced by the Answer Editor

made of buttons with mathematical symbols is to the right (See Figure 4.1). These buttons have labels in the Tutorial, but do not thereafter. Mathematical expressions are entered and edited using the buttons of the Answer Editor keypad, as well as the basic keyboard, the Left and Right arrow keys, the Tab, Enter, and Backspace keys, and the mouse.

**NOTE.** Buttons are displayed to correspond with the kind of problem being solved. The selection is made in such a way as to avoid giving away the correct answer. Keyboard shortcuts (See Figure 4.2) work only when the corresponding button is displayed.

**Basic Input**

When a new page is opened and contains a problem whose solution is a mathematical expression, the entry field initially contains at least one blue box. Each blue box represents a mathematical expression that forms part of the complete answer. To enter a mathematical expression one must first click on a blue box. When this is done, the cursor (or "caret") appears inside the box. The cursor marks the point at which something is entered. Material can be entered using the basic keyboard or the buttons of the keypad. Individual digits can be entered only

| Key | Effect |
|---|---|
| Right arrow<br>Tab<br>Enter | moves the cursor one place to the right (ahead) |
| Left arrow | moves the cursor one place to the left (back) |
| Backspace | deletes input immediately preceding (to the left of) the cursor and moves the cursor one place to the left (back)<br>OR deletes selected input |

Figure 4.3: Using Special Keys in the Answer Editor

from the keyboard. Symbols can be entered using the buttons of the keypad and, sometimes, from the keyboard as well (See Figure 4.2).

**Basic Editing Tools**

The cursor, showing the point at which material is entered, can be moved using the Left and Right arrows and the Tab and Enter keys. It can also be positioned using the mouse. Input can be deleted using the Backspace key (See Figure 4.3).

**Selecting Input**

It is possible to select a continuous portion of input by dragging the pointer with the mouse button held down. A segment that has been selected by dragging in this way can be deleted by pressing Backspace, replaced by typing, or replaced by clicking the buttons of the Answer Editor keypad. It can also be inserted into a mathematical expression such as a fraction or a square root (the selected portion is placed in the numerator position or under the square root sign, respectively).

**Clear & Undo**

After material has been entered, the field can be returned to its empty state by clicking on "Clear." Clicking on "Undo" cancels the most recent action. Clicking on "Undo" a second time restores the effect of the canceled action (including a "Clear" command).

### 4.5.2 Mathematical Expressions

The purpose of the Answer Editor for mathematical expressions is to process user input in the form of syntactically correct mathematical expressions. One important way in which the Answer Editor guides the user in constructing such expressions is by means of the blue

boxes. If a blue box remains on the screen, it is clear that the input typed so far is not valid. If no blue boxes remain it may or may not be valid.

**Entering expressions from the keyboard**
For expressions that do not require the use of the Answer Editor keypad, the user can place the cursor within a blue box and enter the mathematical expression from the keyboard. For many expressions, however, the Answer Editor keypad must be used. It may be used, as well, for some types of expressions that can also be entered from the regular keyboard (See Figure 4.2).

**Using the Answer Editor keypad to structure simple expressions**
To form a simple mathematical expression, the user places the cursor in an empty blue box and clicks on the appropriate button from the Answer Editor keypad. The initial blue box disappears and new blue boxes may appear (depending on the button), accompanied by all of the necessary signs. The user can now fill in the new boxes.

**Entering complex expressions**
Sometimes it is necessary to enter more complex mathematical expressions. What has been written about entering mathematical expressions into a single blue box holds equally true for entering expressions into any of the blue boxes produced by clicking a button of the Answer Editor keypad. One can place the cursor in one of these boxes and enter an expression from the keyboard, or, by clicking on a button of the Answer Editor keypad, replace it with the structure of a new mathematical expression. Expressions of any degree of complexity can be created in this way.
**NOTE.** The Answer Editor does not supply parentheses. The user must know when these are necessary. In particular, when there is an expression consisting of more than one symbol that must be raised to a power, one may need to enclose it in parentheses, just as in writing; otherwise, only the final symbol (just before the exponent) will be raised to the specified power.

**Alternate ways of entering expressions**
The buttons of the Answer Editor keypad can be used in other ways as well. In particular, one can select some portion of the input in the entry field which constitutes a complete mathematical expression, and then click on a keypad button. This will create a new mathematical expression within which the expression selected is one component. The same basic rule applies: the minimum unit of manipulation is a complete mathematical expression.

**Other mathematical signs**

The following mathematical signs can be entered only from the keyboard:

- the plus sign (+);
- the minus sign (-), both for connecting the two parts of a subtraction expression and for designating a negative number;
- the period (.) used in decimals;
- the comma (,) used to punctuate numbers of more than three places.

Please note as well the following special cases:

**The asterisk for multiplication**

The "x" character on the keyboard cannot be used to enter a multiplication sign. Only the asterisk (*) serves this purpose. (The multiplication sign on the Answer Editor keypad, however, is the traditional x-shaped symbol.)

**Mixed numbers**

Although fractions can be entered from the keyboard using the front slash character (/), mixed numbers *cannot* be entered this way. More precisely, the Answer Editor does not automatically regard a whole number followed by a fraction as a mixed number. The mixed number button on the Answer Editor keypad *must* be used to enter mixed numbers.

### 4.5.3 Types of Mathematical Expressions

The following set of tips is intended to illustrate the variety of ways in which mathematical expressions can be entered using the Answer Editor. It is in no way a thorough description of the Answer Editor, which includes many other kinds of mathematical expressions and constructions.

Here, "Button" will always refer to a button on the Answer Editor keypad. By "select" we mean drag the mouse over the expression to be selected with the mouse button depressed, so that a red box appears surrounding it.


**Percentage** 48%

The next example illustrates the possibility, in some cases, of using either the Answer Editor keypad or the regular keyboard to enter signs:

- Enter the expression you wish to express as a percentage and click on the percent button; **OR**
- Enter the expression you wish to express as a percentage and then enter the (keyboard) percent sign.

**Fraction** $\frac{7}{10}$

Fractions can be entered conveniently at least three ways:

- Enter the numerator, enter a (keyboard) forward slash character, and enter the denominator; **OR**
- Enter the numerator, click on the fraction button, and enter the denominator; **OR**
- Click on the fraction button, enter the numerator, then click on the blue square in the position of the denominator and enter the denominator.

**Mixed Number** $5\frac{7}{8}$

Mixed numbers can be entered in more than one way, but they each require use of the mixed number button:

- Enter the whole number part, click on the mixed number button, enter the numerator, press Enter, and enter the denominator; **OR**
- Click on the mixed number button, click on the first blue box (for the whole part), enter the whole number part, press the right arrow, enter the numerator, move the cursor to the denominator position, and enter the denominator (i.e., fill in the boxes).

**Repeating Decimal** $1.\overline{27}$

- Enter all digits that precede the repeating pattern, including the decimal point (a period on the keyboard) and any decimal places preceding the pattern, click on the bar button, and enter the repeating pattern; **OR**
- Enter all digits, including the decimal point (a period on the keyboard) and all decimal positions following it, select the repeating pattern only, and click on the bar button.

**Fraction in square root followed by multiplier** $\sqrt{\frac{5}{8}} \times 3$

For this example only one input method is given, but others can clearly be suggested:

- Click on the square root sign button, click on the fraction button, enter the numerator, tab, enter the denominator, then tab, enter an asterisk (from the keyboard), and enter the multiplier.

 **List** $1, 2, 3$

For the purposes of the following example, assume that there is a list consisting of three components to be entered:

- Enter the first expression, click on the list button (or press the keyboard comma), enter the second expression, click on the list button, enter the third expression, click on the list button, and enter the fourth expression; **OR**

- Click on the list button (or press the keyboard comma) twice, click on the first blue box, enter the first expression, move the cursor right, enter the second expression, move the cursor right, and enter the third expression.

**Answers with Units** **10 cups**

There are also some cases where the Answer Editor does part of the formatting. For example, in problems where answers must be expressed in some kind of units, such as dollars or candies, the unit expression needed may appear in advance.

 **Square Root** $\sqrt{81}$

- Click on the square root button and enter the expression into the square root sign; **OR**

- Enter the expression you wish to appear under the square root sign, select it, and click on the square root button.

In the simple example just given the second method reverses the sequence of steps of the first method. Such complementary methods are typical.

**Absolute Value** $|-6|$

- Click on the absolute value button and enter the expression whose absolute value you wish to express; **OR**
- Enter the expression whose absolute value you wish to express, select it, and click on the absolute value button.

**Exponent** $3^2$

- Click on the Exponent button, enter the base, then move the cursor to the exponent box and enter the exponent; **OR**
- Enter the expression you wish to raise to a power, click on the exponent button, and enter the exponent.

**NOTE.** If the number you wish to raise to a power is an expression consisting of more than one symbol, it may need to be enclosed in parentheses. The Answer Editor will not do this for you. If no parentheses are used, only the last symbol will be raised to a power.

**Square Root Preceded by Multiplier** $2\sqrt{6}$

With more complex expressions you can use the mouse to place the cursor in the needed position, as in the second method:

- Enter the multiplier, click on the square root button, and enter the expression you wish to be under the square root sign; **OR**
- Click on the square root button, click to the left of the square root sign, enter the multiplier, tab (or press the right arrow, or press Enter, or click on the blue box under the square root sign), and enter the expression you wish to be under the square root sign.

### 4.5.4 Advanced Mathematical Expressions

The following types of mathematical expressions occur in more advanced subjects.

To create a matrix, the user clicks on an icon corresponding to the dimensions desired ($2 \times 2$, $2 \times 3$, etc.), then fills in the cells with appropriate values.

For topics involving set notation, there will appear icons for each of the special symbols required, such as curly braces, "belongs to," "such that," the real numbers, the integers, and so forth.

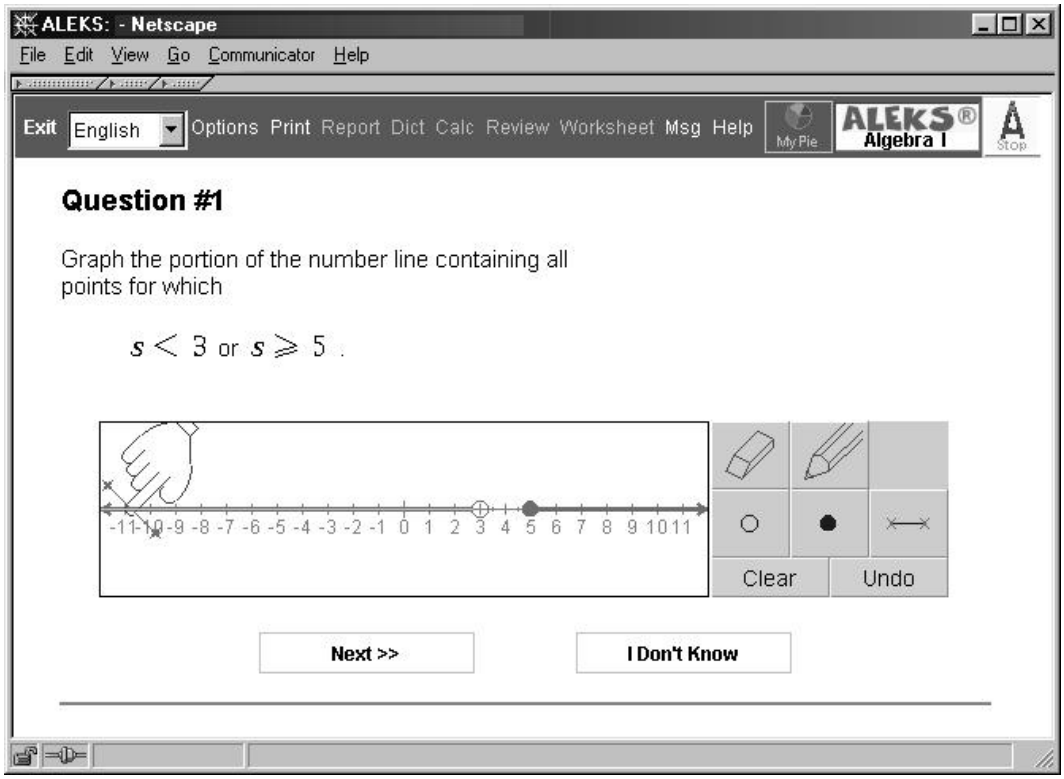


Figure 4.4: The Answer Editor for the Number Line (Assessment)

### 4.5.5 The Answer Editor for the Number Line

The Answer Editor for the number line consists of a number line and tools for placing full and empty endpoints and segments (See Figure 4.4). To place a segment, mark a point on the number line with the pencil, then click on that point with either the full or the empty tool. To place a segment, use the Region tool to click on any point in the relevant part of the number line. If the user clicks between two endpoints, the segment will extend to each of them. When the user clicks between an endpoint and an extremity of the number line, the segment will appear with an arrow to indicate that it continues to infinity. Click with the eraser to remove any part of the construction.

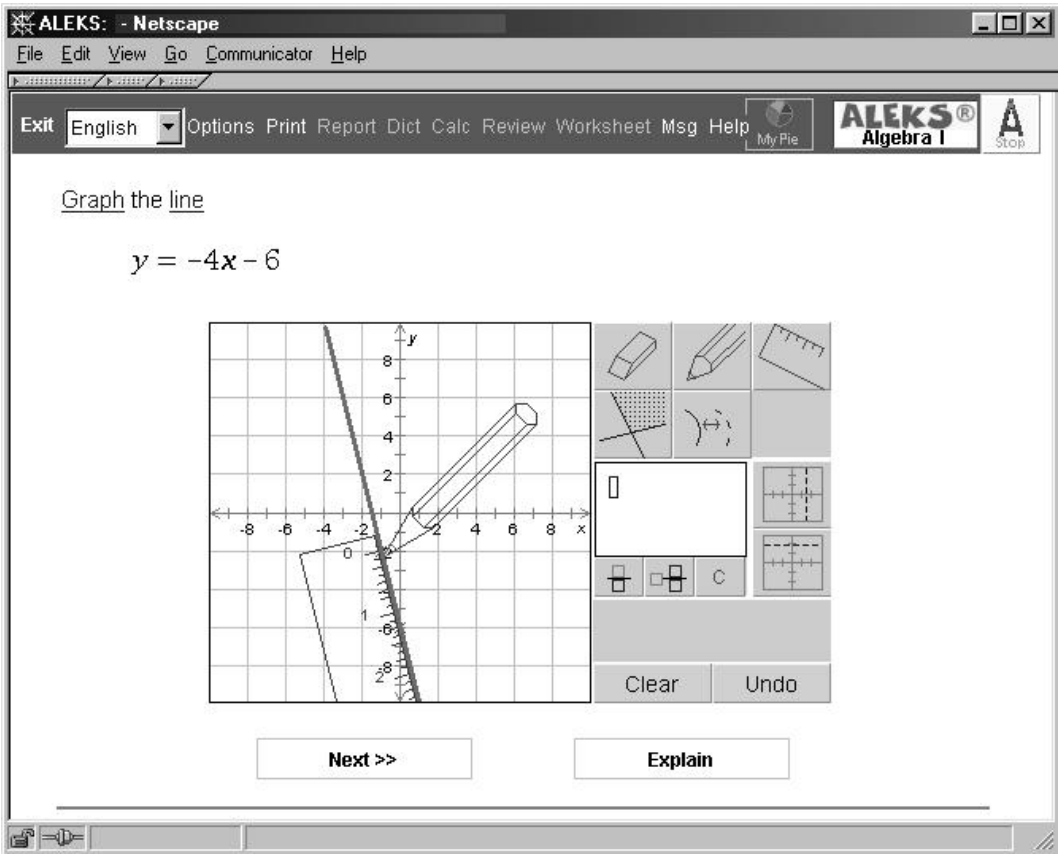


Figure 4.5: The Answer Editor for Graphing (Learning Mode)

### 4.5.6 The Answer Editor for Graphing

The Answer Editor for graphing consists of a Cartesian plane with $x$- and $y$- coordinate axes and a selection of other tools for graphing lines and regions of the plane (See Figure 4.5).

To graph a line, use the pencil tool to plot two points. Then, align the straightedge (ruler) on the two points (it is a "grabby" tool and will jump to a point when it is near it). Then use the pencil tool to draw the line. Note that the effect of the straightedge continues past its ends, so there is no need to move it to make a line going from edge to edge of the depicted plane.

To fill in a region, use the region tool and click in the desired region

of the plane. One must draw all lines defining the region before filling it in. In order for one or more of the lines defining a region to be dotted (as in the graph of a system containing one or more strict inequalities), click on the line with the dotted line tool. This may be done before or after the region is filled.

To place a point where coordinates are not both integers: use the input field to enter numerical values (fractions and mixed numbers can be placed using the icons beneath the field), then click on the icon with horizontal broken line (for the $y$-coordinate) or vertical broken line (for the $x$-coordinate). A broken line will appear on the plane for each given coordinate. Use the pencil to mark the desired point at their intersection. Another method is the click on the ordered pair icon (with a comma separating two boxes in parentheses), enter a pair of coordinates (in terminating decimal, fractional, or mixed-number form), then click on the icon with a small Cartesian plane and a point marked by "X." This will place the point directly on the plane without using the pencil.

To draw a graph requiring an asymptote, use the asymptote tool (broken horizontal or vertical line) to place the asymptote as needed. A slanted asymptote may be placed by first drawing two points and then using the tool with a broken diagonal line. Plot the additional points needed for the graph, and then click on the graph button (curved line connecting "X"s).

For each type of conic section, there is a special tool allowing the construction of its graph. Normally, the user clicks once with the tool to establish the center or vertex of the graph, and then one or more additional times to determine its final form.

As with the number line, select the eraser tool and click on any part of a line, arc, or other component to remove it.

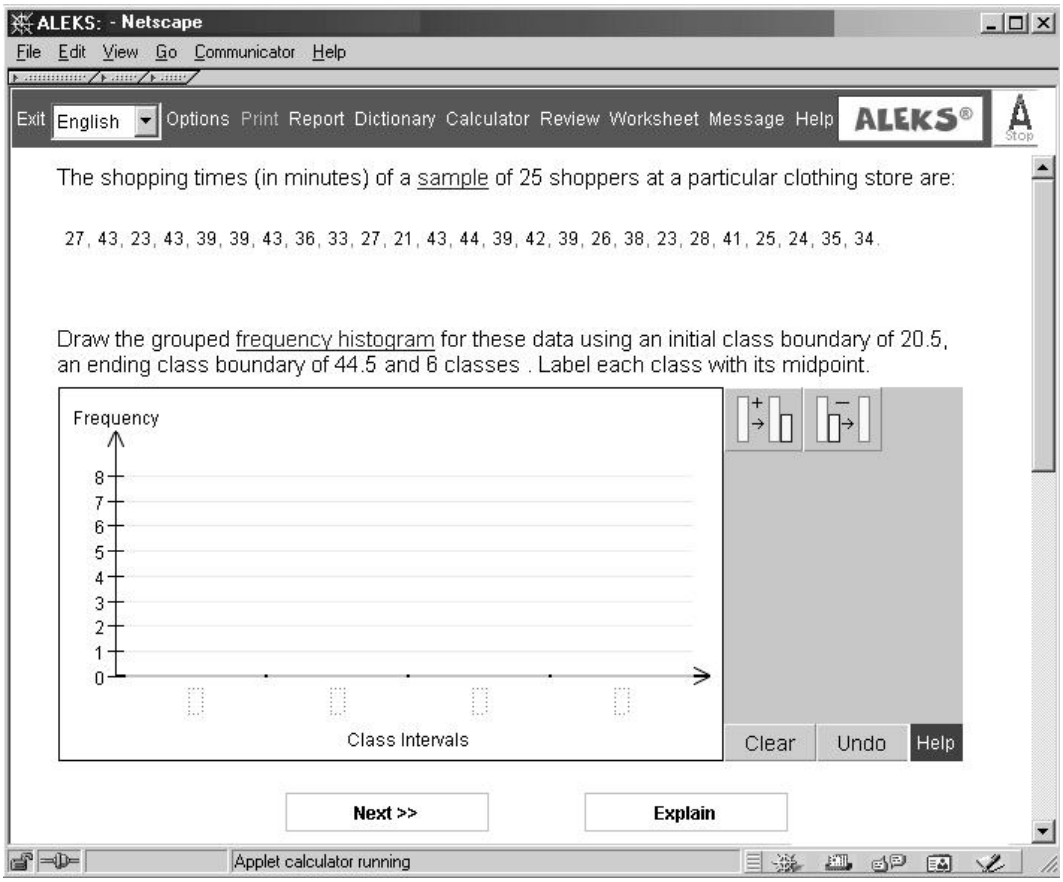


Figure 4.6: The Answer Editor for Histograms (Learning Mode)

### 4.5.7 The Answer Editor for Histograms (Statistics)

The Answer Editor for histograms consists of a space for drawing histograms and icons (buttons) permitting the creation and adjustment of bars (See Figure 4.6).

Initially, the histogram appears with a small number of bars (e.g., two). The height of the bars is adjusted by clicking on the top edge of each and holding the mouse button down while dragging to the desired height. To add bars, click on the icon with the plus sign; to subtract bars, click on the icon with the minus sign. Each bar has a space beneath it where an appropriate label can be typed in.

Any bar may be set to any integer height by dragging. To set the height of a bar at a non-integer value, enter the value in the white area to the upper right of the histogram, then click on the icon with the broken horizontal line. This will place a broken line on the histogram at that height. Any bar may then be dragged to the height of any broken line that has been placed.

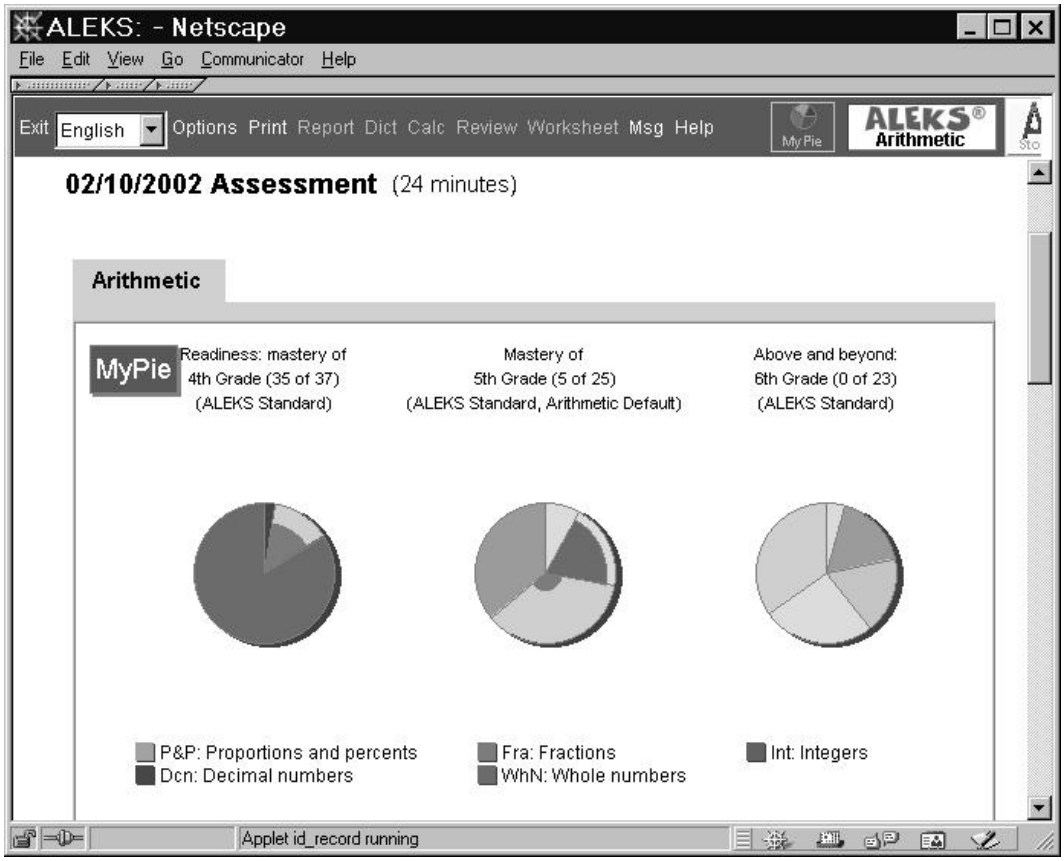


Figure 4.7: Assessment Report

## 4.6 Assessment Report

At the conclusion of an assessment, the Assessment Report is presented. The interpretation of this report is the same as for pie chart displays found in other places within **ALEKS** (such as in "MyPie").

### 4.6.1 Standard Report Format

The standard report format is used for all assessment reports. This format consists of one or more pie charts (See Figure 4.7).

### 4.6.2 Interpreting the Pie Charts

Pie Charts express the results of a given assessment. They contain the following types of information:

- which mathematics topics are part of the course objectives;
- the relative importance of the parts of the mathematics course objectives; and
- to what extent the student has attained the knowledge for each part of the mathematics course objectives, according to the assessment.

Each color-coded slice of the pie chart refers to a particular part of the course objectives, such as "Whole Numbers" or "Proportions and Percents." Each slice is marked with an abbreviation. The meanings of these abbreviations and of the chart's color-coding are given in the legend immediately following the pie chart. If the abbreviation next to the slice is underlined, it means this topic contains concepts the student is most "ready to learn."

A pie chart will show only those topics that are part of the math curriculum for the class indicated. The portion of the chart taken up by any one topic reflects the importance of that topic relative to others in the given course objectives.

The progress a student has made toward satisfying the course objectives for knowledge in a given topic is expressed by the degree to which the slice corresponding to that area is shaded (i.e., filled in with solid color). The measure of progress given by the pie charts is dependent on the standards for a particular class and is set by teachers and administrators (See Chapter 8).

When a user places the pointer over one of the slices of the pie charts, the slice pops out of the pie. A list of the items for that topic the student is currently best ready to learn will appear. Not every slice necessarily contains such a list, even if the topic has not yet been fully mastered. If the slice contains concepts, its label is underlined. This is because a student may not be ready to learn a concept in a given topic (slice) before concepts in another topic (slice) have been mastered. Clicking on any one of these concepts takes the user into the Learning Mode, beginning with that concept.

### 4.6.3 Multiple Pie Charts

For courses in Arithmetic in **ALEKS** it is normal to have separate pie charts for the grade level preceding that assigned to the class, the grade level assigned to the class, and the subsequent grade level (labeled "Readiness," "Mastery," and "Above and Beyond"). The reason for this is that students are very likely to be working on material that spans at least three grade levels. For early or late grade levels the number of pie charts shown may be fewer, depending on how the curriculum has been set up for a given school.

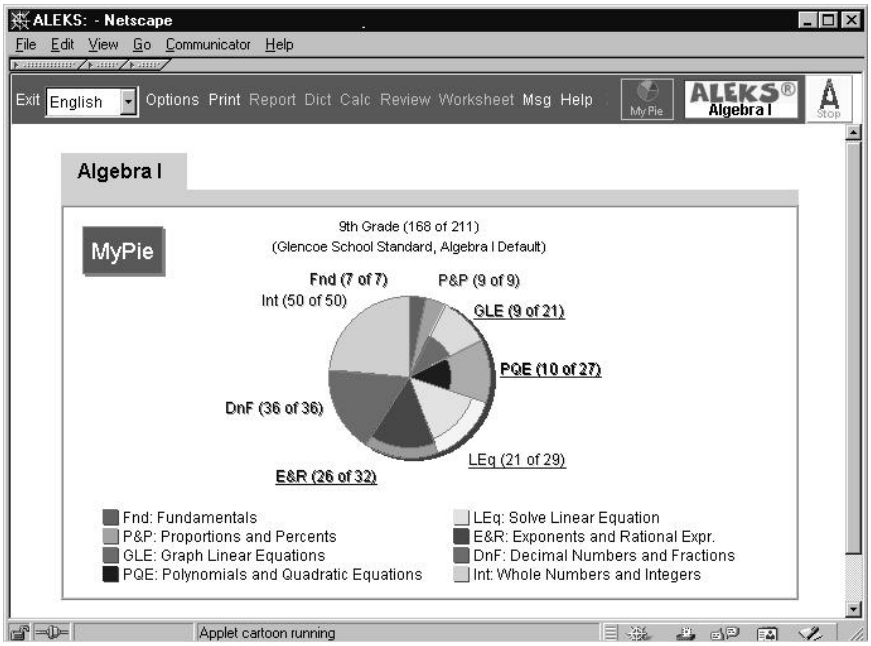


Figure 4.8: Integrated Assessment

### 4.6.4 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 domain (See Chapter 9).

### 4.6.5 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 material mastered in the Learning Mode since that assessment, and the yellow portion material belonging to the curriculum for the given level that has yet to be learned. When the bar is entirely blue, the student has completed the curriculum for a level or levels.

## 4.7 Integrated Algebra 1 Assessment

The Algebra 1 assessment covers both Arithmetic and Algebra 1 in a compact, efficient way; there is no formal division between the parts of the assessment dealing

with different domains. At the end of the assessment two pies appear: the left-hand pie shows the student's knowledge state in Arithmetic, the right-hand pie that in Algebra 1. Then the two pies merge into a single pie with slices encompassing both the Arithmetic and the Algebra 1 material. Some slices are combined and renamed for a more logical, readable display. The student will be able to work on any topics which pop out of this combined pie.

The reason for the integration of the Algebra 1 assessment is to enable students to fill in the gaps in their preparation for Algebra 1 and hence increase the efficiency of their learning.

# Chapter 5

# Learning Mode

## 5.1 The ALEKS Learning Mode

The purpose of the Learning Mode is to assist students in mastering mathematical concepts. Students using **ALEKS** choose which concepts they wish to work on in the Learning Mode from the list of concepts the system has determined they are most prepared to learn. This happens either as the result of an assessment or through the continuous update of assessment results that is performed by the Learning Mode. Students in the Learning Mode work on those concepts they are best prepared to learn so that the benefit of their work is maximized.

In the Learning Mode students always work on one particular concept at a time. The Learning Mode provides them with a rich array of resources to help in mastering this concept. This includes explanations, practice problems, diagnostic feedback on problem solutions, and access to a student mathematical Dictionary. 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. At this point the student is encouraged to choose a new concept from the (updated) pie chart, but the opportunity to continue to work on this concept is available if the student wishes. If the student makes mistakes, a greater number of correct solutions may be required. If the student has continued difficulty, the system may suggest closer attention to the explanations or offer the name of a classmate who has recently mastered this concept. If the student appears frustrated by the present concept, a new selection will be offered.

The student continues to work in the Learning Mode until a new assessment is ordered, either by the teacher or automatically when a certain amount of time has been spent or a certain amount of progress has been made since the last assessment

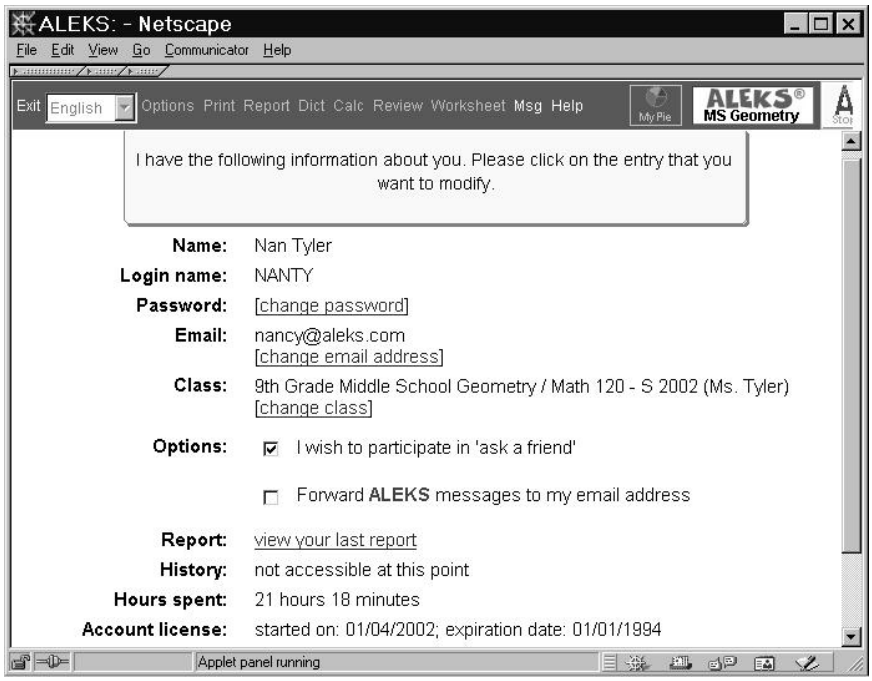


Figure 5.1: The Options Page (Learning Mode)

(See Sec. 4.3).

## 5.2 Buttons

### 5.2.1 Exit

Exit One can end a session with **ALEKS** in either of two ways: click on the "Exit" button at the upper left-hand corner of the browser window or simply close the window in one of the ways provided by the browser. Also, if no input is supplied to the system for 15 minutes the session is terminated automatically. No matter which way you exit, **ALEKS** will return you to the same place when you next log on.

### 5.2.2 Options

Options The "Options" button opens a page containing the user's current registration information (with a link for changing the Password), course and instructor (with a link for changing the course), a checkbox for joining "Ask a Friend" (See Sec. 5.7), and the beginning and expiration dates of the account (See Figure 5.1). "Report" connects to a menu of all assessment reports (See Sec. 5.2.4.). "History" displays a list of concepts the student has worked on recently, indicating the level of mas-

tery achieved and providing the opportunity to return to that concept for further practice. Clicking on "Done" returns to the Learning Mode.

### 5.2.3 Print


To print the contents of the **ALEKS** display, click the "Print" button on the menu bar. This transforms the display into a form suitable for printing. Next, click on the browser's "Print" button, or use whatever keyboard equivalent is provided. The procedure is the same as for printing any web page. To return to the Learning Mode, close or minimize the window that was printed.

### 5.2.4 Report


Clicking on the "Report" button displays a menu of all past assessments, with the most recent displayed by default. Any assessment can be selected (by date) from the menu. Then click "Graph" to see the results of that assessment. This will include one or more pie charts, a list of concepts recently learned, a list of concepts most ready to be learned, and the progress bar graphs (See Sec. 4.6.5). To return to the Learning Mode, click "Done."

**NOTE.** Click on the link "and many other more elementary concepts." to see a complete list of topics mastered.

### 5.2.5 Dictionary


Clicking on the "Dictionary" button produces a new browser window with an index of entries in the online student mathematics Dictionary. Click on any entry to view the definition. Remember that the Dictionary can also be accessed by clicking on underlined words (hypertext links) anywhere in the Learning Mode. Dictionary definitions are designed to present concepts in their simplest form first, moving into greater depth as the definition proceeds (See Sec. 5.3.5). Close or minimize the Dictionary window to return to the Learning Mode.

### 5.2.6 Calculator


The Calculator button will light up (become enabled) on topics where **ALEKS** permits use of a calculator. Click on this button to use the online calculator.

### 5.2.7 Review


The "Review" button gives a list of concepts the student has recently worked on in the Learning Mode (See Sec. 5.5). One can click any of these concepts to get further practice on it. There is also an option for "more extensive review." Click on "Done" to return to the Learning Mode.

### 5.2.8 Worksheet


The student may obtain an individualized, printable homework sheet by clicking "Worksheet." The questions on the worksheet are based on that student's most recent work in **ALEKS** (See Sec. 5.6).

### 5.2.9 Quiz


The student can take a quiz assigned by the teacher or check the results of quizzes already taken by clicking "Quiz." If a quiz has been "scheduled" by the teacher, however, the student does not need to use this button; when the student logs on during the time the quiz has be taken it will begin automatically (See Sec. 7.11).

### 5.2.10 Message


The student can use the "Message" button to check for messages from the teacher or administrator, and send or respond to messages if this has been enabled (See Secs. 7.12, 7.13). It is also possible to send messages directly to ALEKS Corporation. Click on "Done" to return to the Learning Mode.

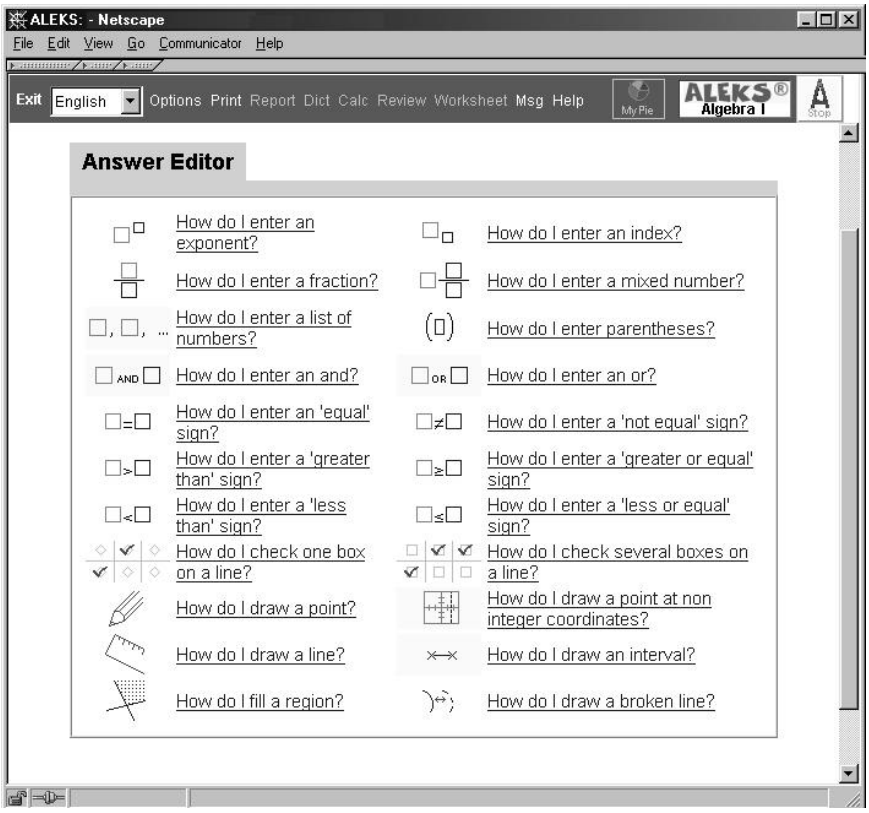


Figure 5.2: The Help Menu

### 5.2.11 Help


The "Help" button in the Assessment and Learning Modes provides detailed assistance with use of the Answer Editor (See Figure 5.2). The Help Menu contains a list of questions on how to use the various icons of the Answer Editor; clicking any one of these leads to a brief refresher tutorial on the use of the icon.

### 5.2.12 MyPie


Clicking on "MyPie" produces a pie chart display reflecting the current state of the student's mastery in the Learning Mode (See 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."

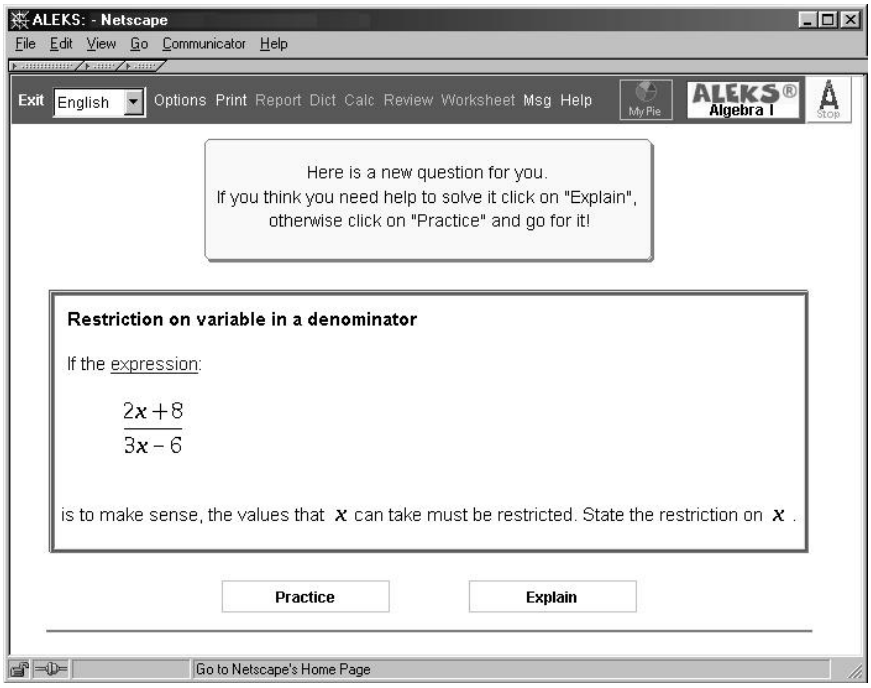


Figure 5.3: Item Page

## 5.3 The Learning Mode Interface

### 5.3.1 Item Page

The item page contains the title of the current item, such as "Absolute Value of a Negative Integer," followed by a problem or *instance* of that item (See Figure 5.3). Mathematical terms are underlined and set off as hyperlinks (clicking on these will open the Dictionary). There is, however, no Answer Editor: the answer to the problem must be given on the Practice page.

Underneath the problem are two buttons, "Practice" and "Explain." Clicking on "Explain" goes to a detailed explanation of the item with additional Dictionary links. Clicking on "Practice" goes to a page containing the Answer Editor and provides the opportunity to attempt solving the problem.

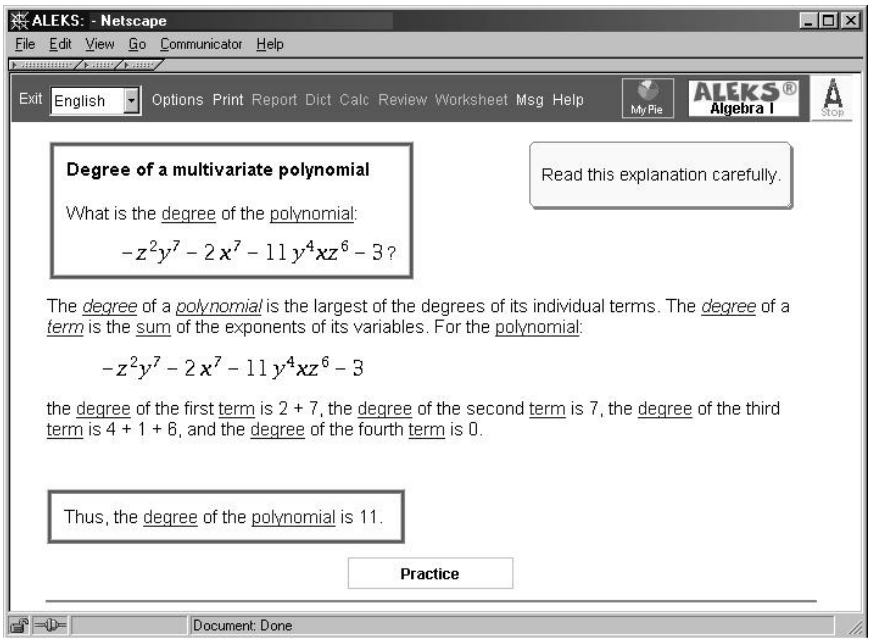


Figure 5.4: Explanation Page

### 5.3.2 Explanation Page

Like the item page, the explanation page (See Figure 5.4) begins with the title of the current item and an instance of that item (the same one that appeared on the item page, but rephrased and sometimes accompanied by a hint). The answer to the problem is supplied at the end of the explanation.

Here again, mathematical terms are linked to Dictionary 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."

### 5.3.3 Practice Page

This page displays an instance of the problem, followed by the Answer Editor. This is where a solution to the problem can be attempted (See Figure 5.5). All practice problems are generated by algorithms with random selection of numerical values values so that the variety of problem instances for any item is very great.

Underneath the Answer Editor are buttons labeled "Next" and "Explain." Clicking on "Next" has the same effect described in the Assessment Mode: it submits the

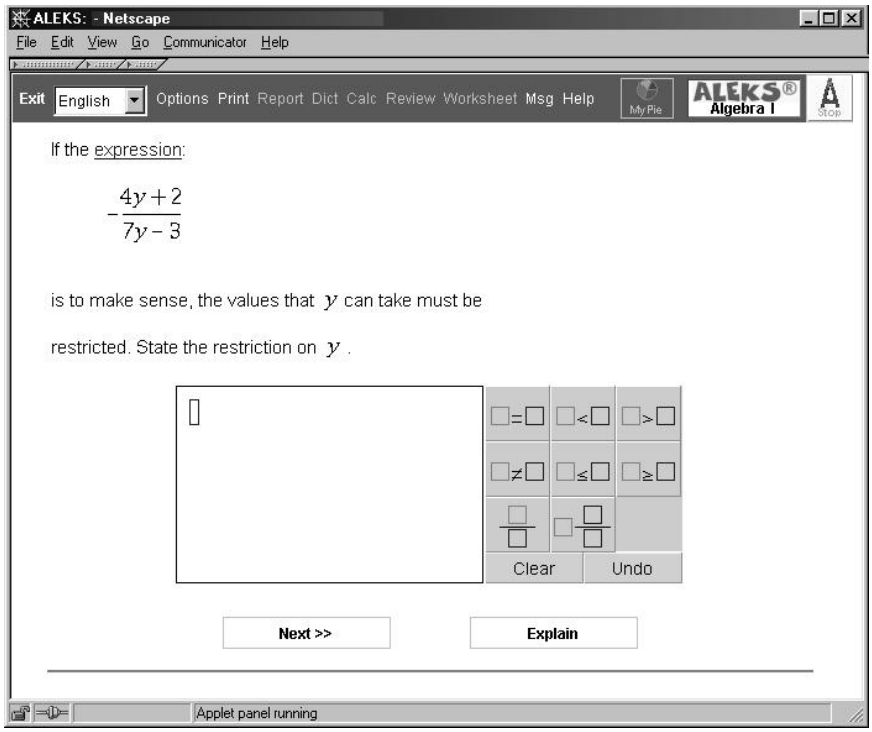


Figure 5.5: Practice Page

answer. Here, however, the user finds out immediately whether the answer is right or wrong. If it was correct, a new problem is presented or (if the system believes this topic has been mastered) a choice of new items is offered. Wrong answers will bring about presentation of the same problem (on the Wrong Answer page) with feedback on the student's error. Students can then click on "Explain." At the explanation page, the problem is rephrased and often a hint is given.

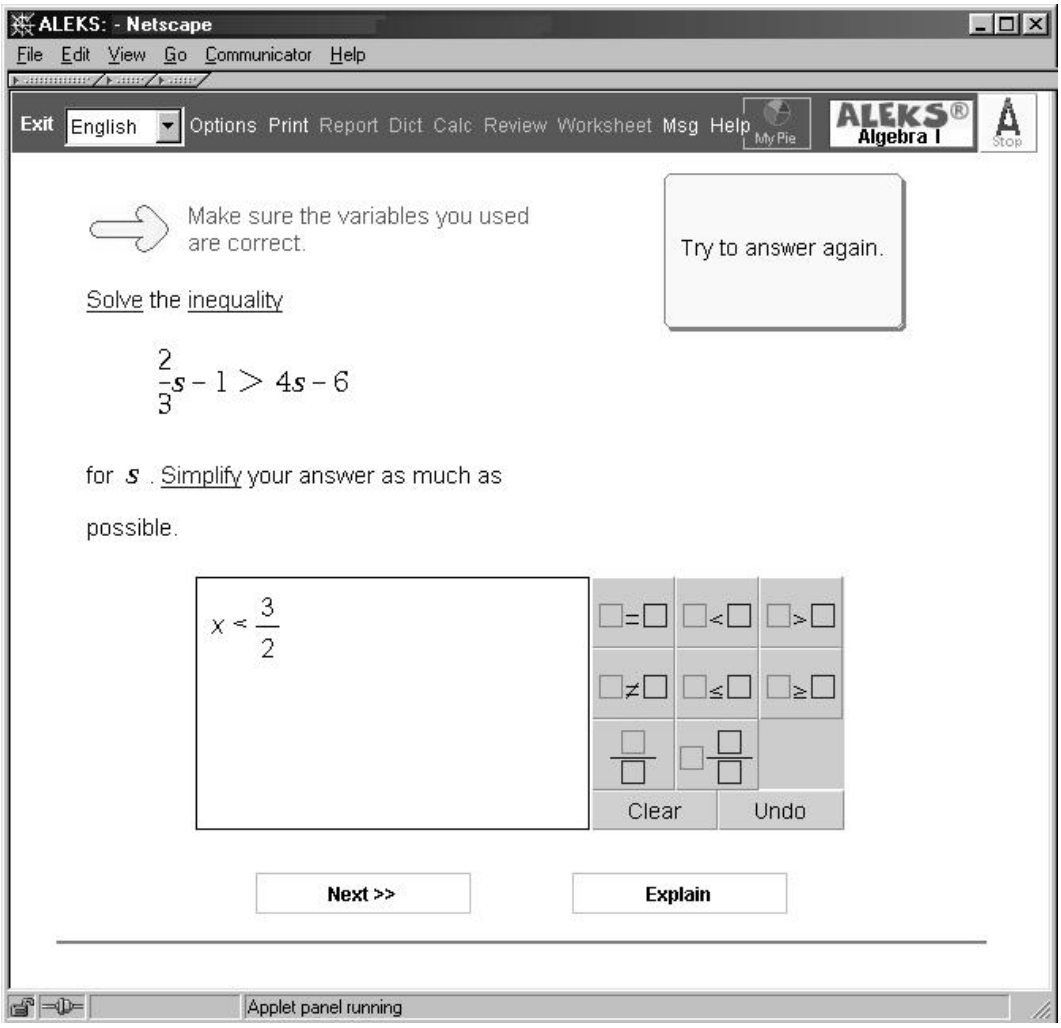


Figure 5.6: Wrong Answer Page

### 5.3.4 Wrong Answer Page

The wrong answer page appears only after an incorrect answer has been submitted on the practice page (See Figure 5.6). It is identical to the previous page except that the system explains the answer is wrong, and offers advice on what went wrong and which words might be looked up in the Dictionary.

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.

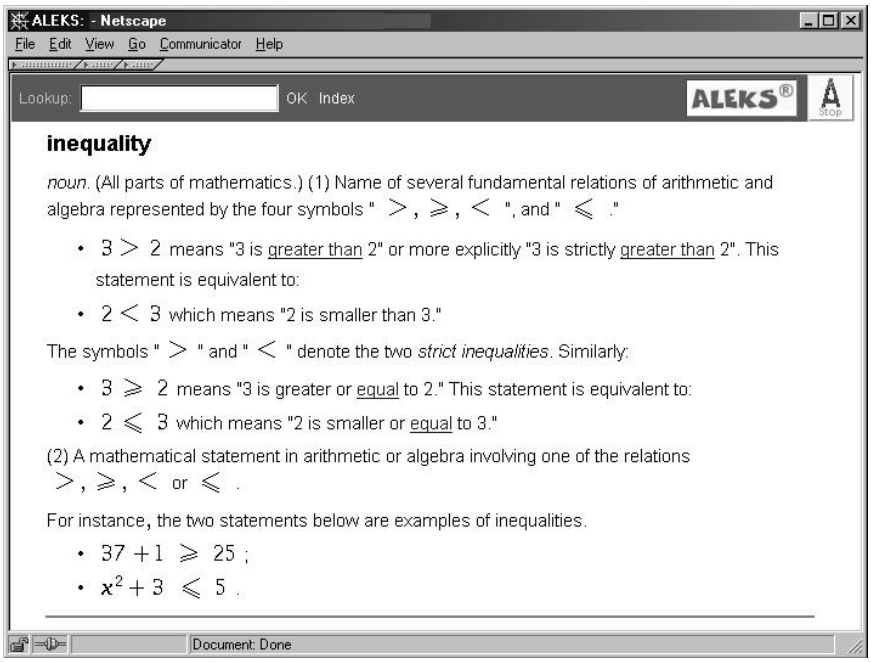


Figure 5.7: Dictionary

### 5.3.5 Dictionary

The online mathematics dictionary is always available in the Learning Mode. In addition to the Dictionary menu (button), links to the Dictionary appear in explanations, item descriptions, and in the feedback.

Clicking on a link to the Dictionary creates a new window on top of the **ALEKS** interface. At the top of the window is a bar with an Index button and text entry field (See Figure 5.7). The "Index" button gives access to an index of all the Dictionary's headings and subheadings. Beneath this bar is the Dictionary entry, with links to other entries and graphic illustrations as appropriate. The window can be closed after use or minimized for quicker access the next time needed.

## 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 (See Figure 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 right 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. This teaching strategy attempts to minimize frustration and keep the

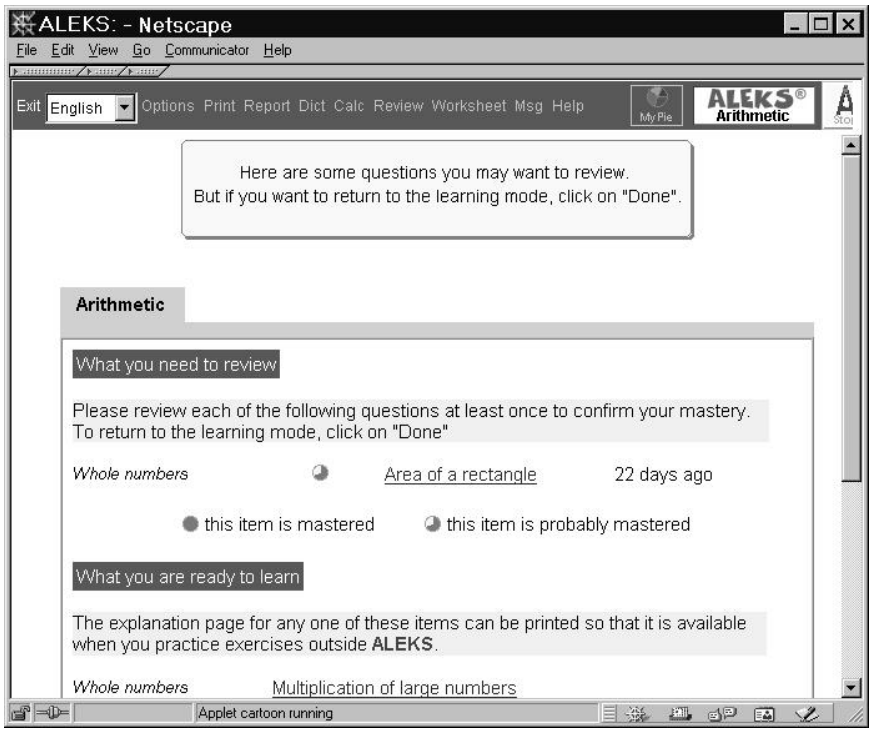


Figure 5.8: Review

student's head clear. If a concept has been left without mastery being attained, however, 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 (See Figure 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. When the student has not yet worked in Learning Mode since a new assessment, this list may be empty. "More Extensive Review" gives a comprehensive list of all topics mastered by the student for brief, summary review.

The Review page also contains a link to the Worksheet (See Sec. 5.6).

**NOTE.** The system will sometimes automatically offer a student the option of reviewing past material at the time of login.

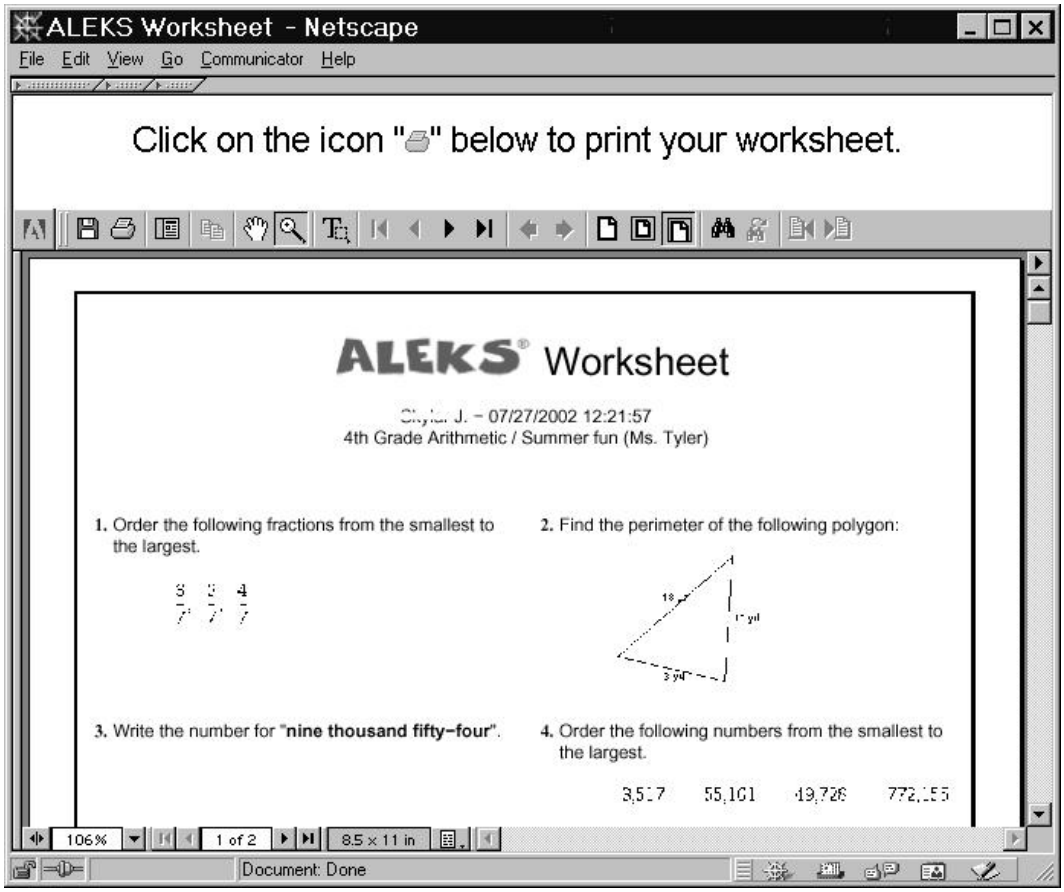


Figure 5.9: Worksheet

## 5.6 Worksheet

A student using **ALEKS** can obtain an individualized, printable homework sheet (in .pdf format) containing 16 practice questions based on the student's most recent work in **ALEKS** by clicking the "Worksheet" button (or the "Review" button) (See Figure 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 teacher via the **ALEKS** message system (See Sec. 7.13). The teacher may set the option for this feature so that there are 12 review questions and 4 "Extra Credit" questions (See Sec. 7.17).

**NOTE.** In order to view or print documents in .pdf format, such as the **ALEKS** worksheet, 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.

## 5.7 Ask a Friend

Under some circumstances, a button marked "Ask a Friend" will appear at the bottom of the page in the Learning Mode, next to the "Explain" button. Clicking on this button enables the student to ask for help from another student using **ALEKS** in the same class.

The button appears only if (1) the teacher or school administrator has made this feature active, (2) the student was unsuccessful in answering this concept, and (3) there is another student who has successfully answered the concept and who has chosen to participate in the "Ask a Friend" component.

# Chapter 6

# Teacher Module: Basic Interface

The basic interface to the **ALEKS** Teacher Module was designed for the greatest possible ease of use. Although all parts of **ALEKS** can be used without training or documentation, the wealth of features in the Teacher Module is not always easily grasped by a first-time user. The basic interface, to address this need, has been constructed to be a fully functional, menu-driven gateway to the **ALEKS** Teacher Module. Once common operations are familiar, the teacher may prefer to bypass the basic interface and work directly in the advanced interface, which is somewhat more powerful, especially in the fewer steps needed to accomplish tasks and in the possibilities for combining tasks and working with groups.

Wherever possible in this chapter, descriptions of operations in the basic Teacher Module are cross-referenced to descriptions of similar operations in the Advanced Teacher Module.

The essential method of the basic interface is what software designers call the "wizard." This method breaks a task down into steps and leads the user through those steps, asking questions and confirming the accuracy of information and decisions as it goes. The wizard minimizes the likelihood that the user will become lost or confused or take an unintended action while using the system. The use of the wizard method involves a tradeoff between the number of steps required for a given action and the degree of familiarity expected of the user.

Throughout the Teacher Module (as we will call the basic interface in this chapter) there is a left-hand sidebar with links to the major areas of the Teacher Module: "How do I," "Class Admin," "School Admin" (available to users with Administrator status), "Reporting," "Taking Actions," and "Advanced" (See Figure 6.1). These areas will be explained in the following sections. Also, each page of the Teacher Module contains a link to the Message Center, which can be used at any time to send queries or messages to ALEKS Corporation Customer Support.

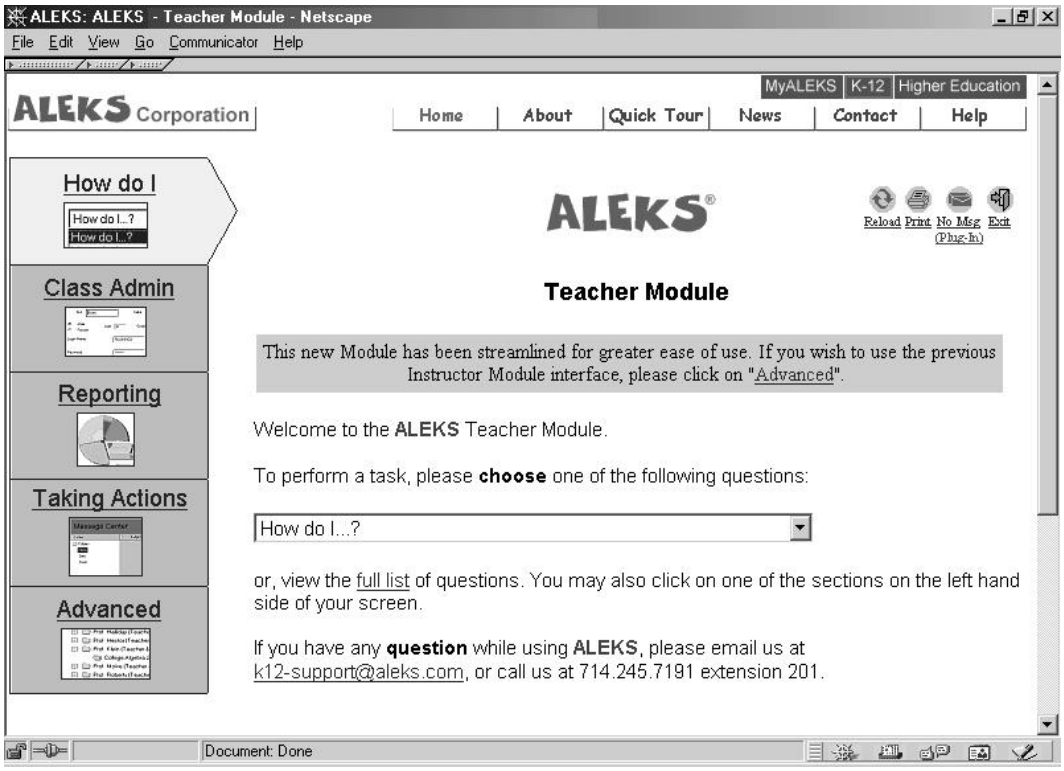


Figure 6.1: Teacher Module

Like the Advanced Teacher Module, the basic Teacher Module offers different capacities to users who are registered in **ALEKS** with Administrator status, as opposed to those with Teacher status. Essentially, a Teacher has control only over those classes for which she or he is the teacher; an Administrator has control over all classes for all teachers in the school, exactly as though he or she were the teacher for each of those classes.

In the following, the parenthetical notation "(*Administrator*)" indicates which areas, operations, and parts of operations are available only to users with Administrator status.

## 6.1 How do I

The first thing you will notice on the home page of the Teacher Module (called "How do I") is a menu of questions. These questions correspond to the most frequently performed operations in the Teacher Module, such as "How do I change someone's password?" or "How do I create a new teacher account?" By choosing the last item, "More," in the menu, or clicking "full list," you can see the entire repertoire of questions listed by category (See Figure 6.2). These categories are also included in

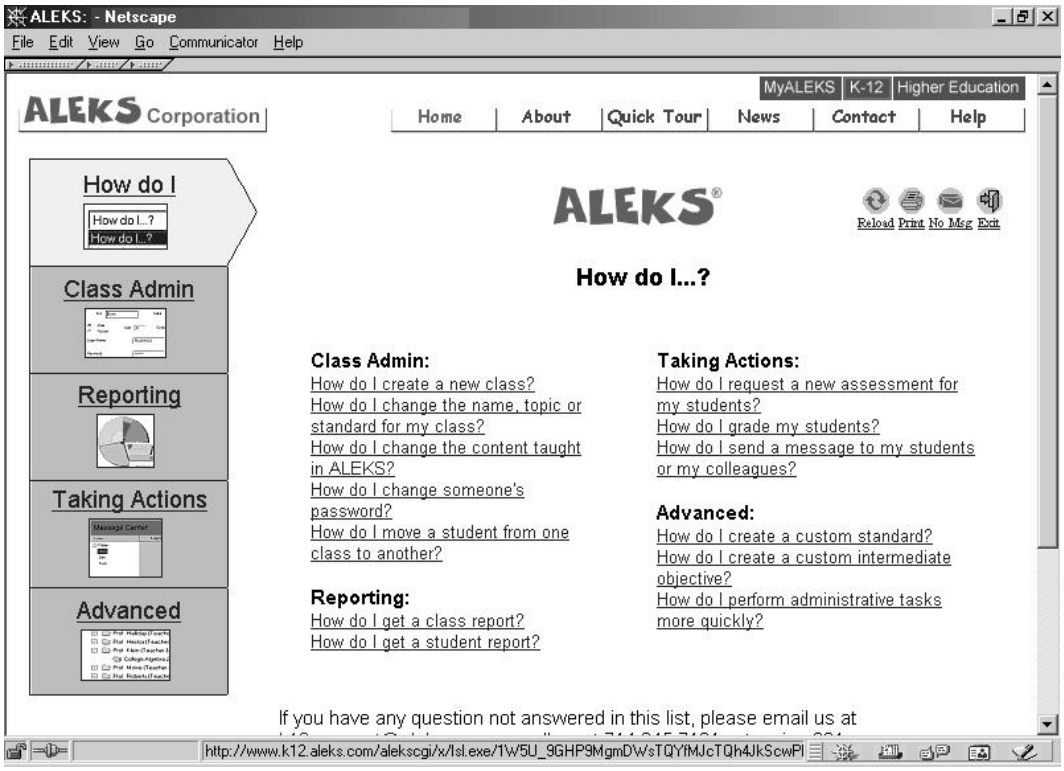


Figure 6.2: How do I Questions

the links featured in the left-hand sidebar of the Teacher Module: "Class Admin," "School Admin" (*Administrator*), "Reporting," "Taking Actions," and "Advanced." Along with "How do I" (for the home page) and "Logout," respectively the top and bottom elements of the sidebar, these are available from anywhere in the Teacher Module.

The questions on "How do I" are simply a way of getting quickly to the tutorial descriptions found in the Teacher Module. For example, clicking on "How do I move a student from one class to another?" brings you to the page for "Move a student from one class to another," which can also be found by clicking the sidebar link for "Class Admin."

The "How do I" page contains an email link and telephone number for contacting ALEKS Corporation Customer Support. Questions and messages can also be sent directly to ALEKS Corporation Customer support using the Message Center links found on each page of the Teacher Module.

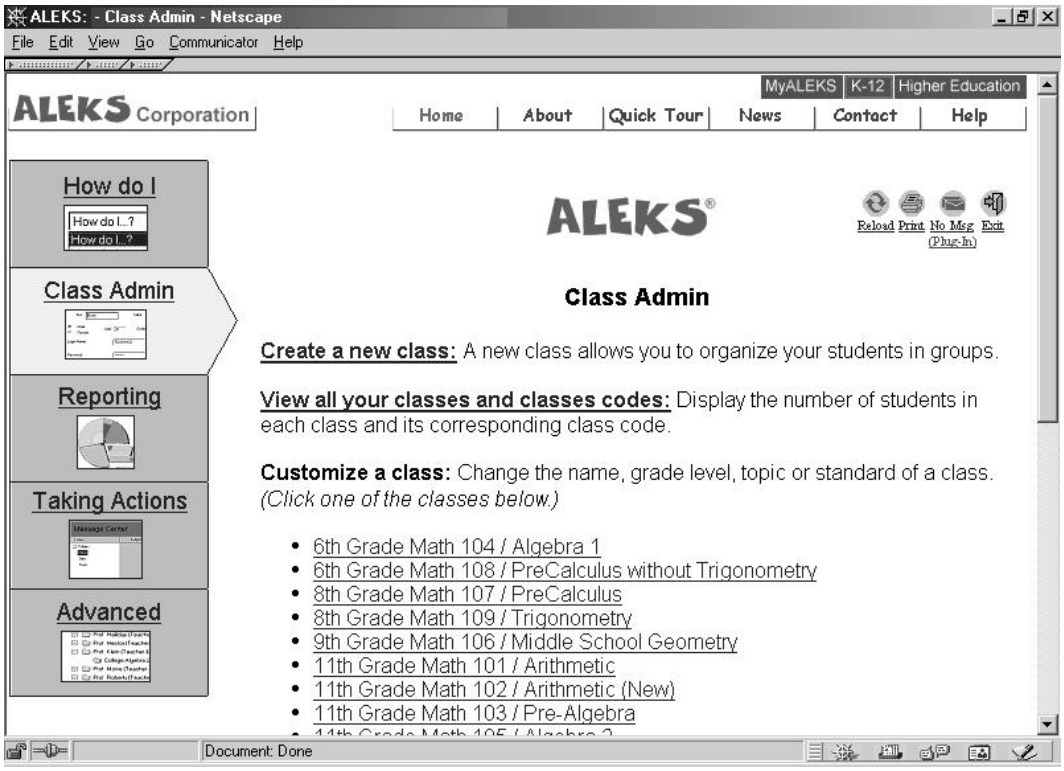


Figure 6.3: Class Admin

## 6.2 Class Admin

Class Admin is concerned with the creation and management of classes in **ALEKS**, and is available to all teachers for **ALEKS** in a given school (See Figure 6.3). This area of the Teacher Module will be needed especially around the beginning of a new term or class, and also as the term proceeds, when students complete domains in **ALEKS** and need to be moved up to new ones.

**Create a new course** (See also Sec. 7.17):

- (*Administrator*) click on a name from a list of existing teachers;
- enter name of class, choose topic, and click "Save";
- receive Class Code for new class, with option for further customization (below).

**View all your courses and course codes:**

- for each class (*Administrator*: for each teacher), view name, topic, teacher (*Administrator*), number of students, and Class Code.

**Customize a course** (See also Sec. 7.18):

- click on name from list of classes (*Administrator*: for each teacher);
- edit name and topic of class and click "Save";
- choose textbook to be linked to class in **ALEKS** and click "Save."

**Password issues** (See also Sec. 7.21):

- click on name from list of classes (*Administrator*: for each teacher);
- click on name from list of students in class;
- enter new password twice and click "Save."

**Account preferences** (See also Sec. 7.16):

- edit own title, name, status options, email, and email/message options and click "Save."

**Student Account preferences** (See also Sec. 7.21):

- click on name from list of classes (*Administrator*: for each teacher);
- click on name from list of students in class;
- edit name, email, and active status of student and click "Save."

**Move a student from one class to another** (See also Sec. 7.20):

- click on name from list of classes (*Administrator*: for each teacher);
- click on name from list of students in class;
- click on name from list of classes (*Administrator*: for each teacher) to move student to that class.

**NOTE.** This procedure is fine for moving one student at a time. If groups of students need to be moved, see Section 7.20.

**Delete a class** (See also Sec. 7.18):

- click on name from list of empty classes (*Administrator*: for each teacher);
- click "Confirm" to confirm deletion of empty class.

## 6.3 School Admin (*Administrator*)

School Admin allows the **ALEKS** Administrator(s) for a given school to create and manage the accounts of teachers using **ALEKS**, and is accessible only to users with Administrator status (See Figure 6.4). In most cases, teachers, once they are enrolled in **ALEKS**, will be able to manage their own accounts, and will require little or no assistance from the Administrator.

**Create a new teacher account** (See also Sec. 7.15):

- fill in title, name, and administrator status (*Administrator*) and click "Next";
- edit Login Name, set Password, and click "Save";
- option to create classes for new teacher (below).

**Password issues** (See also Sec. 7.16):

- click on a name from a list of existing teachers (including self);
- enter new password twice and click "Save."

**Teacher account preferences** (See also Sec. 7.16):

- click on a name from a list of existing teachers (including self);
- edit title, name, status options, email, and email/message options and click "Save."

**Move a class from one teacher to another** (See also Sec. 7.18):

- click on name from list of classes for all teachers;
- click on a name from a list of existing teachers (including self) to transfer class to that teacher.

**Delete an Teacher Account** (See also Sec. 7.16):

- click on a name from a list of existing teachers (including self);
- click "Confirm" to confirm deletion of teacher account (possible only if the teacher does not currently have classes in **ALEKS**).

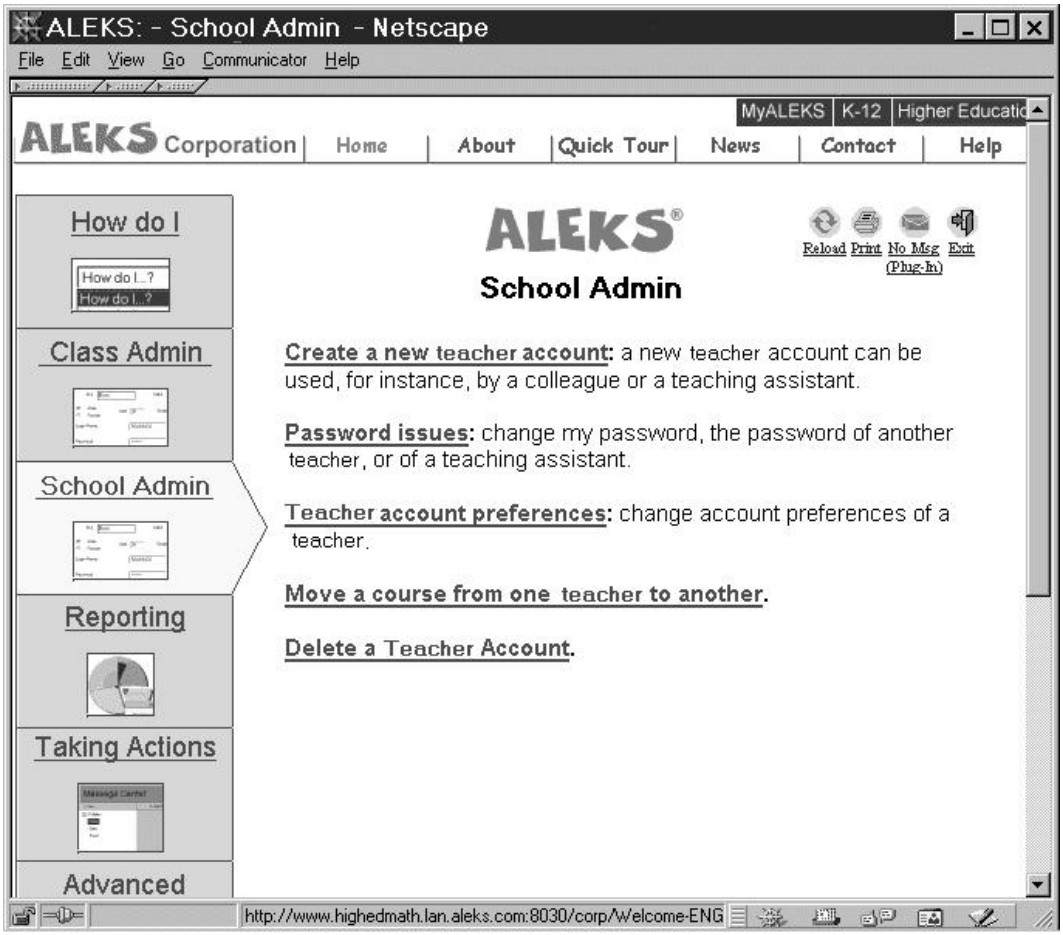


Figure 6.4: School Admin

## 6.4 Reporting

Reporting should be used frequently during a class taught with **ALEKS** to monitor the students' use of and progress in the system.

To begin, click on a name from the list of classes (*Administrator*: for each teacher). A series of options for reporting will be shown (See Figure 6.5).

### Class Progress Options

The rows in these views contain bar graphs showing students' performance on and following dated assessments. You can use the students' Login Names or ID's rather than their names as the identifier in the left-hand column; simply click on the corresponding link at the top of that column. This may be useful when the data from this page needs to be downloaded and stored in a particular format for administrative

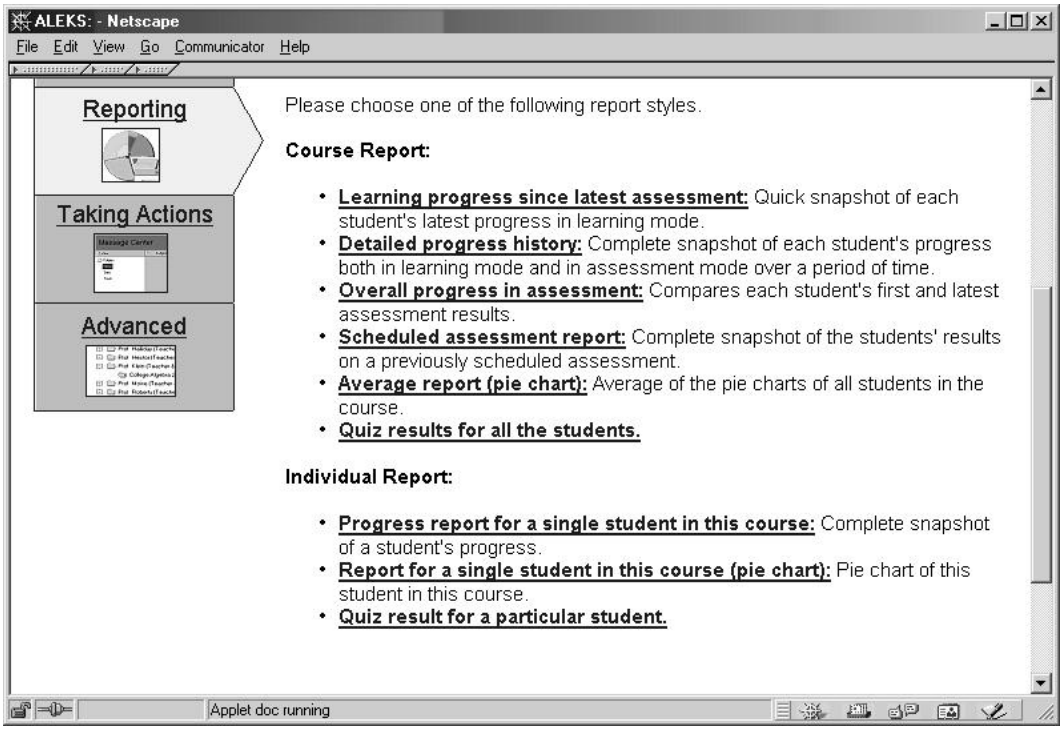


Figure 6.5: Reporting

purposes.

Each student's name is linked to their individual Progress page (See Sec. 6.4).

**Statistical Information.** Most display options provide additional types of statistical information on student progress in the right-hand part of the display. Their significance varies according to the display option, and is indicated in the column headings. One or more fields may be blank if the information gathered for that student is not sufficient at a particular time. It is also possible to choose "Time to Completion"; this indicates the estimated time necessary for individual students to complete the course goals based on average progress for the period chosen. Where the Intermediate Objectives are in use, this also shows "Time to Current Objective" (See Sec. 7.22).

**Download Excel Spreadsheet.** A link at the top of the page allows you to download the data in Excel spreadsheet format.

**Sorting.** The information in the Class Progress page can be sorted on any of the columns. Simply click on the header or footer of a column to sort on that column; a second click switches between ascending and descending order.

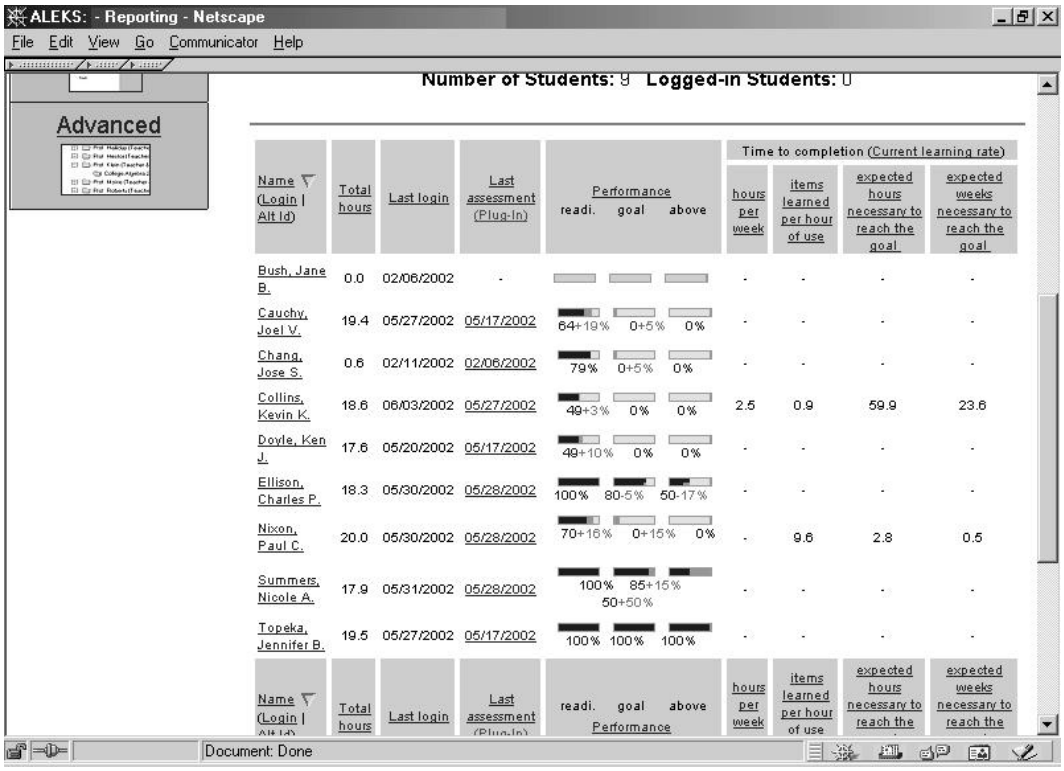


Figure 6.6: Individual learning progress since latest assessment

**Individual learning progress since latest assessment** displays a list of the students in the class, each with a single bar graph showing the most recent assessment and progress made since that assessment (See Figure 6.6). All students who have completed at least one assessment have bar graphs. The blue portion of the bar graph shows mastery as of the most recent assessment, and the green portion shows progress in the Learning Mode since that assessment.

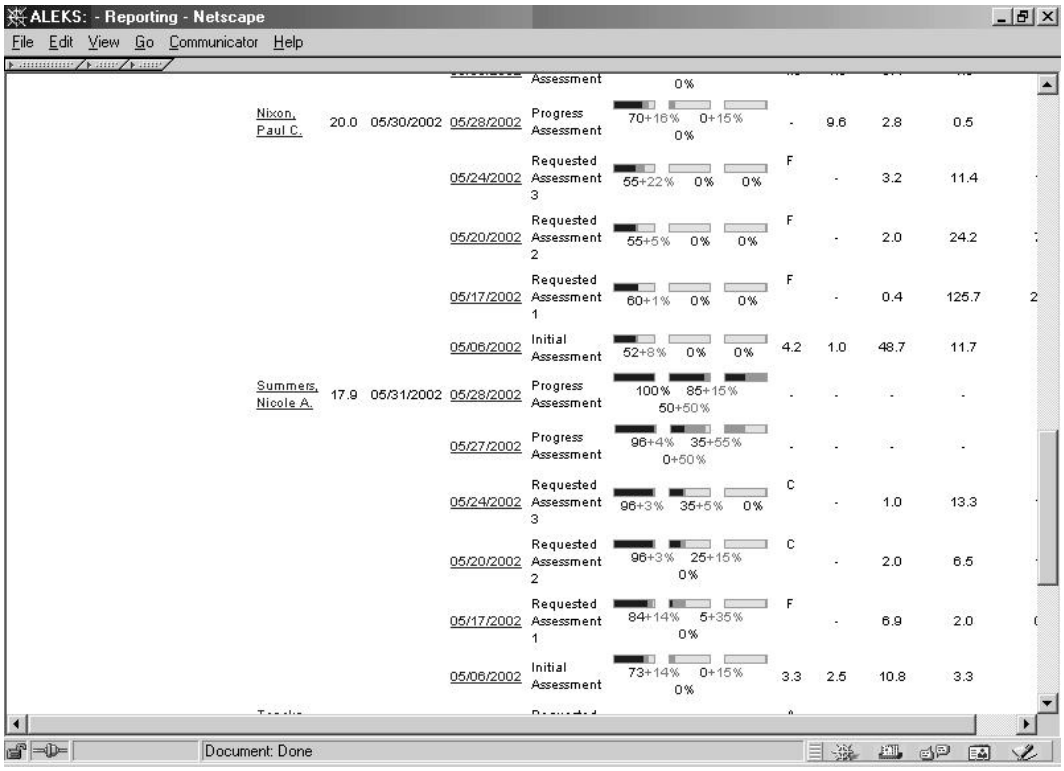


Figure 6.7: Individual detailed progress history

**Individual detailed progress history** displays a list of the students in the class, each with a series of bar graphs for each assessment taken to date (See Figure 6.7). For each student who has taken at least one assessment, there is a bar graph shown for each assessment taken in the last 6 months (other periods may also be chosen). The blue part of the bar shows mastery on the assessment, and the green part additional mastery achieved in Learning Mode following that assessment (but before any subsequent assessment).

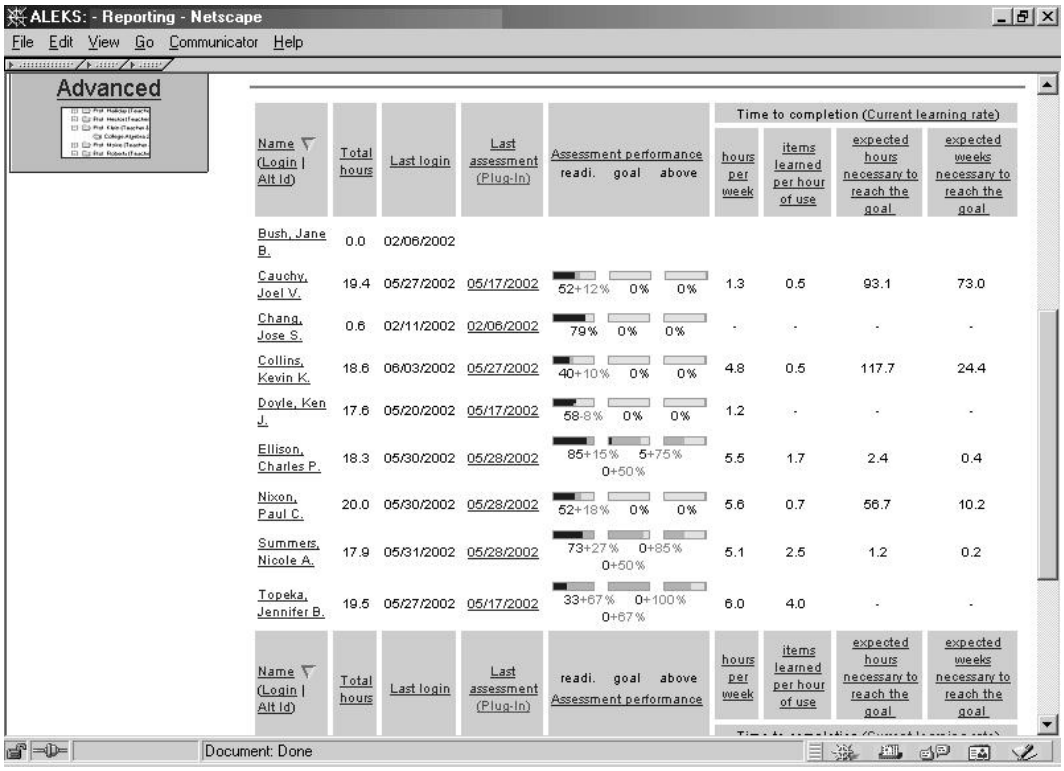


Figure 6.8: Individual overall progress in assessment

**Individual overall progress in assessment** displays a list of the students in the class, each with a single bar graph showing the progress made between that student's first and most recent assessments (See Figure 6.8). All students who have completed at least two assessments have bar graphs. The blue portion of the bar graph shows mastery as of the first assessment, and the light blue portion shows progress made between that assessment and the most recent assessment taken.

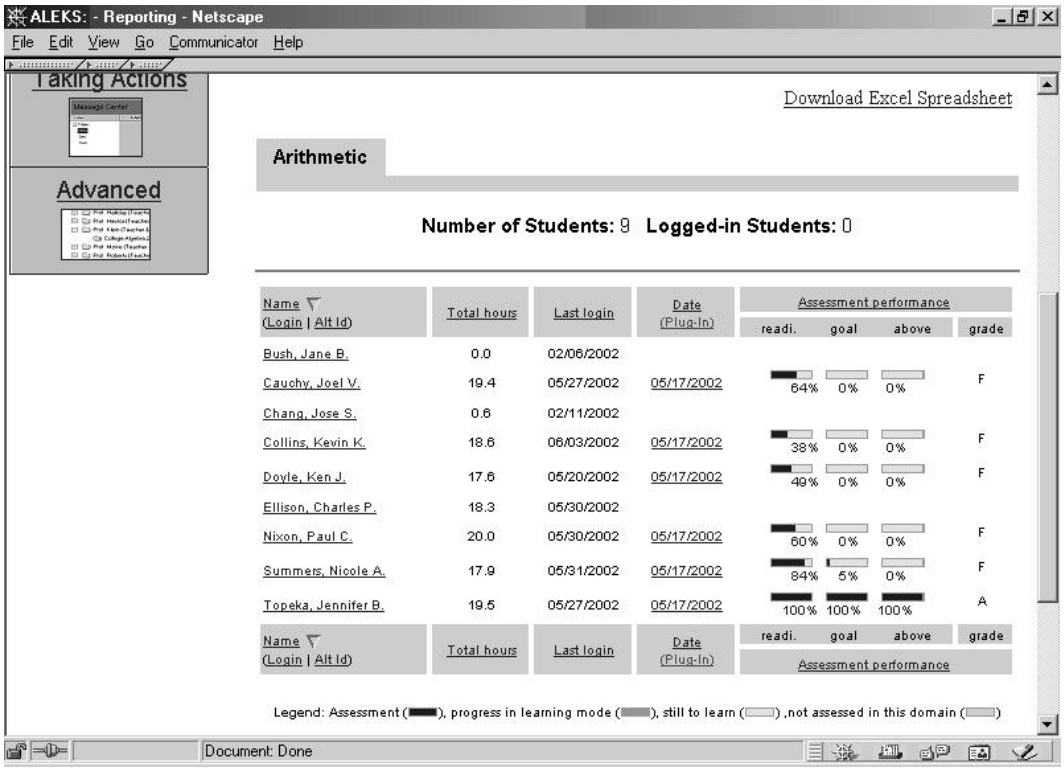


Figure 6.9: Scheduled Assessment Report

**Scheduled assessment report** shows the results of an assessment that has been scheduled for the class in the form of a series of bar graphs (See Figure 6.9). The blue portion of each bar graph shows the student's knowledge as measured by the assessment; subsequent progress in Learning Mode is not shown in this view. Grades for the assessment are shown if the teacher has chosen to grade the assessment (See Sec. 6.5). A menu at the top of the display can be used to choose earlier scheduled assessments.

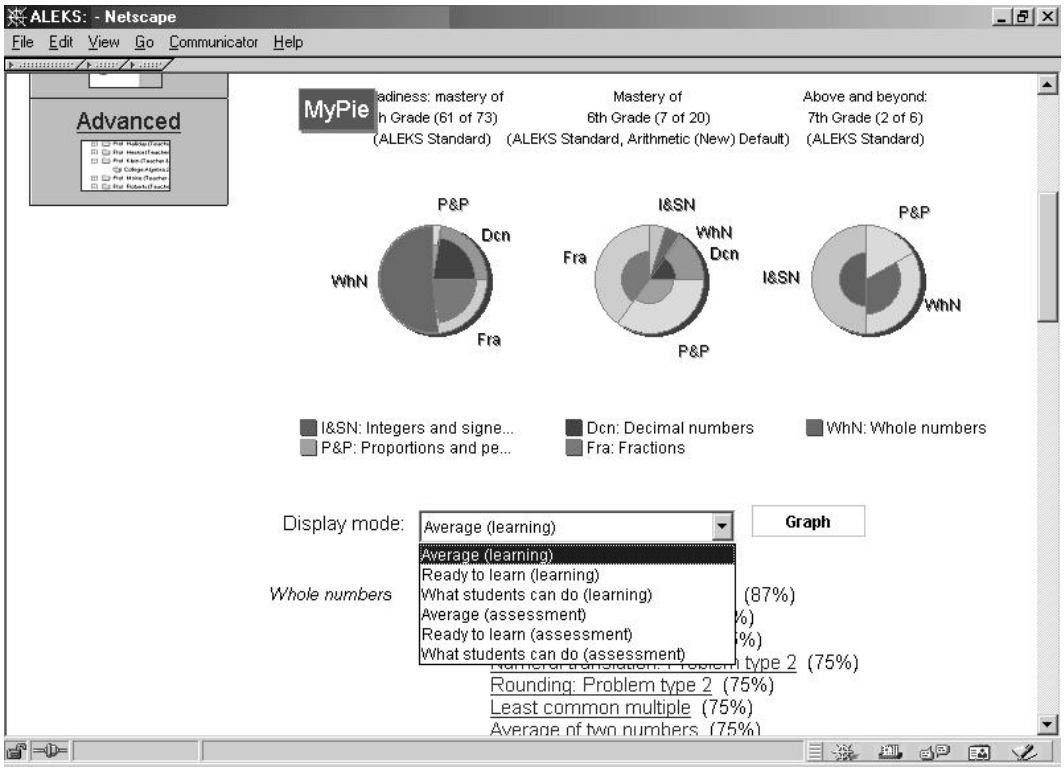


Figure 6.10: Average report (pie chart)

### Class Report Options

**Average report (pie chart)** displays one or more combined pie charts for the class, showing its average progress toward mastery of the curriculum (See Figure 6.10).

**Display options.** Beneath the pie charts there are other kinds of analysis available for class assessment data. Choose "Average," "Ready to learn (learning)," "Ready to learn (assessment)," "What students can do (learning)," or "What students can do (assessment)" from the "Display Mode" menu and click on "Graph" to display results.

**Average**

This option produces a list of the specific concepts mastered by a percentage of the students, as of their most recent assessment. The list is organized by general categories (See Figure 7.6). For each concept, the percentage of students in the class who demonstrated mastery is given.

**Ready to learn**

This option also shows a list of specific concepts, organized by general cat-

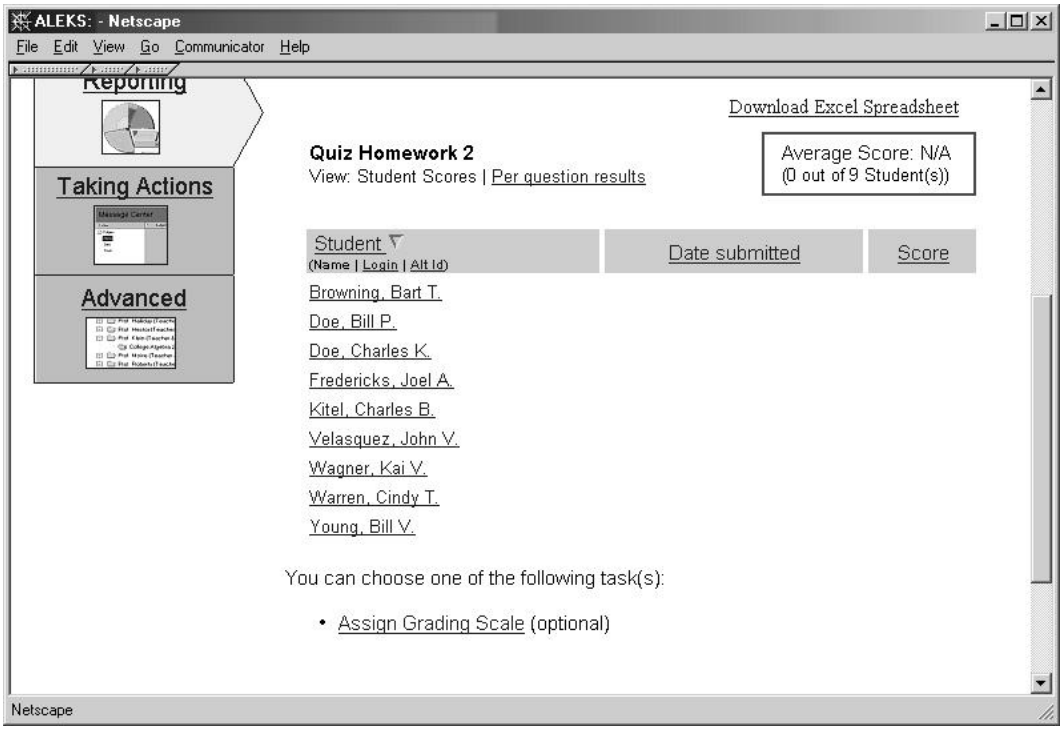


Figure 6.11: Class Quiz Results

egories. For each concept, it shows the number of students in the class who are ready to learn that concept in the Learning Mode (learning) or as of their most recent assessment (assessment). Clicking on the number of students will display a list of their names; there also appears a link for sending a message to all the students in the group so defined (See Secs. 7.12, 7.13). The button "Open All" displays all students' names in each group (with links).

**What students can do**

This option also shows a list of specific concepts, organized by general categories. For each concept, it shows the number of students in the class who have recently mastered that concept in the Learning Mode (learning) or as of their last assessment (assessment). Clicking on the number of students will display a list of their names; there also appears a link for sending a message to all the students in the group so defined (See Secs. 7.12, 7.13). The button "Open All" displays all students' names in each group (with links).

**Class quiz results** shows the results on any given quiz for all students in the class who took the quiz, using bar graphs (See Figure 6.11).

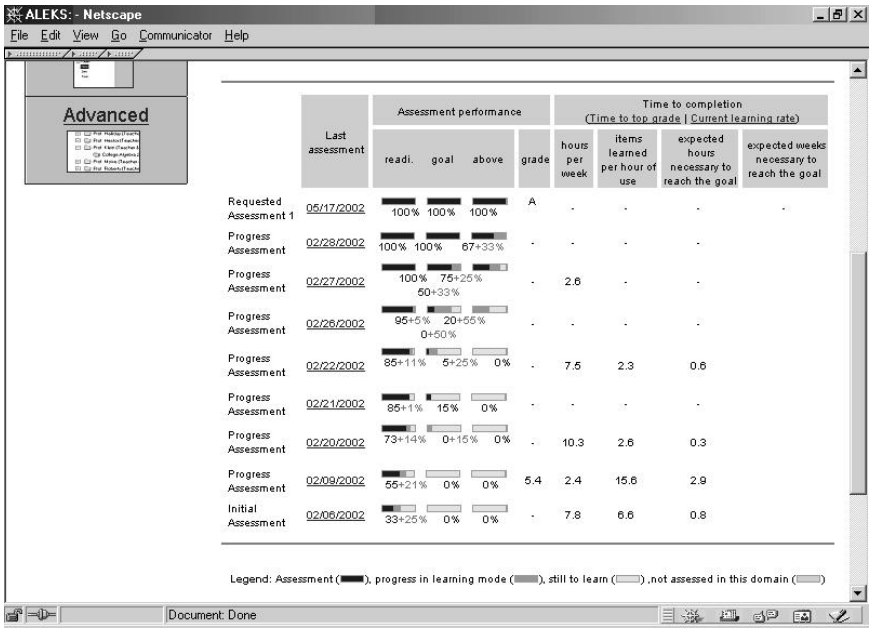


Figure 6.12: Progress report for a single student in this class

### Student Progress Options

**Progress report for a single student in this class** displays a list of bar graphs for the single student chosen. There is one row for each assessment that the student has taken, with dates (linked to the Report page for that assessment) (See Figure 6.12). Each row contains one to three bar graphs, depending on the student's grade. Each bar graph measures the student's mastery as of the given assessment as seen by the blue portion of the bar. Progress made in the Learning Mode subsequently to that assessment (but before the next assessment, if there is one) is measured by the green portion of the bar. There are also percentage values given beneath the bar for the blue and green portions of the bars; for example, 57+9% means that the last assessment showed 57% mastery, and that subsequent work in the Learning Mode added another 9% mastery. If there is more than one bar per row, they will correspond to the course objectives for the previous grade, the current grade, and the subsequent grade.

Information on each assessment, total hours and weeks spent subsequently in the Learning Mode (up to the time of the next assessment) with average numbers of items gained per hour and per week is also provided (optionally, this shows the time left to completion of course goals).

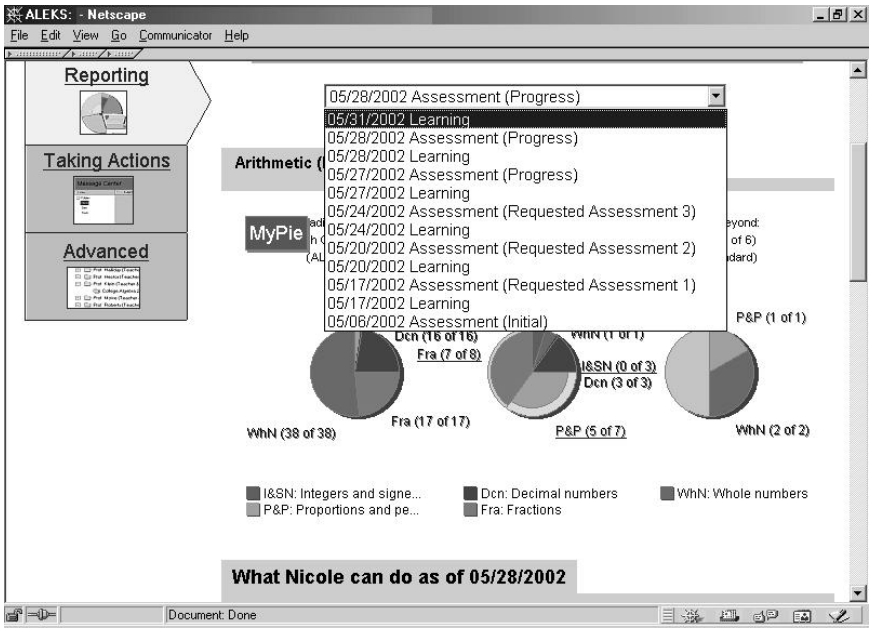


Figure 6.13: Report for a single student in this class

### Student Report Options

**Report for a single student in this class (pie chart)** displays one or more pie charts for the single student chosen, showing the student's current progress toward mastery of the curriculum (See Figure 6.13). There is also a menu giving access to earlier points in the student's progress.

Beneath the pie charts is a list of concepts that the student has mastered recently ("What <Name> Can Do") and another list of concepts that the student is currently (as of the given assessment) most ready to begin learning ("Ready to Learn"). There may also be a summary of the student's history in **ALEKS** ("History") and a log of work in the Learning Mode following that assessment ("Learning Log"). There are also buttons allowing the teacher to request or cancel an assessment for that student and to edit Intermediate Objectives (See Sec. 7.22).

**Complete list of topics mastered.** Click on the link "and many other more elementary concepts." to see a complete list of topics mastered by the student.

**Individual quiz results** shows the results for any given student on any quizzes taken by that student.

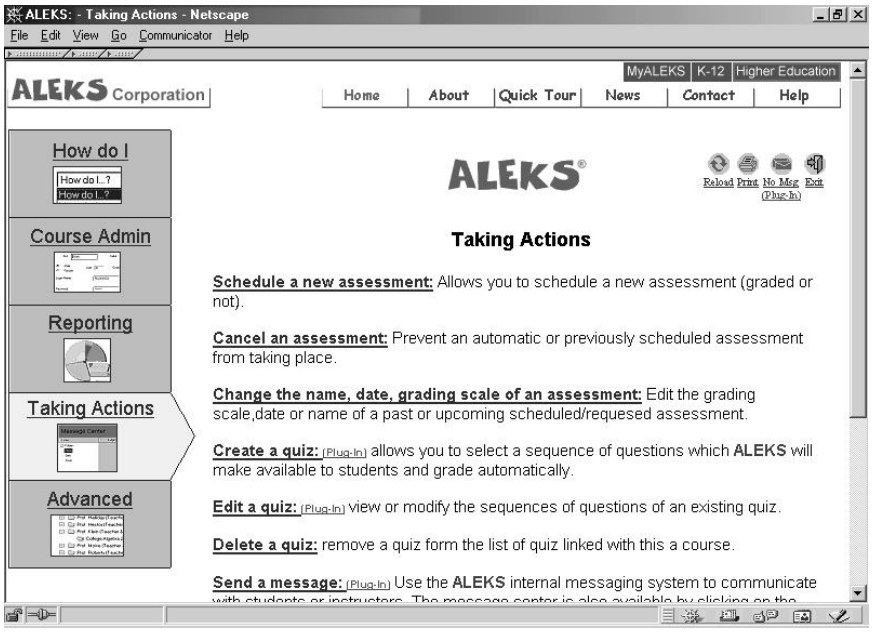


Figure 6.14: Taking Actions

## 6.5 Taking Actions

Additional class management features are available under "Taking Actions" (See Figure 6.14).

**Schedule a new assessment** (See also Sec. 7.9):

- click on a name from a list of classes (*Administrator*: for each teacher);
- provide name and date for assessment and click "Next" (See Figure 6.15);
- provide start time for assessment with option for more detailed scheduling (prevent automatic assessment up to 5 days in advance, trigger assessment on specified day only, restrict assessment to school; assign grading scale to assessment) and click "Save."

In order to schedule a class assessment, the teacher is asked to specify the name of the assessment (by default, a scheduled assessment is called "Requested Assessment" plus its number), a date (by default the current date), and a time (by default the current time) (See Figure 7.8). "Detailed scheduling options" permit the teacher to restrict the assessment to campus and to limit the time when it can be begun. When this information has been given, the teacher schedules the assessment by clicking "Save." If all the defaults are left, the students will immediately enter Assessment Mode at their next login. If a later date and/or time are chosen, the students will enter Assessment Mode the next time they log in *after* that date and time. The

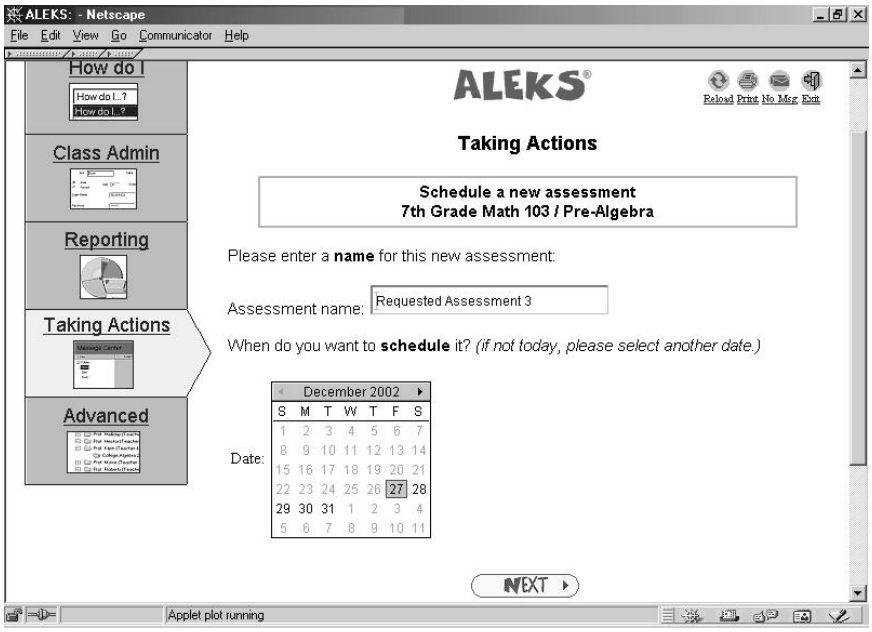


Figure 6.15: Schedule a new assessment

calendar graphic provides a quick and easy way to choose the date of an assessment (click on the calendar thumbnail to use this feature).

**Detailed scheduling options.** You can block automatic assessments for up to 5 days prior to a scheduled assessment (useful to avoid having some students assessed twice in a row); limit the effect of a scheduled assessment to the day it is assigned to or leave it in effect until the next scheduled assessment. If an assessment is limited to the assigned day, a student logging on to **ALEKS** on that day (after the start time) will be assessed, but if the student does not log on that day that student will not be assessed until the next automatic or scheduled assessment.

**Grading with Scheduled Assessments.** You can assign a grading scheme to this assessment only. The Grades feature uses a chart with sliders (See Figure 6.16). The grades received by students on scheduled assessments can be seen under "Scheduled Assessment Report" (See Sec. 6.4).

The three buttons under the graph determine the use of the evaluation: if "Disabled," no one sees it; if "Private," the teacher sees it but the students do not; if "Public," the teacher sees it and each student sees it for their own work.

The graph has sliders, with labels referring to the intervals they define. Additional sliders may be placed by dragging the right-hand or left-hand sliders, or sliders may be removed by dragging them off to the right or left. The sliders may be set and the labels edited as the teacher desires. To change the label on a new or existing slider,

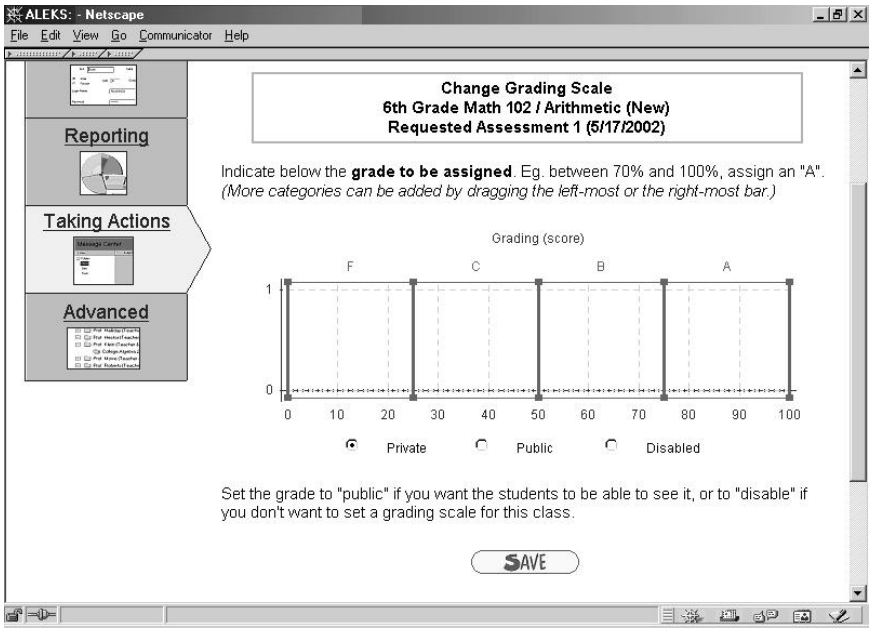


Figure 6.16: Grading with Scheduled Assessment

select the text of the current label, retype as desired, and then press "Return."

**Cancel an assessment** (See also Sec. 7.9):

- click on name from a list of classes (*Administrator*: for each teacher);
- click on name from list of scheduled assessments;
- click "Save" to confirm cancellation of assessment.

**Change the name, date, grading scale of an assessment:**

- click on name from a list of classes (*Administrator*: for each teacher);
- click on name from list of scheduled assessments, with option to schedule new assessment;
- click link to modify grading scale, name, or date of assessment;
- modify settings and click "Save" (possible option for more detailed settings).

**Create a quiz** (See also Sec. 7.11):

- click on name from a list of classes (*Administrator*: for each teacher);
- enter a name for the quiz, or leave the name provided ("Quiz *N*"), and click "Next";

- select from the list of topics in the left-hand window either by dragging topics into the right-hand window, or by highlighting topics and clicking "Add", then click "Save";
- use the links provided to continue editing the topics on the quiz, assign a grading scale, change how the quiz is made available to your students, or assign the quiz to some group of students within the class.

**Tips.** Double-click on the name of any topic to see a sample problem. Topics can be selected in continuous groups using the Shift key or discontinuous groups using Ctrl; the entire folder is selected by using Ctrl-a.

The Quiz feature in **ALEKS** allows teachers to create quizzes for their students using any topics in the **ALEKS** domain. These quizzes are administered through **ALEKS** and scored automatically, with optional use of a grading scale set by the teacher. Quizzes may be scheduled for particular days and times, or they may be made available for the students in a class to take when they are ready ("Homework Quiz"). The results of quizzes can be seen through the reporting features of **ALEKS**, but do not influence the students' knowledge states or their guided learning in **ALEKS**.

**Grading with quizzes.** The grading scale used with quizzes is like the one used for assessments (See Sec. 6.5). As with assessments, grading is not obligatory; if no grading scale is set, the students and the teacher will only see the percentage of questions answered correctly.

**Availability of quizzes to students.** By default, quizzes are made available to students as "Homework Quizzes." This means that the student is not forced into the quiz by **ALEKS**; rather, the student clicks the "Quiz" button when they are ready to take the quiz (See Sec. 5.2.9). If this option is chosen, the teacher must indicate a due date for the quiz, after which the quiz will no longer be available to students. A message can also be sent to students informing them that the quiz has been assigned.

Quizzes may also be "hidden" for later availability to students ("Don't make this quiz available yet"), or they may be scheduled. A graphic calendar is provided for easy scheduling of quizzes. If the quiz is scheduled, the teacher will have options for specifying the time of day it is to begin, the time limit on the quiz, whether students are notified, how many days the quiz should be in effect ("Window of time to take the quiz"), whether the quiz is restricted to the school, and prevention of automatic assessments up to five days before the quiz is scheduled.

The quiz may be assigned to all the students in the class or, optionally, to some group within the class.

**Edit a quiz** (See also Sec. 7.11):

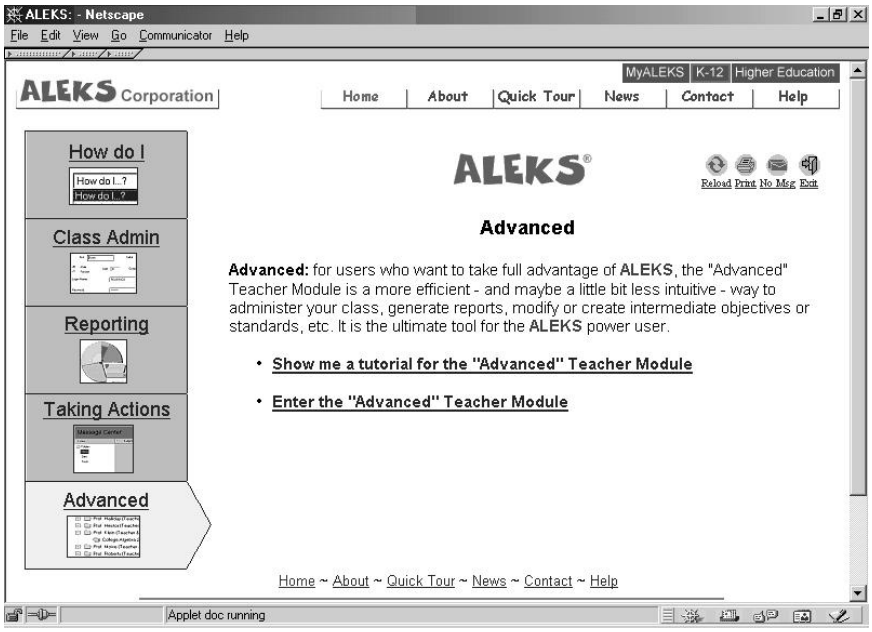


Figure 6.17: Advanced

- click on name from a list of classes (*Administrator*: for each teacher);
- click on name from a list of existing quizzes;
- modify the quiz using the features described above.

**Delete a quiz** (See also Sec. 7.11):

- click on name from a list of classes (*Administrator*: for each teacher);
- click on name from a list of existing quizzes;
- click on "Confirm" to delete the quiz, or "Cancel" to leave it.

**Send a message** (See also Sec. 7.12):

Using this link connects you to the **ALEKS** Message Center, an extremely powerful and useful component of the **ALEKS** system. Please see Section 7.12 for a detailed description of the Message Center. The Message Center can also be reached via the envelope icon in the upper right corner of every Teacher Module page.

## 6.6 Advanced

On clicking this link, the user is shown a brief explanation of how the Advanced Teacher Module differs from the standard one (See Figure 6.17).

Teachers using **ALEKS** should not be intimidated about trying the advanced interface. It is a visual or graphic ("point and click") interface based on a model of directories, files, and actions applied to files and directories, which is essentially shared by all modern computer systems. With even slight familiarity, most users will have no difficulty using it (See Chapters 6-8).

**Show me a tutorial for the "Advanced" Teacher Module.**

The Tutorial for the Advanced Teacher Module is a complete guide to the most commonly-used features of this area (See Sec. 7.2). From within the Advanced Teacher Module, it is possible to retake the Tutorial at any time or to review parts of it by using the "Help" button.

- click "Next" to enter the Tutorial for the Advanced Teacher Module.

**Enter the "Advanced" Teacher Module now.**

When a teacher has achieved a certain level of familiarity with the Teacher Module, she or he may wish to try using the advanced interface, or even to use the advanced interface exclusively. As noted, the Advanced Teacher Module has certain advantages of efficiency and flexibility, especially in operations affecting groups of students.

- click "Next" to enter the Advanced Teacher Module (optionally, set your preferences to log directly into the Advanced Teacher Module when using this account).

# Chapter 7

# Advanced Teacher Module: Results & Progress

## 7.1 The ALEKS Advanced Teacher Module

The Advanced Teacher Module interface provides an array of features enabling teachers having some familiarity with **ALEKS** to carry out management and monitoring of their classes with more efficiency and power. The Advanced Teacher module is entered from the basic Teacher Module by clicking "Advanced"; teachers may also choose to make the advanced interface their default interface for the **ALEKS** Teacher Module. Teachers using the Advanced Teacher Module can return to the basic Teacher Module at any time by using the link, "Go to the Basic Teacher Module," located at the top of the Advanced Teacher Module window.

## 7.2 Teacher Tutorial (Advanced Teacher Module)

The Tutorial for the Advanced Teacher Module is designed to parallel the function of the Tutorial taken by all student users of **ALEKS** when they first register with the system. It introduces the teacher to the features of the **ALEKS** Advanced Teacher Module in a brief, but thorough, interactive way, and will give teachers who choose this interface confidence in carrying out the operations needed to effectively monitor and manage their **ALEKS** classes.

The Tutorial for the Advanced Teacher Module reproduces the advanced **ALEKS** interface and poses the teacher a series of tasks involving the interface tools (See Figure 7.1). The teacher proceeds to the next page by carrying out the current task; feedback is provided to guide the teacher through all needed actions.

Teachers will normally take the Tutorial at the time that they begin to explore or

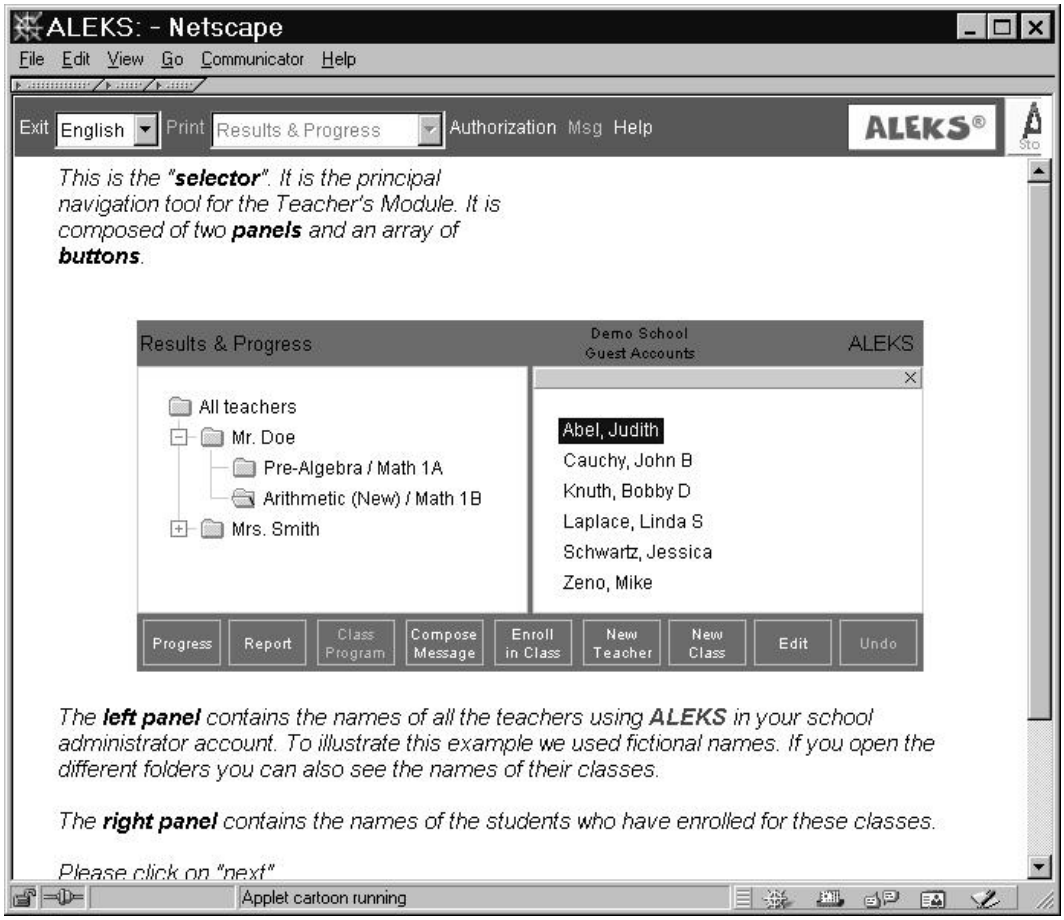


Figure 7.1: Tutorial for the Advanced Teacher Module

use the Advanced Teacher Module interface. The Tutorial can be skipped; a teacher who has skipped part of the Tutorial can return to where they left off or restart from scratch. Also, the Help page contains an index, which links to every section of the Tutorial. Current teachers may take the Tutorial at any time by clicking the link marked "Show me a Tutorial" at the top of the Advanced Teacher Module window. (An teacher who has chosen to skip all or part of the Tutorial sees "Return to the Tutorial.")

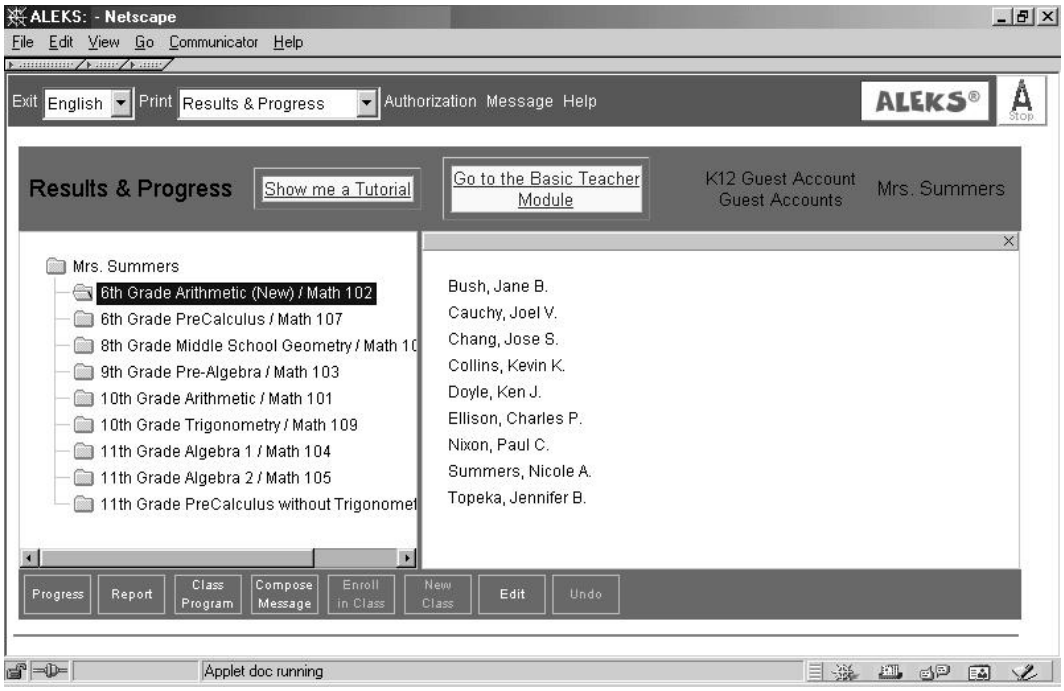


Figure 7.2: The Results & Progress Directory (Advanced Teacher Module)

## 7.3 Access to the Advanced Teacher Module

When you enter the Advanced Teacher Module with teacher status, you will see a directory containing only your own classes. If you have an administrator account you will see all of the teacher directories for your school. If you have a root administrator account you will see directories for all schools under your administration (See Figure 7.2).

**NOTE.** The directory window is called the "Selector." It is the chief graphic navigation tool of the Advanced Teacher Module. You can always return to the Selector by scrolling your browser window up. Similar Selector windows are used in other areas of the Advanced Teacher Module for special purposes.

If you have a teacher account, the system features at your disposal can affect only your classes and the students under your supervision. If your account is that of a school administrator, your privileges are similar, but extend to all the classes and all of the students in the school. If your account is that of a root administrator (e.g., over an entire school district), your privileges extend to all schools under your administration. In the following, we assume that your account is that of a school administrator.

The Advanced Teacher Module has two parts: "Results & Progress" and "Standards

& Course Objectives." When you enter the Advanced Teacher Module, you are automatically placed in "Results & Progress." Use the **ALEKS** menu bar to change the part of the Advanced Teacher Module in which you are working (See Chapter 8).

"Results & Progress" is used for most administrative tasks, such as monitoring individual and group progress. Teachers using **ALEKS** with one or more classes will probably wish to check into this part of the Teacher Module on a daily basis. This allows the teachers to verify the rate of progress achieved by the students. The features also enable teachers to set up additional classes if they need to.

The following sections describe the various actions that can be carried out by teachers with appropriate levels of privilege in the Advanced Teacher Module.

## 7.4 Online Help in the Advanced Teacher Module

Context-sensitive online help in the Advanced Teacher Module can be obtained by clicking on "Help" in the bar at the top of the window (next to the "Message" button).

**Bulletin Board and Mailing List.** The "Help" button also gives access to the **ALEKS** bulletin board and mailing list for teachers. The purpose of these features is to allow teachers using **ALEKS** to exchange information and viewpoints on teaching methods, strategies, and the like. They can also be accessed from the **ALEKS** website by registered teachers (click on "Help").

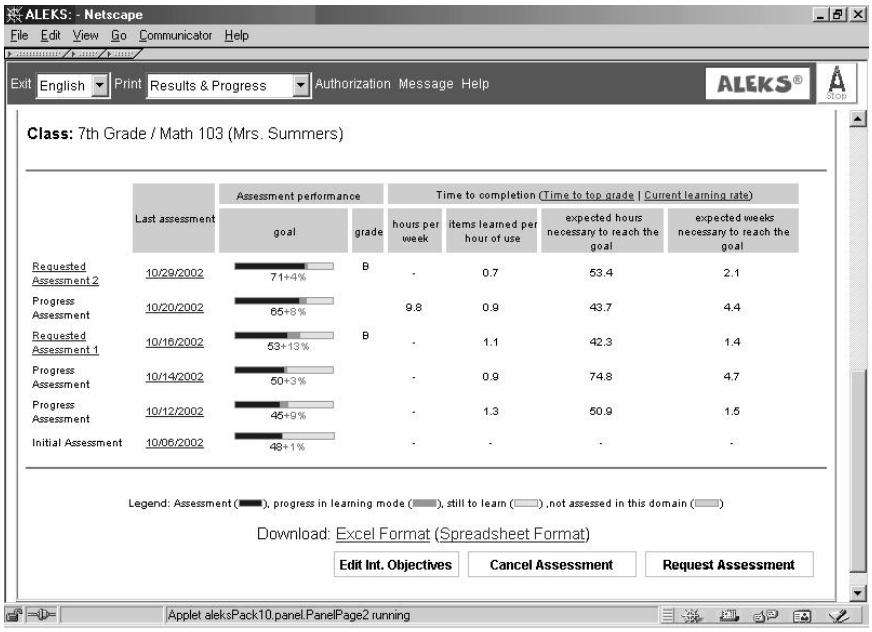


Figure 7.3: Student Progress (Advanced Teacher Module)

## 7.5 View Student Progress


To view student progress, select the name of the student and click on the "Progress" button. A chart will appear below the directories window with one or more rows of information (See Figure 7.3). There is one row for each assessment that the student has taken, with dates (linked to the Report page for that assessment). Each row contains one to three bar graphs, depending on the student's grade. Each bar graph measures the student's mastery as of the given assessment as seen by the blue portion of the bar. Progress made in the Learning Mode subsequently to that assessment (but before the next assessment, if there is one) is measured by the green portion of the bar. There are also percentage values given beneath the bar for the blue and green portions of the bars; for example, 57+9% means that the last assessment showed 57% mastery, and that subsequent work in the Learning Mode added another 9% mastery. If there is more than one bar per row, they will correspond to the course objectives for the previous grade, the current grade, and the subsequent grade.

A variety of other information, clearly labeled, is provided on the Progress page: date of last login, enrollment date, total hours spent on the system. Information on each assessment, total hours and weeks spent subsequently in the Learning Mode (up to the time of the next assessment) with average numbers of items gained per hour and per week is also provided (optionally, this shows the time left to completion of course goals). There are also buttons allowing the teacher to schedule or cancel

an assessment for that student and to edit Intermediate Objectives (See Secs. 7.9, 7.22), and a link for downloading this information to the teacher's computer.

**Downloading.** Information from the Student Progress page can be downloaded in two formats. "Spreadsheet Format" is comma-separated values (CSV), which can be imported into a variety of applications but is raw in appearance. "Excel Format" is in Microsoft Excel format, and has a legible, professional appearance, suitable for printing.

**Monitoring progress.** When a student has spent enough time on **ALEKS** to have had two or more assessments, the sequence of bar graphs appearing on the Student Progress page begins to tell a clear story of the student's success in moving toward mastery. There may be considerable difference among individual students in the speed and smoothness of their progress. When one bar graph appears above another bar graph, the uppermost one represents a later assessment, in which the student seeks to confirm knowledge of material tentatively mastered in Learning Mode. For some students progress in assessments is slower than that in Learning Mode. This can be seen when the green portion of one bar graph extends further to the right than the blue portion of the bar graph above it (not everything covered in Learning Mode was confirmed subsequently in the assessment). For other students the opposite is true: progress in assessments is for some reason faster than that in the Learning Mode. This can be seen when the green portion of one bar graph does not extend so far to the right as the blue portion of the bar graph above it (more knowledge was confirmed in the assessment than had been covered previously in Learning Mode). When a student is frustrated, this will be obvious from the bar graphs; in such cases the teacher may need to provide extra help or encouragement. It is well worth the teacher's time to check daily on individual and class progress in **ALEKS**.

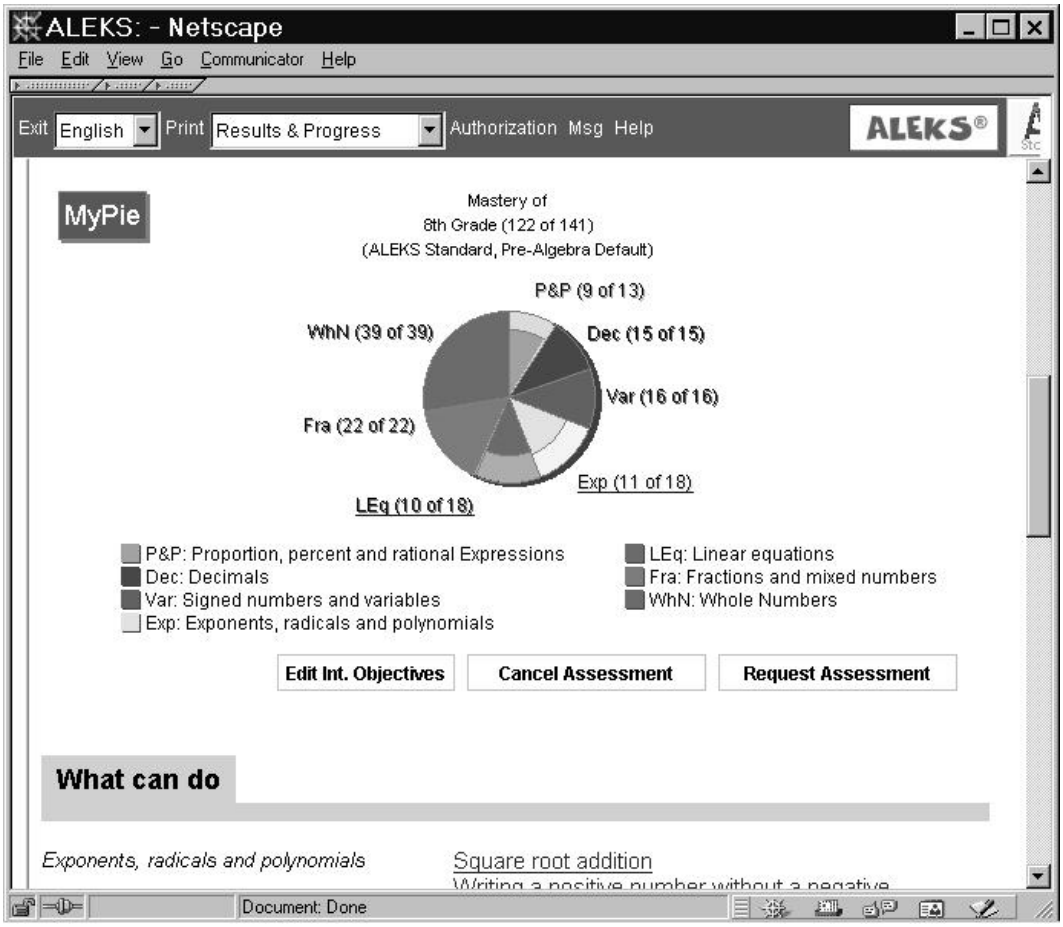


Figure 7.4: Student Report (Advanced Teacher Module)

## 7.6 View Student Assessment Report


Select the name of the student for whom you wish to observe a report and click on the "Report" button. A display containing one or more pie charts will appear beneath the directories window (See Figure 7.4). Its interpretation is the same as for the reports received by students following all formal assessments (See Sec. 4.6.1). By default, the Report page shows the most recent assessment or the most recent knowledge attained in the Learning Mode. Other assessments or other Learning Mode reports may be chosen by selecting dates from the menu at the top of the chart and clicking on "Graph."

**Dates.** Each report in the menu at the top of the Student Report page is dated. If an assessment is begun on one date and finished on another, the begin and end dates are shown on the Student Report page, along with the amount of time spent in the assessment (the menu shows only the begin date). The date for a Learning

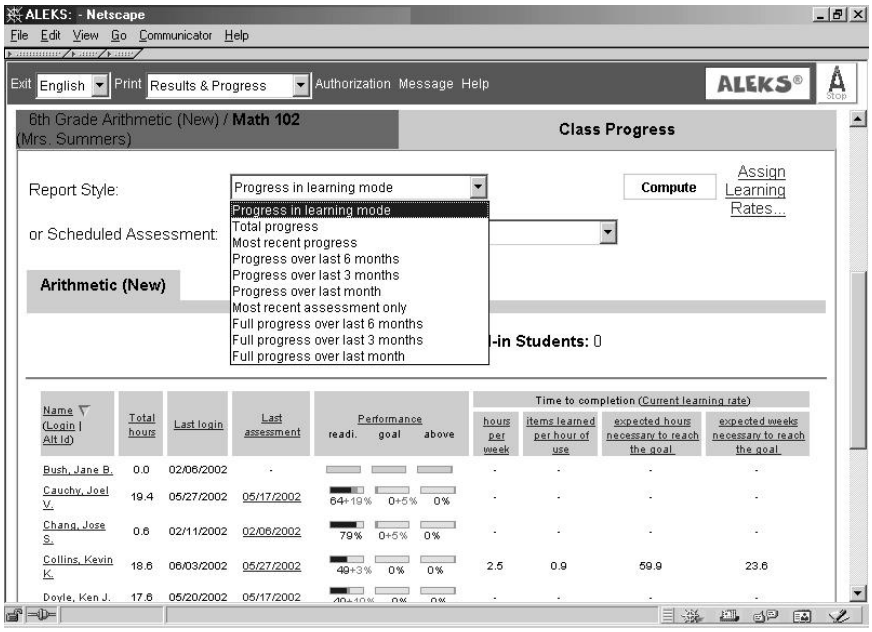


Figure 7.5: Class Progress (Advanced Teacher Module)

report is the last date on which the student worked in the Learning Mode before any subsequent assessment.

Beneath the pie charts is a list of concepts that the student has mastered recently ("What <Name> Can Do") and another list of concepts that the student is currently (as of the given assessment) most ready to begin learning ("Ready to Learn"). There may also be a summary of the student's history in **ALEKS** ("History") and a log of work in the Learning Mode following that assessment ("Learning Log"). There are also buttons allowing the teacher to request or cancel an assessment for that student and to edit Intermediate Objectives (See Secs. 7.9, 7.22).

**Complete list of topics mastered.** Click on the link "and many other more elementary concepts" to see a complete list of topics mastered by the student.

## 7.7 View Class Progress


Select the class for which you wish to observe progress and click on the "Progress" button. A chart will appear below the directories window with a series of rows, one for each student enrolled in the class (See Figure 7.5). The rows contain bar graphs (See interpretation in "View Student Progress," Sec. 7.5). By default, only the bar graph for the most recent assessment is shown (the students' names are linked to their individual Progress pages, while the assessment dates are linked to

their individual Report pages). You can use the students' Login Names or ID's rather than their names as the identifier in the left-hand column; simply click on the corresponding link at the top of that column. This may be useful when the data from this page needs to be downloaded and stored in a particular format for administrative purposes.

**Report Style.** A range of options providing variations on this format are accessible through a menu at the top of the chart. Choose the desired format from the menu and click on "Compute" to view results.

Of these options, the following have been found particularly useful by a wide range of users: "Progress in learning mode" (for frequent checks on progress and time spent in **ALEKS**), "Total progress" (for viewing the overall effectiveness of students' use of **ALEKS** over a longer period of time, such as a term or semester), and "Full progress over last 6 months" (for convenient examination of the learning patterns followed by students in a class).

**Progress in learning mode**

All students who have completed at least one assessment have bar graphs. The blue portion of the bar graph shows mastery as of the most recent assessment, and the green portion shows progress in the Learning Mode since that assessment.

**Total progress**

All students who have completed at least two assessments have bar graphs. The blue portion of the bar graph shows mastery as of the first assessment, and the light blue portion shows progress made between that assessment and the most recent assessment taken.

**Most recent progress**

All students who have completed at least two assessments have bar graphs. The blue portion of the bar graph shows mastery as of the assessment immediately preceding the most recent one, and the light blue portion shows progress made between that assessment and the most recent assessment taken.

**Progress over last 6 months**

All students who have completed at least two assessments within the last six months have bar graphs. The blue portion of the bar graph shows mastery as of the first assessment taken within the last six months, and the light blue portion shows progress made between that assessment and the most recent one taken.

**Progress over last 3 months**

All students who have completed at least two assessments within the last three months have bar graphs. The blue portion of the bar graph shows mastery as of the first assessment taken within the last three months, and the light blue

portion shows progress made between that assessment and the most recent one taken.

**Progress over last month**

All students who have completed at least two assessments within the last month have bar graphs. The blue portion of the bar graph shows mastery as of the first assessment taken within the last month, and the light blue portion shows progress made between that assessment and the most recent one taken.

**Most recent assessment only**

All students who have completed at least one assessment have bar graphs. The blue portion shows mastery as of the most recent assessment.

**Full progress over last 6 months**

For each student who has taken at least one assessment, there is a bar graph shown for each assessment taken in the last 6 months. The interpretation is the same as for "Progress in learning mode"; that is, the blue part of the bar shows mastery on the assessment, and the green part additional mastery achieved in Learning Mode following that assessment (but before any subsequent assessment).

**Full progress over last 3 months**

For each student who has taken at least one assessment, there is a bar graph shown for each assessment taken in the last 3 months. The interpretation is the same as for "Progress in learning mode"; that is, the blue part of the bar shows mastery on the assessment, and the green part additional mastery achieved in Learning Mode following that assessment (but before any subsequent assessment).

**Full progress over last month**

For each student who has taken at least one assessment, there is a bar graph shown for each assessment taken in the last month. The interpretation is the same as for "Progress in learning mode"; that is, the blue part of the bar shows mastery on the assessment, and the green part additional mastery achieved in Learning Mode following that assessment (but before any subsequent assessment).

**Scheduled Assessment**

Underneath the "Report Style" menu is a second menu listing assessments that have been scheduled for this class. To view the results of that assessment, select the name (with date) of the assessment and click "Compute" (See Sec. 7.10).

Buttons at the bottom of the page allow the teacher to schedule an assessment for all the students taking the class and to download information from the page in a format suitable for spreadsheet display (See Sec. 7.10).

**Statistical Information.** Most display options provide additional types of statistical information on student progress in the right-hand part of the display. Their

significance varies according to the display option, and is indicated in the column headings. One or more fields may be blank if the information gathered for that student is not sufficient at a particular time. It is also possible to choose "Time to Completion"; this indicates the estimated time necessary for individual students to complete the course goals based on average progress for the period chosen. Where the Intermediate Objectives are in use, this also shows "Time to Current Objective" (See Sec. 7.22).

**Assign Learning Rates.** A link at the top of the Class Progress page provides access to the learning rates feature (See Sec. 7.24).

**Sorting.** The information in the Class Progress page can be sorted on any of the columns. Simply click on the header or footer of a column to sort on that column; a second click switches between ascending and descending order.

**Grouping.** It is possible to create arbitrary groups within the class and generate Progress pages for these groups. Simply select the names of the students in the Selector: hold Shift to select a continuous range, or Ctrl to select a discontinuous group. Then click the "Progress" button.

**Downloading.** Information from the Class Progress page can be downloaded in two formats. "Spreadsheet Format" is comma-separated values (CSV), which can be imported into a variety of applications but is raw in appearance. "Excel Format" is in Microsoft Excel format, and has a legible, professional appearance, suitable for printing.

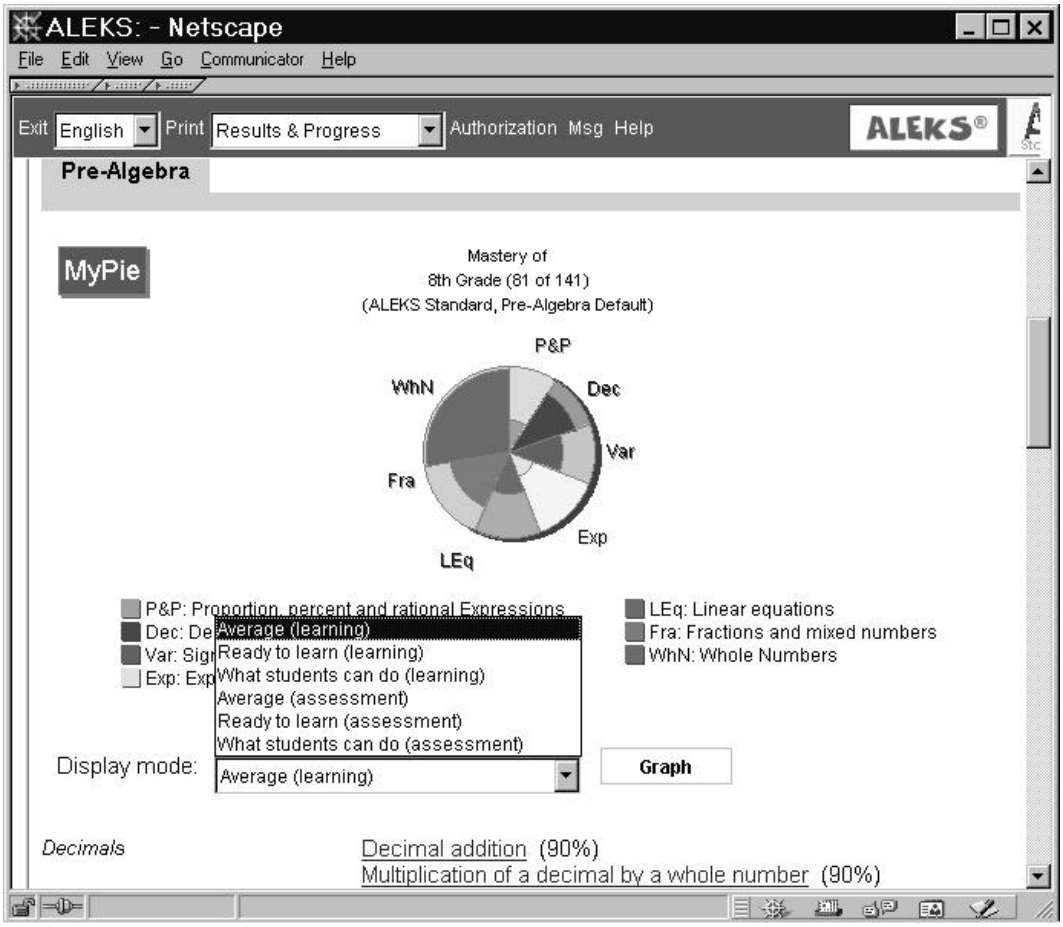


Figure 7.6: Class Report (Advanced Teacher Module)

## 7.8 View Class Report


Select the class for which you wish to view a report and click on the "Report" button. A display containing one or more pie charts will appear beneath the directories window (See Figure 7.6). Its interpretation is the same as for the reports received by students following all formal assessments, except that it represents a synthetic summary of reports received by all students in the class. The period summarized may be changed using the menu at the top of the chart (click on "Graph" to display results).

**Display options.** Beneath the pie charts there are other kinds of analysis available for class assessment data. Choose "Average," "Ready to learn (learning)," "Ready to learn (assessment)," "What students can do (learning)," or "What students can do (assessment)" from the "Display Mode" menu and click on "Graph" to display results.

**Average**

This option produces a list of the specific concepts mastered by a percentage of the students, as of their most recent assessment. The list is organized by general categories (See Figure 7.6). For each concept, the percentage of students in the class who demonstrated mastery is given.

By default, items are not listed if they have been learned by fewer than 5% or by more than 95% of the students in the class. For a comprehensive list (0%-100%), click the link "Display full list."

**Ready to learn**

This option also shows a list of specific concepts, organized by general categories. For each concept, it shows the number of students in the class who are ready to learn that concept in the Learning Mode (learning) or as of their most recent assessment (assessment). Clicking on the number of students will display a list of their names; there also appears a link for sending a message to all the students in the group so defined (See Secs. 7.12, 7.13). The button "Open All" displays all students' names in each group (with links).

**What students can do**

This option also shows a list of specific concepts, organized by general categories. For each concept, it shows the number of students in the class who have recently mastered that concept in the Learning Mode (learning) or as of their last assessment (assessment). Clicking on the number of students will display a list of their names; there also appears a link for sending a message to all the students in the group so defined (See Secs. 7.12, 7.13). The button "Open All" displays all students' names in each group (with links).

**Focusing instruction.** These tools can be used to focus instruction for classes and groups of students. The "Average" display shows very clearly which specific concepts and general areas within the course objectives need the most work for the greatest number of students. Consequently, it can be used to prioritize topics for lectures and lesson plans. The "Ready to learn" display, on the other hand, makes it possible to break a large class up into small groups, each focused on the concept or concepts that it is working on currently in Learning Mode. The "What students can do" display mode can be used to form groups of students for special discussions and exercises designed to expand and deepen their understanding of a concept they have all recently mastered. Where there is not sufficient teaching staff to coach several groups simultaneously, the teacher may call out small groups during their use of **ALEKS** for brief, pointed "chalk talks."

At the bottom of the Class Report page there are buttons allowing the teacher to schedule an assessment for all the students in the class or to edit Intermediate Objectives (See Secs. 7.10, 7.22).

**Grouping.** It is possible to create arbitrary groups within the class and generate Report pages for these groups. Simply select the names of the students in the

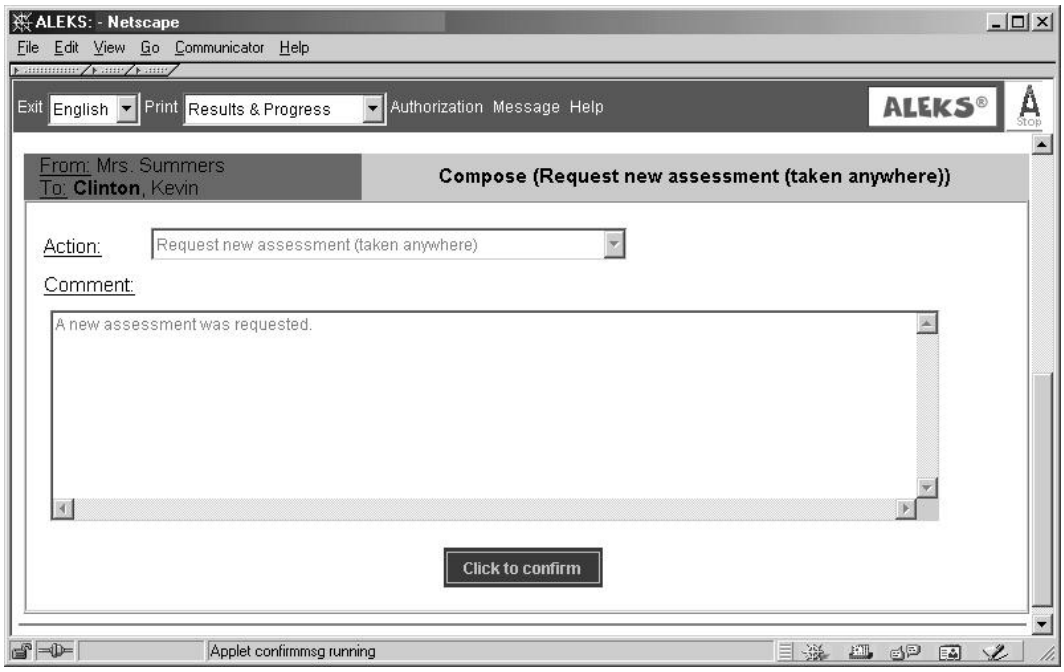


Figure 7.7: Student Assessment (Advanced Teacher Module)

Selector: hold Shift to select a continuous range, or Ctrl to select a discontinuous group. Then click the "Report" button.

## 7.9 Schedule Student Assessment

Assessments for individual students may be requested or canceled using buttons on the Progress or Report pages for those students (See Figure 7.7). If more than one student name is selected before clicking "Progress" or "Report," the assessment will be requested for that group of students. When the teacher has requested an assessment, the student or students will immediately enter the Assessment Mode at the next login. The teacher can specify whether the assessment is to be taken from any location or only from the school.

**NOTE.** If an assessment is scheduled, whether by the teacher or automatically by the system, and the student is required to take the assessments at the school, the student will be unable to use the system from locations other than school until the assessment is completed (See Sec. 7.17). Teachers wishing to constrain assessments in this way should contact ALEKS Corporation for assistance in determining the domain addresses used by their school.

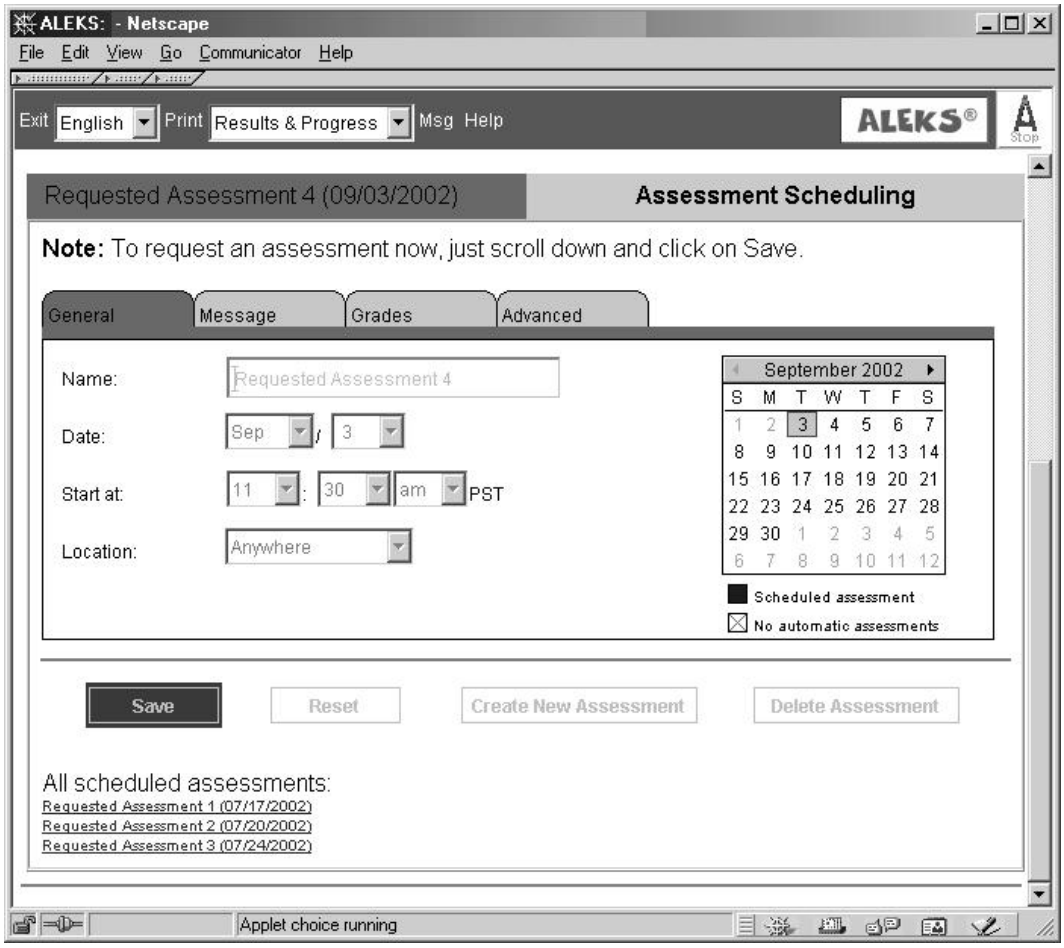


Figure 7.8: Class Assessment (Advanced Teacher Module)

## 7.10 Schedule Class Assessment

Assessments for entire classes may be scheduled using buttons on the Progress or Report pages for those classes, or on the Edit page under the tab "Advanced."

In order to schedule a class assessment, the teacher is asked to specify the name of the assessment (by default, a scheduled assessment is called "Requested Assessment" plus a number), a date (by default the current date), and a time (by default the current time) (See Figure 7.8). The teacher can also specify whether the assessment can be taken anywhere (the default) or is restricted to campus. When this information has been given, the teacher schedules the assessment by clicking "Save." If all the defaults are left, the students will immediately enter Assessment Mode at their next login. If a later date and/or time are chosen, the students will enter Assessment Mode the next time they log in *after* that date and time. The

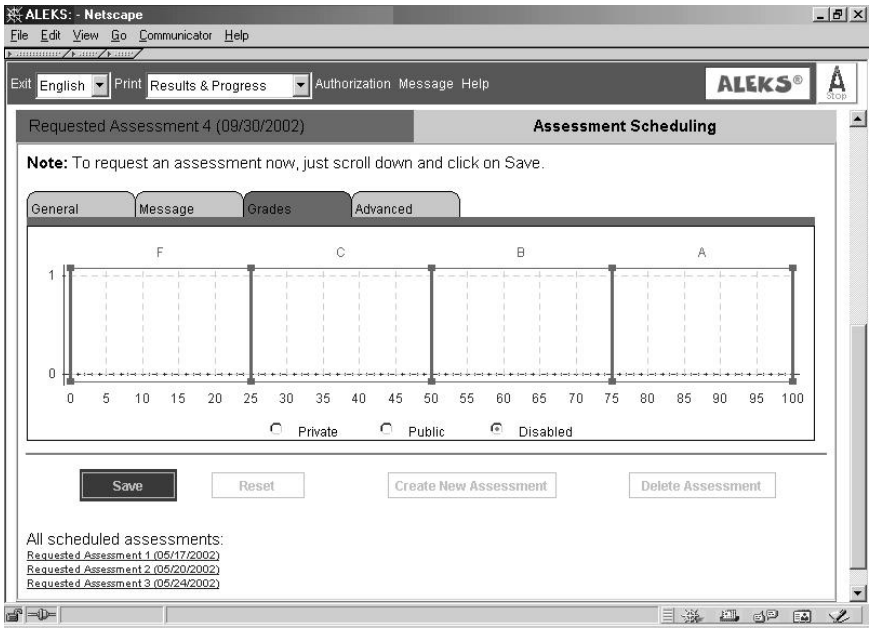


Figure 7.9: Grading with Scheduled Assessment (Teacher Module)

calendar appearing to the right of the input fields provides a quick and easy way to choose the date of an assessment. The calendar also shows the dates of all currently scheduled assessments and days on which automatic assessments have been blocked.

At the bottom of the Class Assessment page all currently scheduled assessments are listed. Clicking any of these links brings up the scheduled assessment for modification or deletion. Use the "Delete Assessment" button to delete a scheduled assessment, or the "Create New Assessment" button to add a new assessment from this page.

The tabs "Message," "Grades," and "Advanced" provide access to additional features affecting scheduled assessments.

**Message**

Add a special message to accompany the automatic message which students receive informing them that they are entering a scheduled assessment. If you prefer that the students not receive a message, cancel the automatic message.

**Grades**

Assign a grading scheme to this assessment only. The Grades feature uses a chart with sliders (See Figure 7.9). The grades received by students on scheduled assessments can be seen under Class Progress using the "Scheduled Assessment" menu (See Sec. 7.7).

The three buttons under the graph determine the use of the evaluation: if

"Disabled," no one sees it; if "Private," the teacher sees it but the students do not; if "Public," the teacher sees it and each student sees it for their own work.

The graph has sliders, with labels referring to the intervals they define. Additional sliders may be placed by dragging the right-hand or left-hand sliders, or sliders may be removed by dragging them off to the right or left. The sliders may be set and the labels edited as the teacher desires. To change the label on a new or existing slider, select the text of the current label, retype as desired, and then press "Return."

**Advanced**

Block automatic assessments for up to 5 days prior to a scheduled assessment (useful to avoid having some students assessed twice in a row); limit the effect of a scheduled assessment to the day it is assigned to or leave it in effect until the next scheduled assessment. If an assessment is limited to the assigned day, a student logging on to **ALEKS** on that day (after the start time) will be assessed, but if the student does not log on that day that student will not be assessed until the next automatic or scheduled assessment.

**NOTE.** If an assessment is scheduled, whether by the teacher or automatically by the system, and the student is required to take assessments at the school, the student will be unable to use the system from locations other than school until the assessment is completed (See Sec. 7.17). Teachers wishing to constrain assessments in this way should contact ALEKS Corporation for assistance in determining the domain addresses used by their school.

**Grouping.** It is possible to create arbitrary groups within the class and request assessments for these groups. Simply select the names of the students in the Selector: hold Shift to select a continuous range, or Ctrl to select a discontinuous group. Then click the "Progress" or "Report" button, and request the assessment as you normally would for an entire class.

## 7.11 Create, Edit, View Quizzes


To create, edit, or view quizzes, select the name of the class for which you wish to do this and click "Quiz." You will see a list of students in the class with results for the most recent quiz. A menu at the top of the list allows you to select previous quizzes. To see detailed results for any particular student on that quiz, click on the date of the quiz opposite the student's name. To see all quiz results for a particular student, click that student's name. This list can be resorted on any of the headings by clicking on that heading. Links at the top of the page enable you to see a breakdown of quiz results by question and to assign a grading scale.

The Quiz feature in **ALEKS** allows teachers to create quizzes for their students

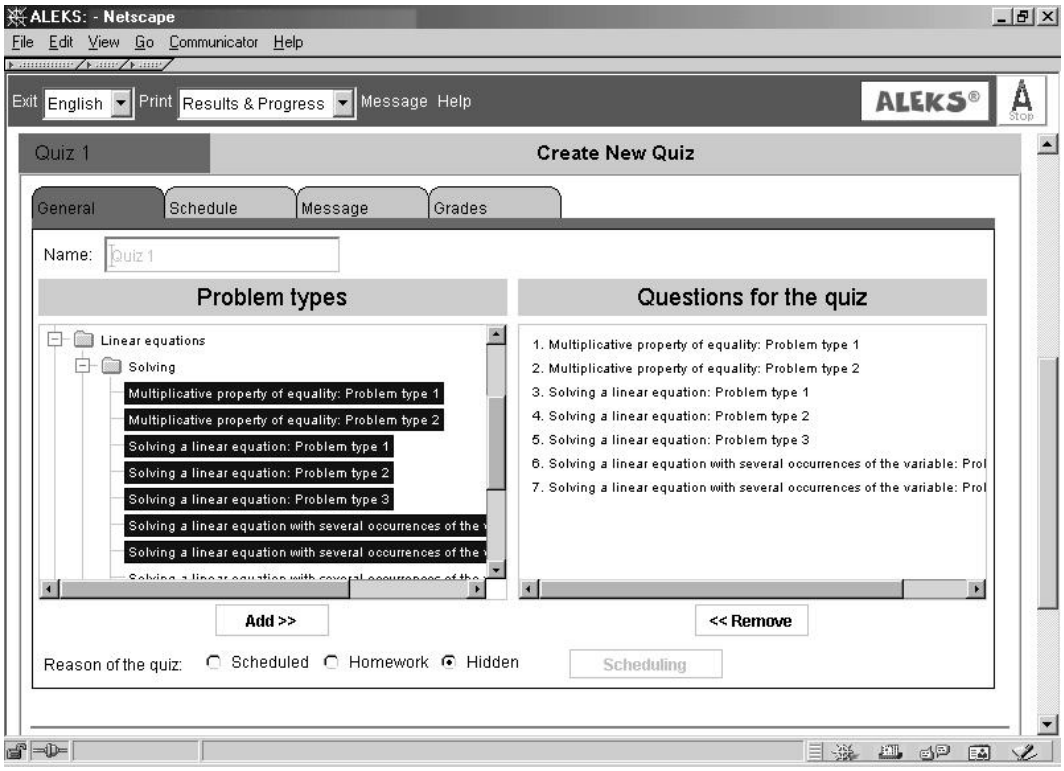


Figure 7.10: Creating a Quiz (Advanced Teacher Module)

using any topics in the **ALEKS** domain. These quizzes are administered through **ALEKS** and scored automatically, with optional use of a grading scale set by the teacher. Quizzes may be scheduled for particular days and times, or they may be made available for the students in a class to take when they are ready ("Homework Quiz"). The results of quizzes can be seen through the reporting features of **ALEKS**, but do not influence the students' knowledge states or their guided learning in **ALEKS**.

**Create New Quiz.** To create a new quiz, click on the button to lower right, "Create New Quiz." On the page that follows, you will see various options for the quiz. Enter a name for the quiz in the box to upper left, or leave the name provided ("Quiz *N*"). Next, select from the list of topics in the left-hand window either by dragging topics into the right-hand window, or by highlighting topics and clicking "Add." Click "Save" to create the quiz. To set the availability of the quiz, use the radio buttons at the bottom of the page and the "Scheduling" button. Other buttons enable you to create a different quiz, edit this one, or delete this one. There are links at the bottom to other existing quizzes; finally, the tabs at the top can be used to schedule, send a message to announce the quiz, or set a grading scale.

**Tips.** Double-click on the name of any topic to see a sample problem. Topics can

be selected in continuous groups using the Shift key or discontinuous groups using Ctrl; the entire folder is selected by using Ctrl-a.

**Grading with quizzes.** The grading scale used with quizzes is like the one used for assessments (See Sec. 7.10). As with assessments, grading is not obligatory; if no grading scale is set, the students and the teacher will only see the percentage of questions answered correctly.

**Availability of quizzes to students.** By default, quizzes are made available to students as "Homework Quizzes." This means that the student is not forced into the quiz by **ALEKS**; rather, the student clicks the "Quiz" button when they are ready to take the quiz (See Sec. 5.2.9). If this option is chosen, the teacher must indicate a due date for the quiz, after which the quiz will no longer be available to students. A message can also be sent to students informing them that the quiz has been assigned.

Quizzes may also be "hidden" for later availability to students, or they may be scheduled. A graphic calendar is provided for easy scheduling of quizzes. If the quiz is scheduled, the teacher will have options for specifying the time of day it is to begin, the time limit on the quiz, whether students are notified, how many days the quiz should be in effect ("Window of time to take the quiz"), whether the quiz is restricted to the school, and prevention of automatic assessments up to five days before the quiz is scheduled.

**Edit Quiz.** To edit an existing quiz, click on the button to the lower right, "Edit Quiz." The quiz may be modified using the features described above for the creation of quizzes, or it may be deleted.

**Downloading.** Information from the Quiz page can be downloaded in two formats. "Spreadsheet Format" is comma-separated values (CSV), which can be imported into a variety of applications but is raw in appearance. "Excel Format" is in Microsoft Excel format, and has a legible, professional appearance, suitable for printing.

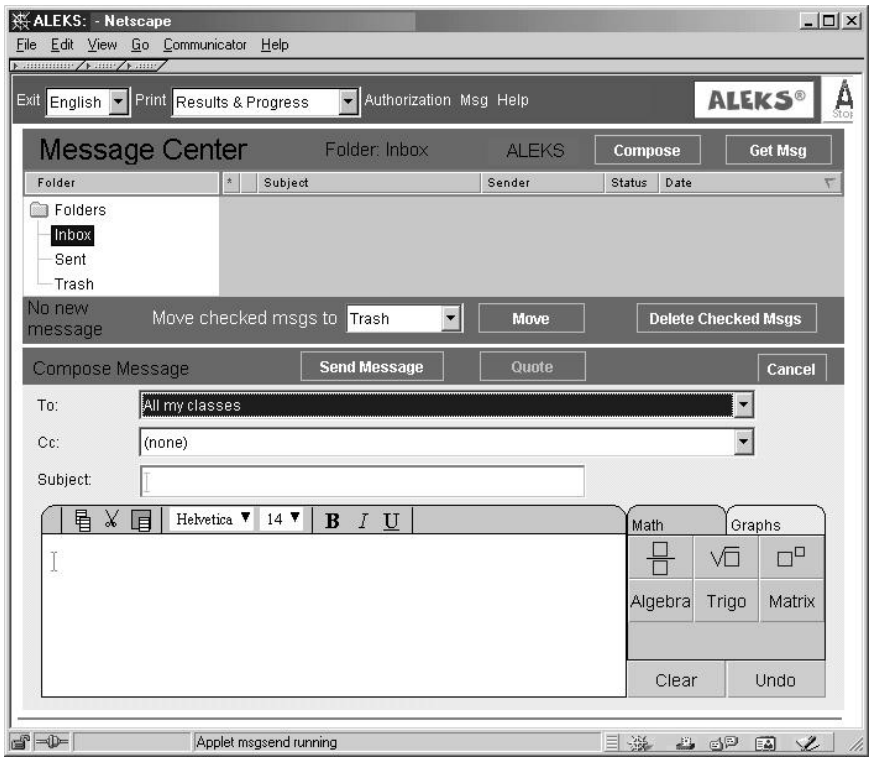


Figure 7.11: Send Message (Teacher Module)

## 7.12 Send Message


Select the student or class to whom you wish to send a message, and click on the "Compose Message" button. A full-featured editor will appear beneath the directories window with fields for a subject and a message and a "Send Message" button (See Figure 7.11). The student or students to whom the message is being sent will see it at their next login (See Sec. 5.2.10). It is also possible to send messages directly to ALEKS Corporation.

**ALEKS Message Center.** The **ALEKS** Message Center resembles an email program in most of its features, although the exchange of messages takes place within the **ALEKS** system. Also, the Message Center is equipped with special symbols and tools appropriate to communication about the subject-matter used in **ALEKS**. Optionally, you can have copies of your students' messages sent to your email account as well (See Sec. 7.15).

**Mathematical Expressions.** The **ALEKS** Message Center contains a full range of tools for using mathematical symbolism, constructions, and expressions in your messages. The tools are like those used by **ALEKS** itself in the Answer Editor

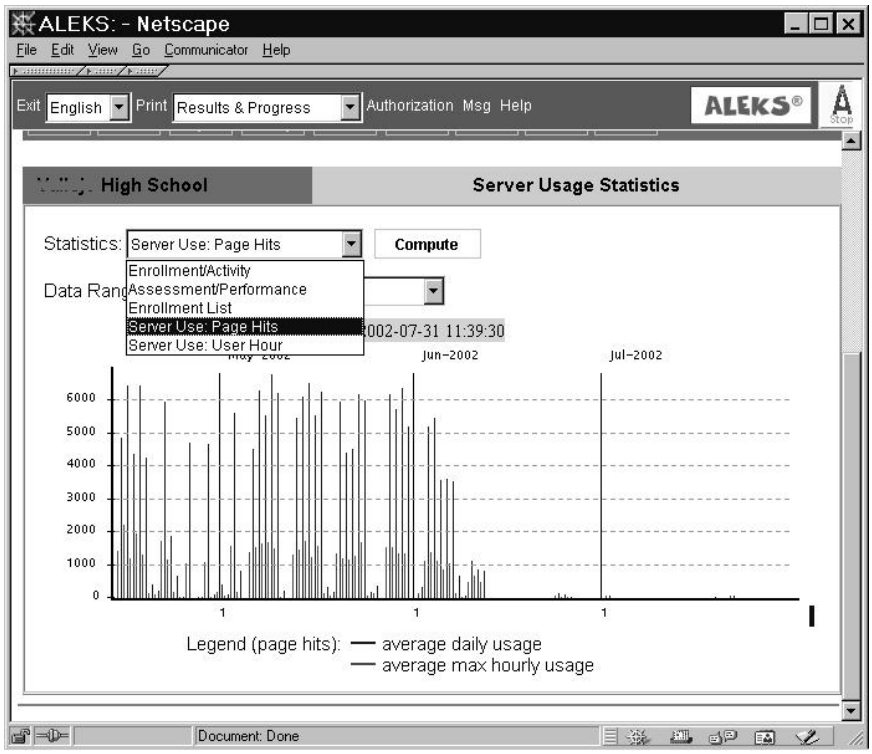


Figure 7.12: Server Statistics (Teacher Module)

(See Sec. 4.5). Moreover, students sending you messages in the Message Center can attach a graphic representation of the problem they are currently working on, to facilitate posing and answering mathematical questions.

**Grouping.** It is possible to create arbitrary groups within the class and send messages to these groups. Simply select the names of the students in the Selector: hold Shift to select a continuous range, or Ctrl to select a discontinuous group. Then click the "Compose Message" button.

## 7.13 Check Messages

Msg Click on the "Message" button at the top of the Teacher Module window. You can receive messages from students in a class only if this has been enabled in the teacher account (See Sec. 7.15.).

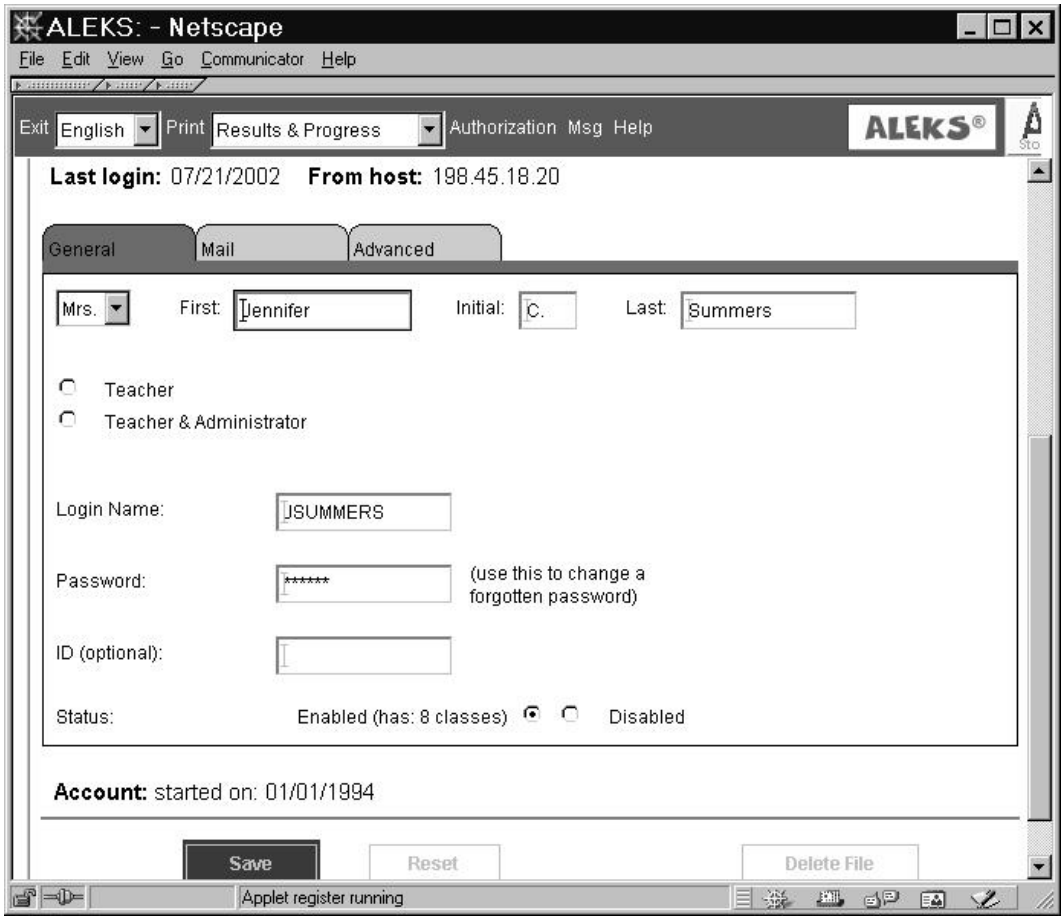


Figure 7.13: Teacher Account (Advanced Teacher Module)

## 7.14 Check Server Usage

Server Stats

Click on the "Server Stats" button. A table will appear beneath the directories window (See Figure 7.12). The type of information shown in the table can be changed by selecting a heading from the menu at the top of the table and clicking the "Compute" button. The options for display are: Enrollment/Activity, Assessment/Performance, Enrollment List, Server Use: Page Hits, Server Use: User Hours.

**NOTE.** The information provided by this feature is of interest to system administrators, teachers, and educational administrators seeking general statistical information on the use of **ALEKS**.

## 7.15 Create Teacher Account


Select the directory for the school where you wish to create a teacher account (or the directory "All teachers") and click on the "New Teacher" button. A form for the new account will appear beneath the directories window (See Figure 7.13). Supply the teacher's first and last names, a title ("Mr.," "Mrs.," "Ms.," etc.), a Login Name, and a Password. By default, the new account is set for a teacher. If you are an administrator, you can make another administrator account by checking "Teacher and Administrator." The "ID" field is optional and may be left blank. "Message from student" should be enabled if you wish the account holder to receive messages from students (See Sec. 7.13). "Status" must be enabled if the teacher is to have classes assigned (if "Status" is enabled, you will see here how many classes are assigned to the teacher).

When you are finished filling in the form click on "Save." This creates the account. To start over, click "Reset." To cancel the account, click "Delete File."

Other settings may be changed for the teacher by using the additional tabs "Mail" and "Advanced."

**Mail**

This tab contains options for entering an email address, forwarding **ALEKS** messages to this address, and permitting students to send the teacher messages through **ALEKS** (See Sec. 7.13).

**Advanced**

This tab contains a button for "Cleanup Tools." These tools permit the teacher to unenroll and delete students and to modify database records in other ways.

**NOTE.** Deleting a student removes that student's records permanently from the **ALEKS** system.

**NOTE.** Under the "Cleanup Tools," "Records" refers to information in the database concerning student knowledge as shown on assessments and in the Learning Mode. Clear Records will remove all such information. "Stats" refers to information in the database concerning the hours students have spent in **ALEKS**. Clear Stats will remove all such information.

## 7.16 Edit Teacher Account


Select the teacher whose account you wish to edit and click the "Edit" button. The same form will appear as described in "Create Teacher Account" (See Figure 7.13). The account may be deleted ("Delete File") only if there are no classes and no students enrolled for this teacher ("Advanced").

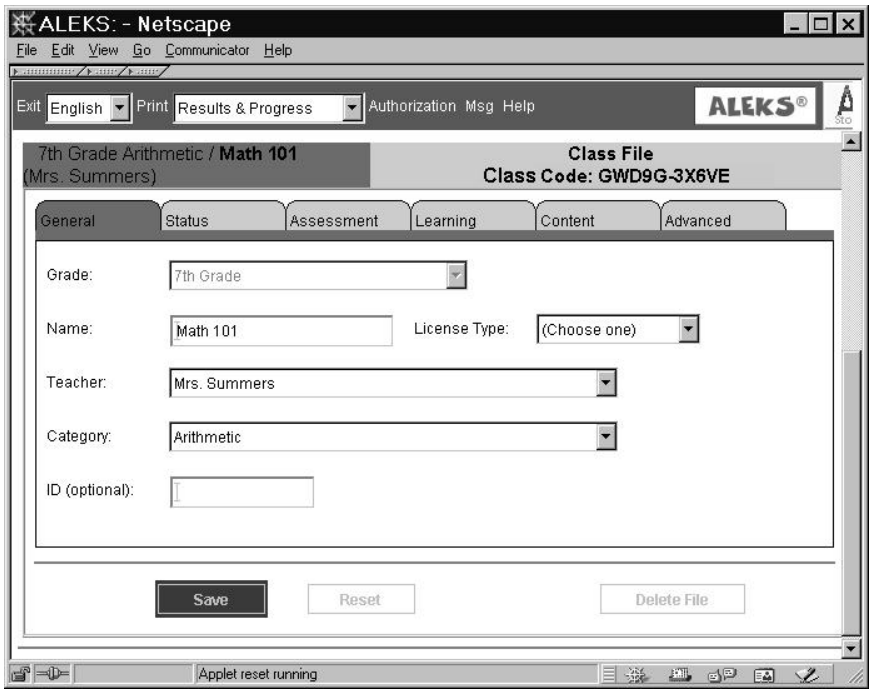


Figure 7.14: Class Account (Advanced Teacher Module)

## 7.17 Create Class Account


Select the teacher for whom you wish to create a class and click on the "New Class" button. A form for the new account will appear beneath the directories window (See Figure 7.14). Select a grade or level for the class. Provide a name (e.g., "Aleks") and choose a category. At this point, you have the option of choosing a teacher other than the one initially selected (if others are available). This will transfer the class to that teacher. The "ID" field is optional and ordinarily left blank.

**The Class Code for the newly-created Class appears in the upper right-hand corner of the screen.**

When you are finished filling in the form click on "Save." This creates the account. To start over, click "Reset." To cancel the account, click "Delete File."

Other settings may be changed for the class by using the additional tabs "Status," "Assessment," "Learning," "Content," and "Advanced."

**Status**

Under "Status" you can close the class for enrollment (by default it is open) and restrict students' access to their account ("assessment only" or "denied"—no access). Also, you can request to be notified by **ALEKS** (through the Message

Center) when any student in the class assesses at 100% of your syllabus.

**Assessment**

The students' assessments can be restricted so that either the initial assessment, or subsequent assessments, or both, can be taken only from the school. For this setting to be effective, a valid domain name must be entered in the school account. Teachers wishing to constrain assessments in this way should contact ALEKS Corporation for assistance in determining the domain addresses used by their school.

**Learning**

If the "Ask a friend" option is checked, students in the class will be able to request the name of a classmate for help with a topic that is causing difficulty. "Novice" means the system will choose a classmate who has mastered the concept very recently. "Expert" means that the system will choose a classmate who mastered the concept earlier than others in the group. The teacher may pick any point on the continuum between "novice" and "expert."

This tab also contains options for the use of the **ALEKS** Worksheet (See Sec. 5.6). The teacher may enable or disable the worksheet, choose between 16 review questions or 12 review plus 4 extra credit, remind students to print a worksheet when exiting **ALEKS**, and have answer sheets sent through the Message Center each time a student downloads a new worksheet.

Other options here concern the availability of the calculator and of the "Time to Completion" data to students on their Report page (See Secs. 5.2.4, 7.5, 7.7).

**Content**

Clicking the "Content" tab gives access to the **ALEKS** Content Editor (See Sec. 7.23). This feature lets the teacher quickly and easily modify the content for a course. If the teacher clicks in the checkbox for any content area, that content area is removed from the curriculum of the course; it will also not appear in assessments. To see exactly which items are contained in this content area, click on the title of the content area.

**Advanced**

Under "Advanced" it is possible to find a range of class management features. "Cleanup Tools" permit the teacher to unenroll and delete students and to modify database records in other ways. The "Course Objectives" button is equivalent to the "Select Course Objectives" button (See Sec. 7.19). "Assign Learning Rates" opens the Learning Rates feature (See Sec. 7.24). "Edit Int. Objectives" gives access to the Intermediate Objectives feature (See Sec. 7.22). "Schedule Assessment" permits the teacher to schedule an assessment for the class (See Sec. 7.10.).

**NOTE.** Under the "Cleanup Tools," "Records" refers to information in the database concerning student knowledge as shown on assessments and in the Learning Mode. Clear Records will remove all such information. "Stats" refers

to information in the database concerning the hours students have spent in **ALEKS**. Clear Stats will remove all such information.

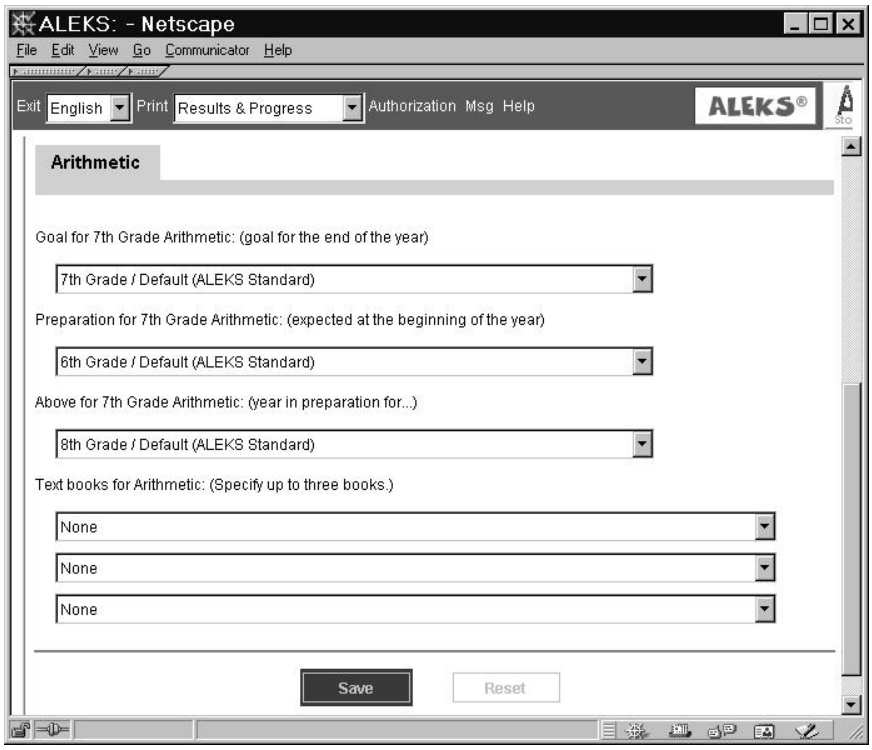


Figure 7.15: Course Objectives (Advanced Teacher Module)

## 7.18 Edit Class Account


Select the class you wish to edit and click on the "Edit" button. The same form will appear as described in "Create Class Account" (See Figure 7.14). The account may be deleted ("Delete File") only if there are no students currently enrolled in the class ("Unenroll Students").

**The Class Code for the Class being edited appears in the upper right-hand corner of the screen.**

## 7.19 Select Course Objectives


Select the class for which you wish to choose the course objectives and click on the "Select Course Objectives" button. A form will appear beneath the directories window containing menus for all course objectives needed for the given class (See Figure 7.15). When you are finished filling in the form click on "Save." To start over or restore defaults, click on "Reset."

**NOTE.** The "course objectives" are a set of topics or items used as a goal for mastery by the students in a given class (See Chapter 8.). In school classes several sets of course objectives are usually set for the class, including course objectives for the preceding and/or subsequent grades. "Standards" are collections of sets of course objectives covering a range of grades. **ALEKS** always contains ready-made standards set to appropriate defaults. Thus, in most cases the school teacher need not select the course objectives.

## 7.20 Enroll and Unenroll Students


Select the class for which you wish to enroll or unenroll students and click on "Enroll in Class." A display will appear beneath the directories window showing the names of all students who may be enrolled. The students currently enrolled in this class appear with their names highlighted in gray; those enrolled in some other class are highlighted in yellow. The names of students can be highlighted (enrolled) or dehighlighted (unenrolled) by clicking on them. When all desired changes have been made, click on the "Save" button.

**Drag and drop.** Students may be moved between classes more easily by dragging and dropping their names. Simply select the names of students to be moved in the right-hand side of the directories window and drag them to the target folder on the left. The entire class can be selected by using Ctrl-A; a continuous range by holding Shift and clicking; or a discontinuous group by holding Ctrl and clicking. You will see the target folder become highlighted when the student or students are ready to "drop."

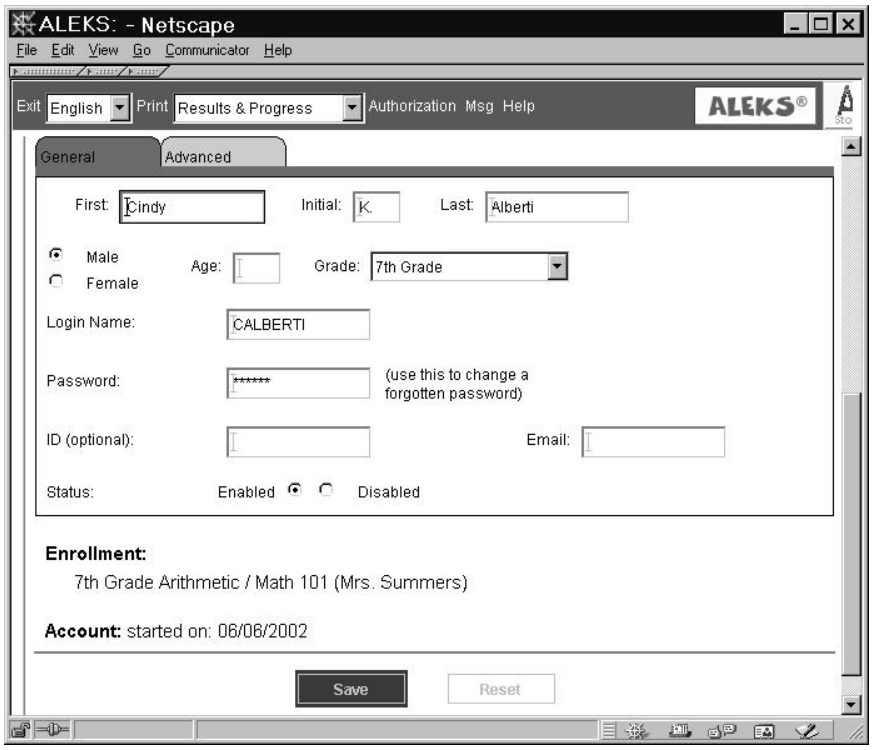


Figure 7.16: Student Account (Advanced Teacher Module)

## 7.21 Edit Student Account


To edit a student account, select the name of the student and click on the "Edit" button. A form will appear beneath the directories window containing the student's account information: name, login name, ID, email, and current enrollment status (See Figure 7.16). The student's Password is not shown in a readable form, but it can be changed to provide a student with a new Password when one has been forgotten. Corrections or changes may also be made to the student's name, login name, ID, and email. The student's ID and email are optional, though it may be useful to have these on record.

**Advanced.** Under "Advanced," "Cleanup Tools" permit the teacher to unenroll and delete the student and to modify database records in other ways. "Records" refers to information in the database concerning student knowledge as shown on assessments and in the Learning Mode. Clear Records will remove all such information. "Stats" refers to information in the database concerning the hours the student has spent in **ALEKS**. Clear Stats will remove all such information.

**Account Information.** The begin and expiration dates of the student's current account are also shown on this page. Similar information is available to the student

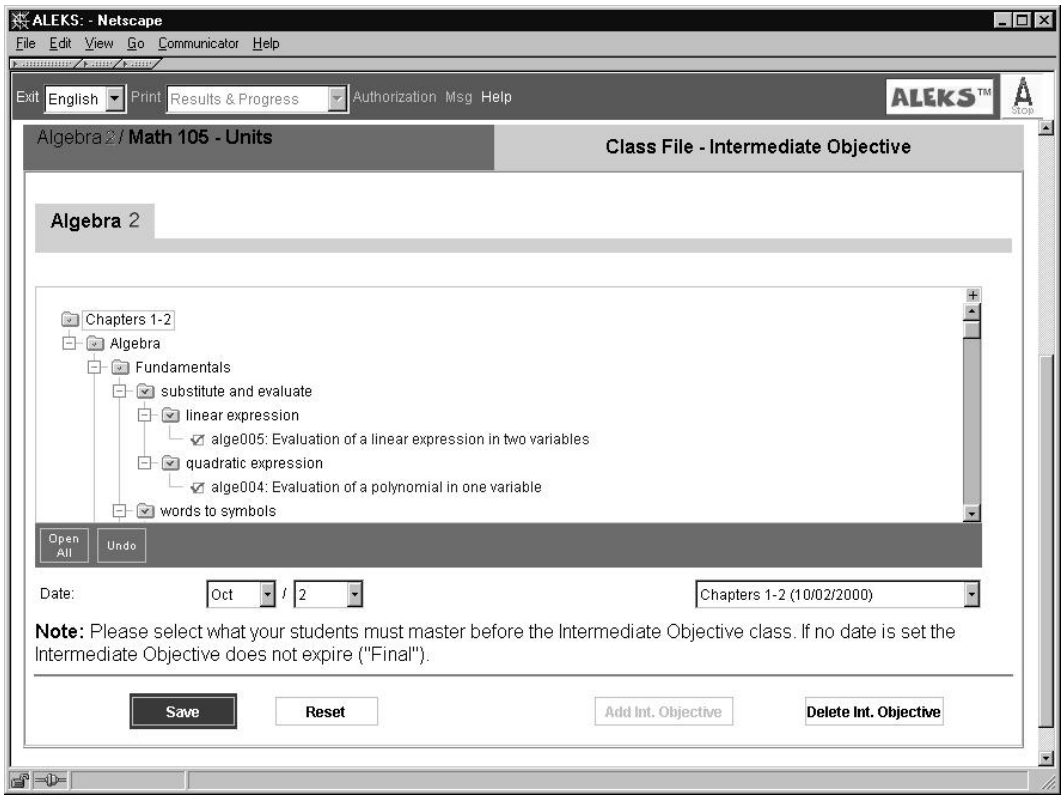


Figure 7.17: Intermediate Objectives (Advanced Teacher Module)

on the Options page (See Sec. 5.2.2).

## 7.22 Intermediate Objectives

The Intermediate Objectives feature was created to address the needs of teachers using **ALEKS** in conjunction with a planned sequence of topics for classroom instruction (See Figure 7.17). It enables teachers to prioritize certain groups of topics for specified segments of time, when these topics will be at the focus of class discussion. When intermediate objectives have been set, students will be directed to work on these objectives as soon as they are available in the domain and guided through their prerequisites in the most direct way possible.

To create or edit intermediate objectives, select the name of the class for which you would like to set or modify objectives and click "Edit." On the Edit page, click the tab marked "Advanced." On the page that follows, click "Edit Int. Objectives."

The page that follows shows you a list of any intermediate objectives currently set for your class (or a note that none is currently set) and buttons for adding

and copying intermediate objectives. The dates for existing intermediate objectives can be changed by using menus in the list and clicking "Update." If you wish to copy one or more intermediate objectives that have been set for another class or section, click "Copy Int. Objectives." Also, you can choose to prevent automatic assessments for students in this class for up to five items before fulfillment of your intermediate objectives. To create a new set of intermediate objectives, click "Add Int. Objectives," or click an existing set of intermediate objectives in the list to edit them.

Here you will see a vertically divided window. This window displays the topics available to be selected for the set of intermediate objectives. To view a single, scrolling list of topics, click on "Open All," then on the tiny "X" in the upper right-hand corner of the window. Select and unselect items for inclusion by clicking on and off the little checkmarks in the boxes that precede them.

**NOTE. ALEKS** always maintains the coherence of its intermediate objectives; any set of intermediate objectives must contain all of the items within the domain needed to learn the items it contains. If an item being added to the objectives has prerequisite items not currently also belonging to the objectives, these will be automatically added as well; conversely, if an item being removed from the objectives is a prerequisite item for some items presently in the objectives, these will also be removed. The editor warns when this is occurring (See Sec. 8.4.3).

Every set of intermediate objectives is assigned to a particular date, which is the date by which the students are to have completed this set of objectives. The date is set in a pair of menus directly below the selector window, one for month, one for day. The set of objectives will be in effect through the date to which it is assigned, after which the next set of objectives will take effect. If no date is assigned, the objectives will take effect following the last set of objectives to which a date has been assigned, and remain in effect to the end of the class ("final" objectives).

The name of a set of objectives appears at the top of the list of topics. Click on this name to edit it. When you have picked a name, selected topics, and set a date, click "Save" to enter the objectives into the system for this class.

When a set of objectives is in effect, both teacher and student will receive information about progress toward their fulfillment. The teacher will see notations on the Class Progress page indicating which students have fulfilled the current objectives, and which are close to doing so. The student will see dotted lines on their pie chart showing how far each slice will need to be filled in to achieve the current objectives. The teacher will see the same dotted lines when they view the pie charts for the class and for individual students.

When a student uses MyPie to choose a topic for work in the Learning Mode, the names of all items that student is "Ready to Learn" will pop out, just as they usually

do. Some of the items, however, may appear in gray rather than blue; these items are not available to the student (clicking on them has no effect) even though the student is ready to learn them, because they do not belong to the shortest possible path leading the student to fulfillment of the current objectives set by the teacher. They may become available to the student after the current objectives have been achieved.

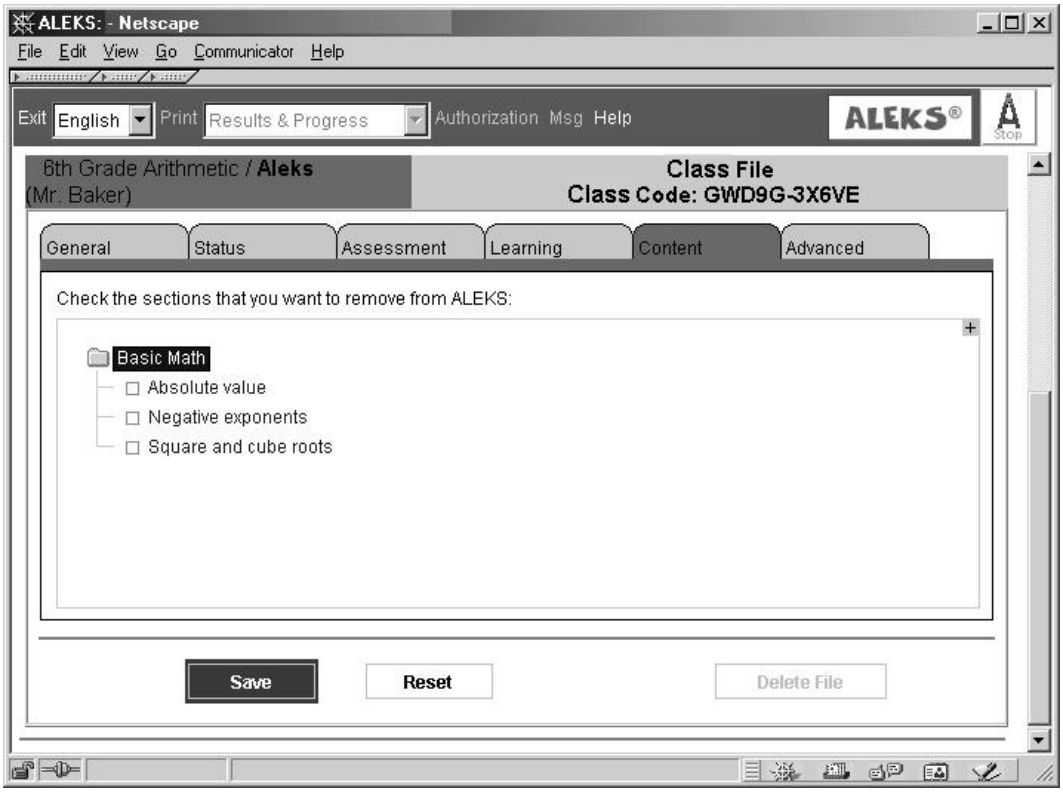


Figure 7.18: Content Editor

## 7.23 Content Editor

The **ALEKS** Content Editor is a quick and easy way to modify the content of a course (See Figure 7.18). Select the name of the course and click "Edit," then click on the tab for "Content." You will see a list of content areas, each preceded by a checkbox. To see what is contained in any of these areas, click on its title. To *remove* the area from the course, click on the checkbox to place an "x" in the box. This indicates that the area has been *removed* from the course content; it will also not appear in assessments. Then click "Save" to put your changes into effect, or "Reset" to undo them.

**NOTE.** The Content Editor is far more convenient, though somewhat less powerful, than the Course Objectives Editor (See Sec. 8.4). Keep in mind that while a course objectives created or modified by the Course Objectives Editor can be used by any number of classes within the school, the Content Editor acts on only one course at a time.

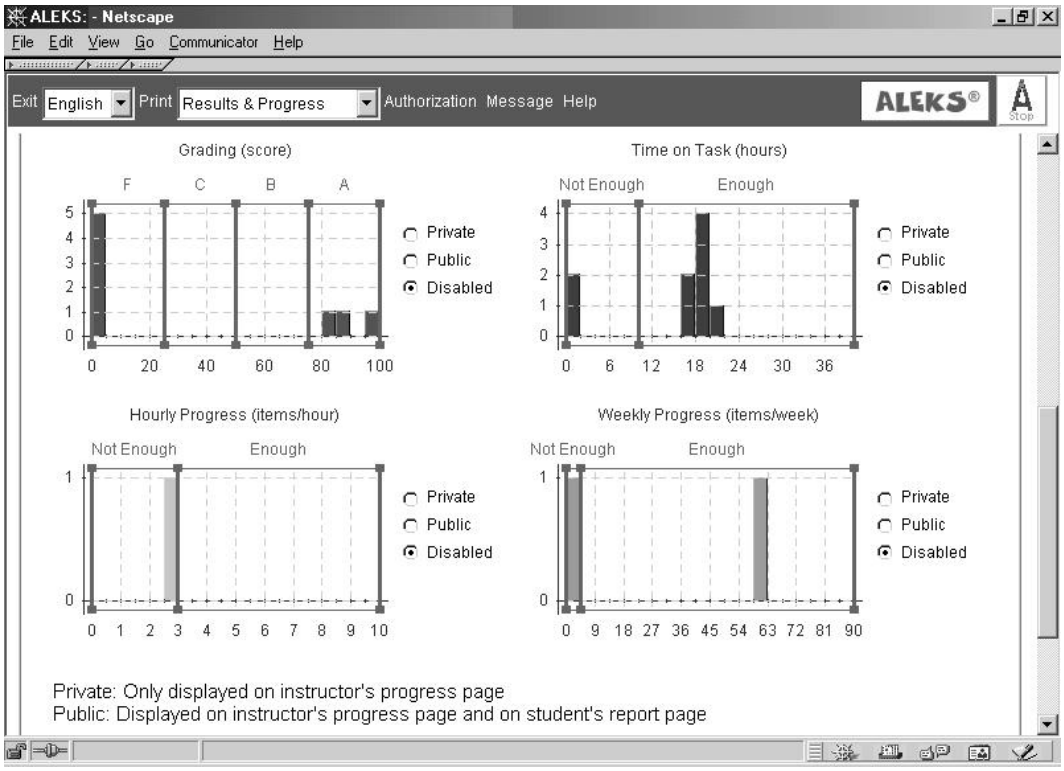


Figure 7.19: Assign Learning Rates (Advanced Teacher Module)

## 7.24 Assign Learning Rates

The purpose of the Assign Learning Rates feature in **ALEKS** is to provide teachers with a highly flexible tool for interpreting and evaluating the work of students in **ALEKS**. One possible use of the information provided by this feature is as a component in the grading system used for a class, or in some other method of motivation or reinforcement for student success.

In the Advanced Teacher Module, select the name of the class for which you wish to assign learning rates and click the "Progress" button. At the top of the Class Progress page you will see a link marked "Assign Learning Rates." Clicking on this link produces a page with four rectangular graphs (See Figure 7.19). Each of the graphs refers to a particular way of evaluating a student's work: by the percentage of course objectives that they have mastered (Grading), by the total number of hours spent on **ALEKS** (Time on Task), by the average number of items gained per hour (Hourly Progress), and by the average number of items gained per week (Weekly Progress). The vertical bars appearing in the graphs indicate the distribution of students relative to the given scales. Any combination of these scales may be used. The three buttons to the right of each graph determine the use of the evaluation: if

"Disabled," no one sees it; if "Private," the teacher sees it but the students do not; if "Public," the teacher sees it and each student sees it for their own work.

Each graph has sliders, with labels referring to the intervals they define. Additional sliders may be placed by dragging the right-hand or left-hand sliders, or sliders may be removed by dragging them off to the right or left. The sliders may be set and the labels edited as the teacher desires. To change the label on a new or existing slider, select the text of the current label, retype as desired, and then press "Return."

The function of the sliders is as follows: a student's evaluation on a given scale is the label of the interval within which that student is currently located. For example, if one slider is set to 80 on the "Grading" graph and another slider to 90, with the interval between them labeled "B," a student who has mastered 82% of the class goals will have the evaluation "B." To take another example, if a slider under "Time on Task" has been set to 10 hours and another to 20 hours, with the label for their interval set to "Enough," a student who has spent 11 hours on **ALEKS** will receive the evaluation "Enough." When the desired settings have been made, click "Save." Now the labels set to "Private" will appear in the Progress page.

If any of these charts are set to "Public" the students will see their ratings according to those charts when they log on to **ALEKS**. Explain carefully to the students what the meaning is of the notations that they will see, and how they relate to the overall goals for the class. Some charts, such as Weekly Progress, may be more useful to the teacher than to the students, as an aid to monitoring students' work and learning. These should be set to "Private."

**Variable Scale.** By default, the segments into which values are divided in the "score" graph are at 5-unit intervals. This can be reset to 2 units for greater precision, using a link in the lower right-hand part of the page.

# Chapter 8

# Advanced Teacher Module: Standards & Course Objectives

By default, the Advanced Teacher Module displays "Results & Progress," as described in the preceding sections (See Chapter 7). A second mode, "Standards & Course Objectives," can be chosen from the menu at the top of the Advanced Teacher Module window (See Figure 8.1). This mode enables the teacher to explore the system of standards and course objectives currently available in their **ALEKS** database. Administrators with a sufficiently high level of user privilege may also copy course objectives and standards, and modify them to suit the needs of a school.

The "course objectives" are a set of concepts taken from the sum total of concepts defining mastery of a domain (e.g., Arithmetic or Algebra) that has been set as the curricular goal for a particular level of study. That is to say, mastery of this set of concepts is equivalent to completion of the curriculum for that level, and all reports generated by the system for students and classes using the course objectives are framed in terms of these course objectives. A "standard" is a collection of sets of course objectives covering a range of grades, such as might be published by a government educational authority.

To view a particular standard or set of course objectives, use the directories window of "Standards & Course Objectives." This will open the folder for a particular grade within a particular standard. Normally the course objectives will be organized by topics and subtopics using standard mathematical terminology. There is a list of individual concepts within each of these topics, each of which is either marked with a checkmark, indicating that it belongs to the set of course objectives, or not so marked. Editing a new standard means adding and removing checkmarks from individual "items" according to some scheme of curricular progress.

**NOTE.** The course objectives selected for use by particular classes in **ALEKS** do not affect the system's assessment, which is always conducted over the entire

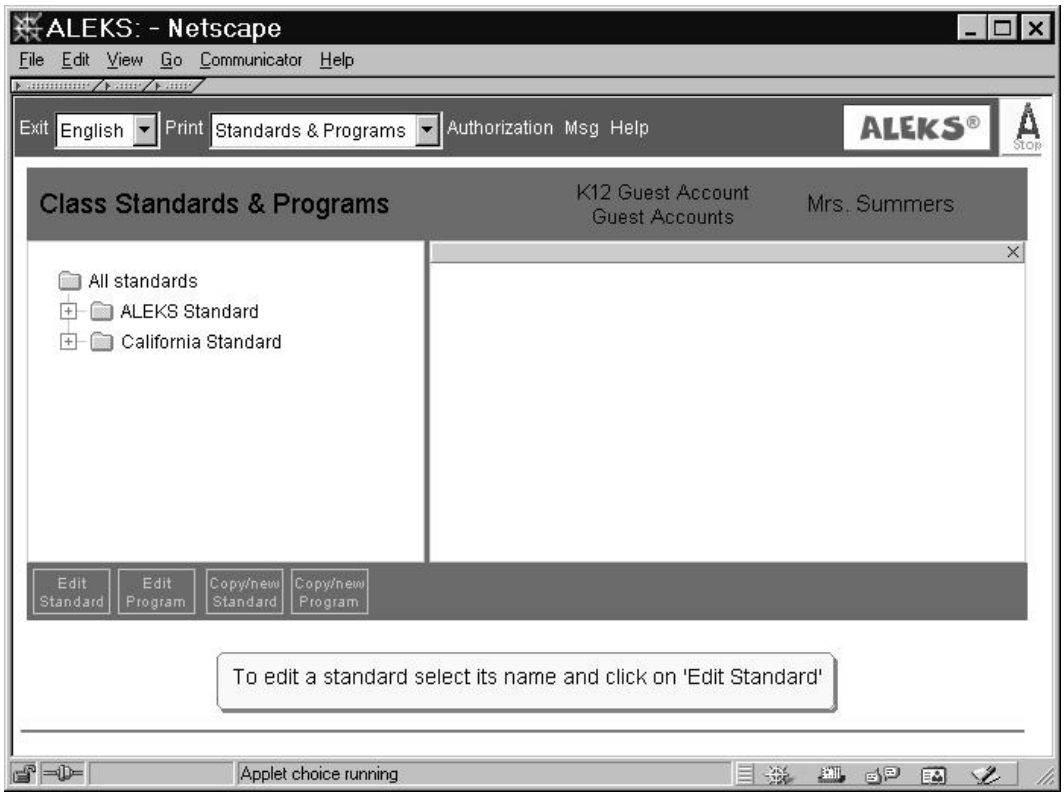


Figure 8.1: The Standards & Course Objectives Directory (Advanced Teacher Module)

domain.

## 8.1 Items, Course Objectives, and Standards

In order to understand and use this part of the Advanced Teacher Module effectively, it is necessary to grasp three key concepts. Additional information can be found in the discussion of Knowledge Space theory (See Chapter 9).

**Item**

An item is a fundamental unit of knowledge or ability recognized by the system. An example of an item in Arithmetic is "Subtraction of Negative Integers." Every mathematicalsubject covered by **ALEKS**(such as Arithmetic) corresponds to a set of items, each of which can be tested and taught by the system. Mastery of the subject means mastery of each of the items making up the subject.

**Course Objectives**

Course objectives are a subset of the set of items belonging to a mathematical subject that has been defined as the goal for a particular class. For example,

course objectives for Arithmetic are a set of items that students completing the class are expected to master. All assessment reports by the **ALEKS** system are based on some course objectives selected by teachers or administrators for use by those students. The **ALEKS** Course Objectives Editor is provided to permit teachers and administrators to customize existing course objectives (See Sec. 8.4).

**Standard**

A standard is a set of sets of course objectives, usually covering the entire range of grades over which a particular subject is taught. A standard should organize the teaching of a subject in a coherent and methodical way. That is, items belonging to the course objectives for one grade should belong to the course objectives for higher grades, and items should be distributed among the course objectives according to some well-founded pedagogical rationale. A standard may be published by some social or governmental educational authority, or it may be created by a school or teacher for special purposes.

Under "Standards & Course Objectives," users of the Advanced Teacher Module can navigate through a hierarchical listing of the standards currently available and the course objectives contained by them. Standards and course objectives can be copied. Users with appropriate levels of privilege can enter the Course Objectives Editor to create new course objectives based on existing ones, possibly leading to the creation of new standards.

## 8.2 Navigation and Use

Access to directories under "Standards & Course Objectives" is the same for all levels of user privilege, teacher and above. Any user of the Advanced Teacher Module may navigate through all directories and make copies of all available standards and course objectives. Users, however, may change only those standards and directories which they have themselves created (by copying existing ones), or those created by users within their authority. This means, for a root administrator, any administrator or teacher under their administration; for a school administrator, it means any teacher in the school. A user not within the authority of another given user has independent authority. Standards and course objectives created by a user with independent authority may not be changed. The privilege level of a particular user also determines where the new standards and course objectives created by that user will be placed.

- On choosing "Standards & Course Objectives," the user begins with a master directory entitled "All Standards," containing a list of all the standards available for that system (See Figure 8.1).

- On opening any of the listed standards, the user is presented with a list of the grades covered by that standard.
- On opening any of the grades listed for the given standard, the user will see a list of the (mathematical) subjects covered for that grade. At a minimum, there will be an element entitled "Basic." Each element in this list corresponds to course objectives available within the system.

## 8.3 Buttons

The following buttons appear next to and beneath the navigation display in "Standards & Course Objectives" (See Figure 8.1). The buttons are always visible; which buttons are active at any given moment depends on what is selected in the navigation display.


**Edit Standard**

The selected standard must have been created (copied from another standard) by the current user or by one within the authority of the current user. The basic standards included with **ALEKS** and course objectives created by users with independent authority cannot be changed, but they can be copied and the copies changed.

A standard is defined by designating its name, source (authority), and an optional ID number. The "Enabled" button must be selected if the standard is intended for use.

**Edit Course Objectives**

This will open the selected set of course objectives for modification in the Course Objectives Editor (See Sec. 8.4). The selected set of course objectives must have been created (copied from another set of course objectives) by the current user or by one within the authority of the current user. Course Objectives belonging to the basic standards included with **ALEKS** and course objectives created by users with independent authority cannot be changed, but they can be copied and the copies changed.


**Copy/New Standard**

If a standard is selected, this will make a copy of that standard, usually for the purpose of establishing a new one based on it. If no standard is selected, it creates a new, empty one.

**Copy/New Course Objectives**

If a set of course objectives is selected, this will make a copy of that set of course objectives, usually for the purpose of establishing a new one. If no set of course objectives is selected, it creates a new, empty one. If a new standard has been created, the new course objectives will be placed here.

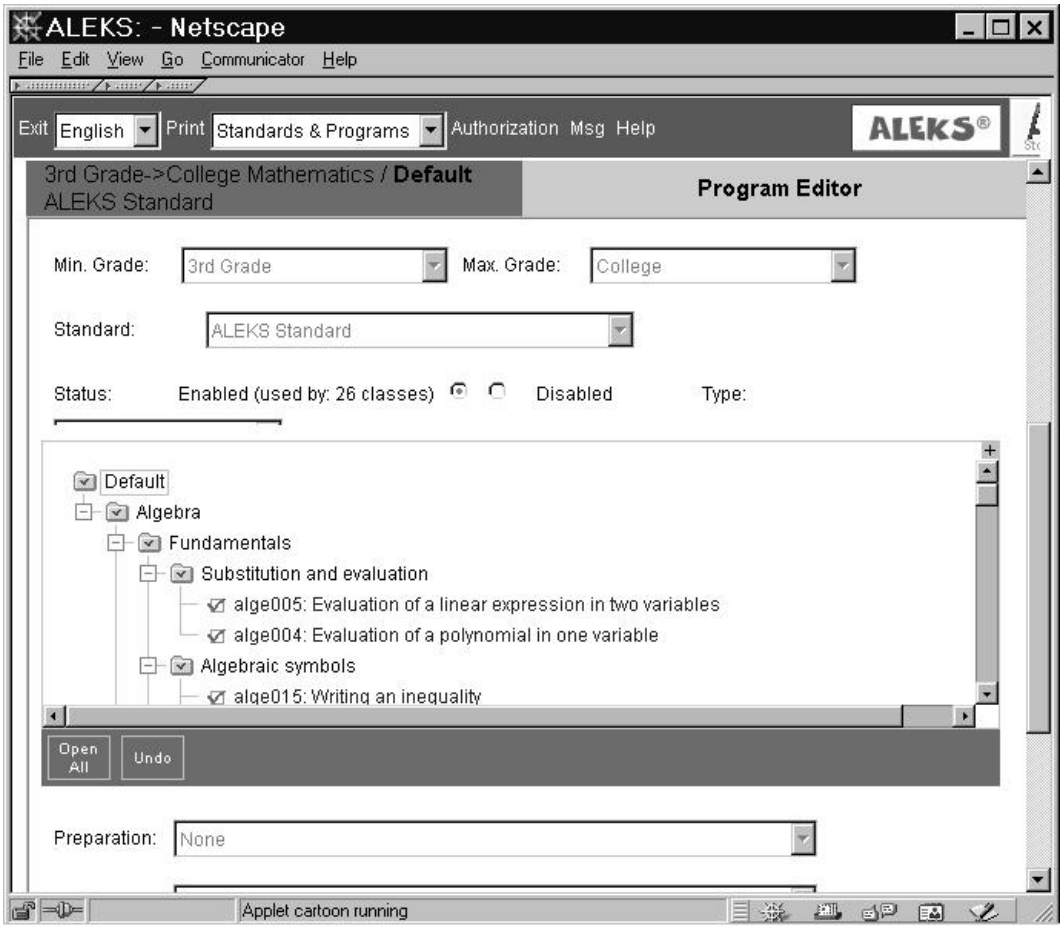


Figure 8.2: The Course Objectives Editor (Advanced Teacher Module)

**Drag and drop.** The course objectives may be copied between folders by dragging and dropping them. Simply select the names of course objectives to be copied in the right-hand side of the directories window and drag them to the target folder on the left. You will see the target folder become highlighted when the course objectives are ready to "drop."

## 8.4 Course Objectives Editor

In order to make changes to course objectives that have been copied, users must select the new set of course objectives and click on the "Edit Course Objectives" button (or double-click on the icon for that set of course objectives). This gives access to the **ALEKS** Course Objectives Editor for that set of course objectives. Although the Course Objectives Editor is always entered under the heading "Standards & Course Objectives," it has its own, distinctive interface appearing beneath

the "Standards & Course Objectives" directory.

The Course Objectives Editor displays items for the given subject, organized in folders by general topic. To see items you must open all folders in which they are contained. Items are labeled by name and topic, and indicate whether or not they belong to the current course objectives by a checkmark (See Figure 8.2). If a new set of course objectives is created by copying another set of course objectives, precisely the same items are selected in it as in the original. If the set of course objectives is created from scratch, no items in it are selected.

**NOTE.** If a folder is marked with a large checkmark, this means that all items in that folder currently belong to the course objectives. A small checkmark means that some of the items in that folder belong to the course objectives. No checkmark means no items in that folder belong to the course objectives.

Clicking on the tiny "x" in the upper right-hand corner of the directory window creates a single window and makes it possible to view all the items at once (click on "Open All").

### 8.4.1 Fields

The following fields appear above and below the editor display, and should be filled in as needed in creating or editing a set of course objectives.

**Standard**

The standard to which this set of course objectives belongs.

**Status**

Should be set to "enabled" if the course objectives are to be available for use.

**Parser**

The name of the person creating or modifying the course objectives (and so responsible for selection of items). To parse in this sense means to establish functional relationships between all elements of a sequence; the parser is making all items for the subject either members or nonmembers of the set of course objectives.

**ID**

Optional identification number.

### 8.4.2 Buttons

The following buttons also appear adjacent to the editor display.


**Open All**

Shows all folders in the editor display. This gives a complete picture of the topical structure of the subject matter.


**Undo**

Undoes the most recent editing action (the addition or removal of an item).

### 8.4.3 Using the Course Objectives Editor

To define a set of course objectives, the teacher must first ascertain which of the items in the complete list of items making up the subject matter are to belong to this set of course objectives. This should be a thoughtful decision, usually made within an appropriate institutional framework. If a particular source is used for defining a set of course objectives, the source should be recorded in the standard containing the new course objectives, and should be documented externally as justification for the decision to adopt the given course objectives. If the class is part of a sequence, the course objectives for the other classes in this sequence will normally be defined together with it as part of a single progression.

Once the list of items to be included has been established, the teacher responsible for editing the course objectives examines each of the displayed items. There should be a checkmark before each item to be included, and no checkmark before items that are not to be included. A checkmark is added or removed by clicking once on the checkbox. Following this, click on the "Save" button to record the course objectives.

**NOTE. ALEKS** always maintains the coherence of its course objectives; any **ALEKS** course objectives must contain all of the items within the domain needed to learn the items it contains. If an item being added to the course objectives has prerequisite items not belonging to the course objectives, these will be automatically added as well; conversely, if an item being removed from the course objectives is a prerequisite item for some items presently in the course objectives, these will also be removed. The Course Objectives Editor warns when this is occurring.

# 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

An exposition of Knowledge Space Theory is not intended here, nor is one necessary for the purposes of this manual. Knowledge Space Theory is expressed in a mathematical discipline often referred to as "Combinatorics." The Bibliography contains a number of references for those interested in further details (See Sec. 9.3). 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 Arithmetic or Algebra 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 Arithmetic uses dots standing for items

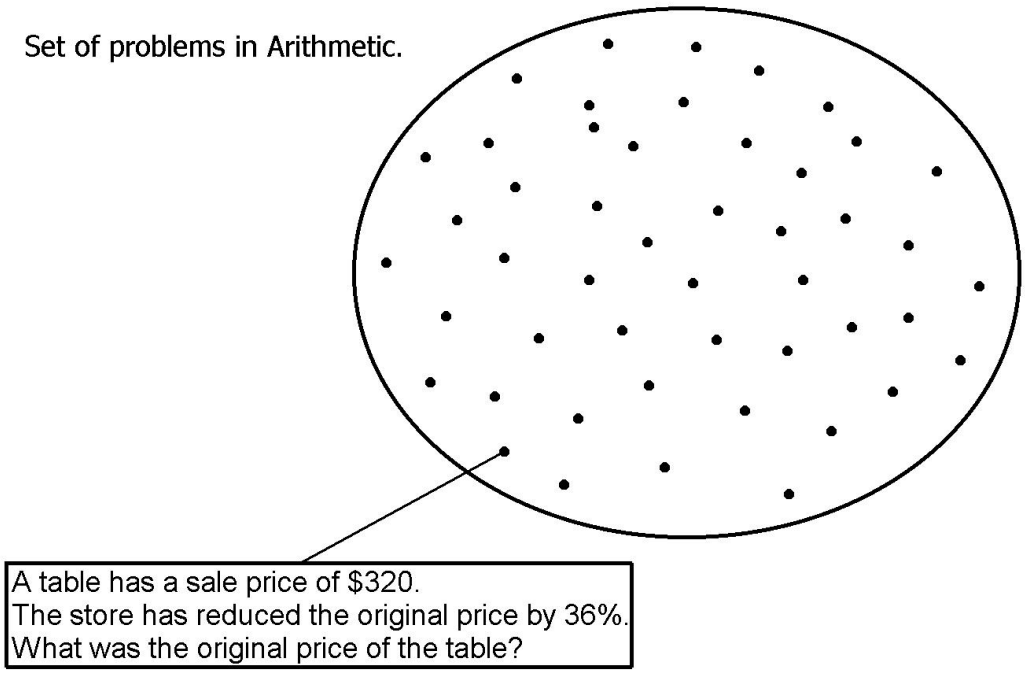


Figure 9.1: Domain of Arithmetic

(See Figure 9.1). One of the items, which might be entitled "Word Problem with Percentages," is indicated by a line. The problem in the rectangle is an *instance* of that item.

Each item, or problem type, has dozens, sometimes hundreds, of instances. In **ALEKS**, the domain of Arithmetic is made up of about one hundred items, ranging from two-digit addition (without carry), to negative exponents. Algebra has a domain containing around two hundred items. Full mastery of the domain 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 very systematic, painstaking consultation with teachers. 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 essential in the particular academic discipline.

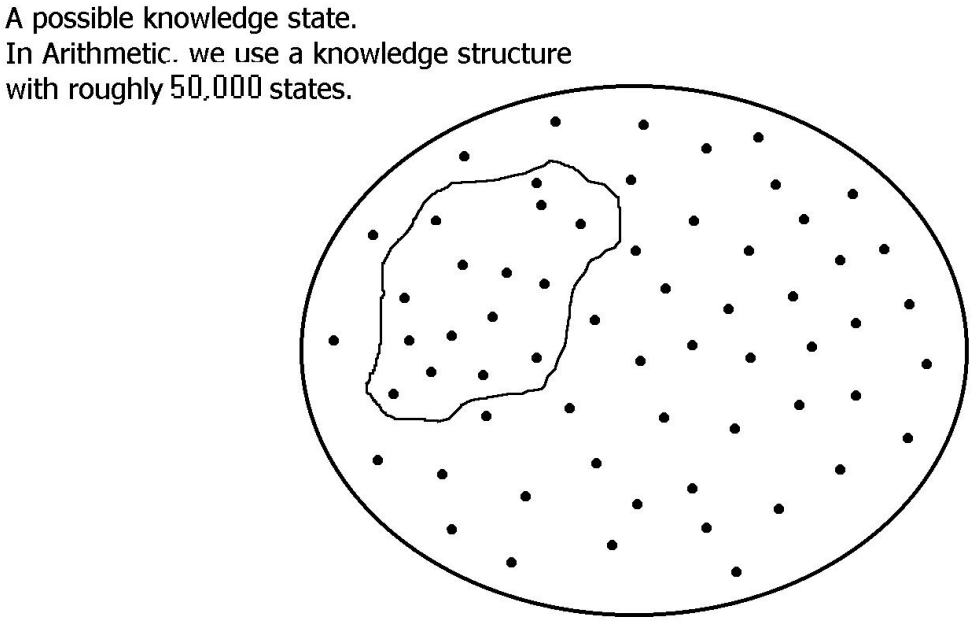


Figure 9.2: Knowledge State

### 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 (See Figure 9.2). This means that the student is not working under time pressure, is not impaired by emotional turmoil of any kind, 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.) In general, an individual's knowledge state is thus not directly observable, and has to be inferred from the responses to the questions.

### 9.2.3 Knowledge Structures and Knowledge Spaces

It should be intuitively 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*. In the current implementation of **ALEKS**

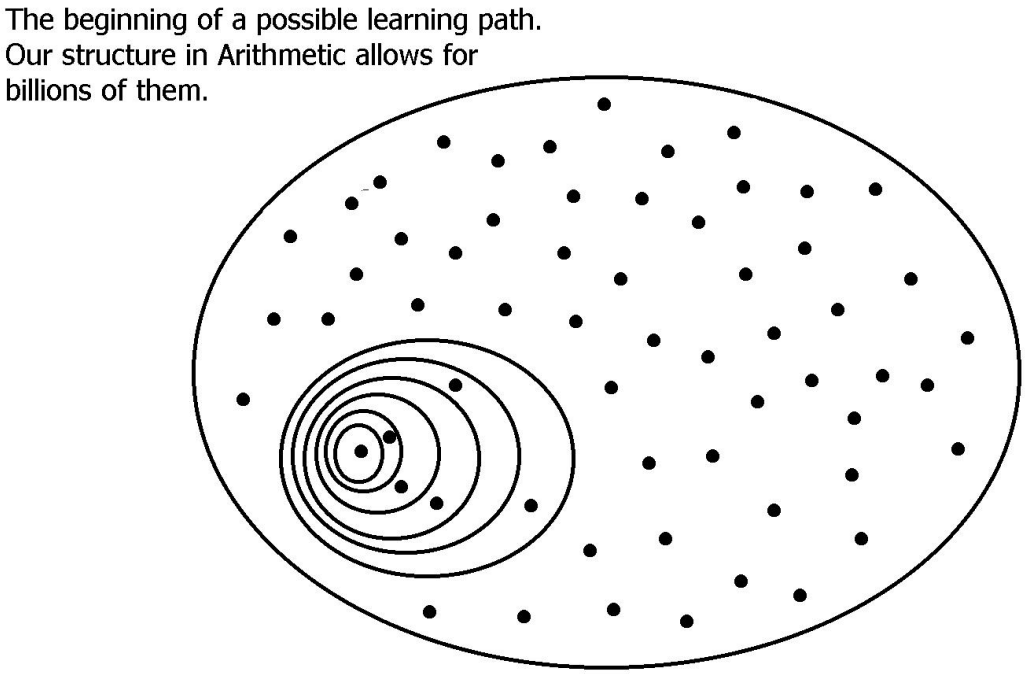


Figure 9.3: Learning Path

for Arithmetic, the number of feasible knowledge states is approximately 50,000. Thus, the knowledge structure for Arithmetic contains approximately 50,000 knowledge states. In order to assess a student in Arithmetic, **ALEKS** must find out by efficient questioning which of these 50,000 states the student is in. This large number of states means that there are many possible ways of acquiring knowledge, i.e., many learning paths (See Figure 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 elegantly from any misconceptions. 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.

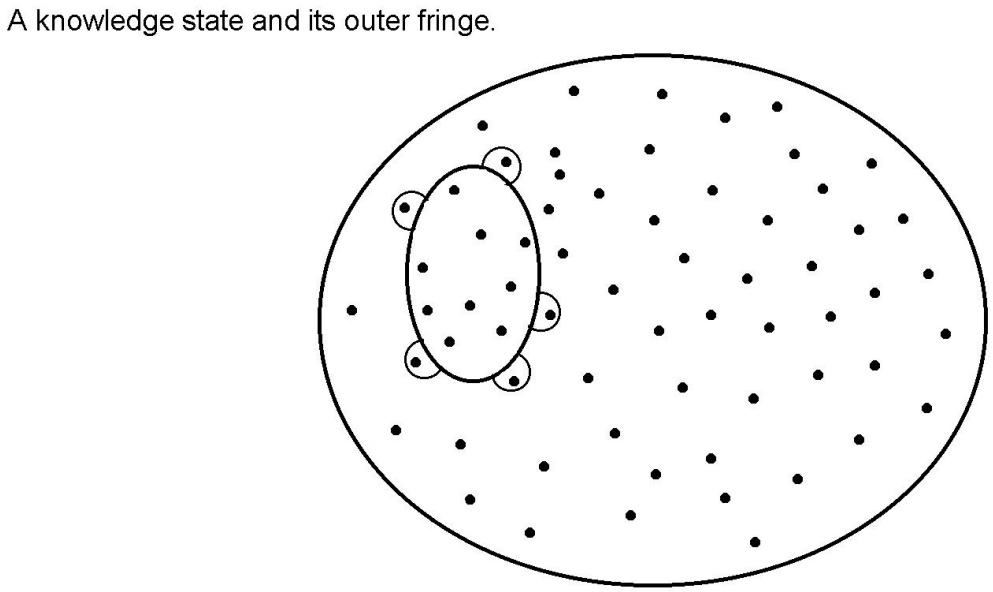


Figure 9.4: Outer Fringe of a Knowledge State

### 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 $K$. More precisely, 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 (See Figure 9.4). Typically, the outer fringe of a knowledge state will contain between one and a few 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 $K$ (See Figure 9.5). The *inner fringe* of a state $K$ is thus defined as the set of all items 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.

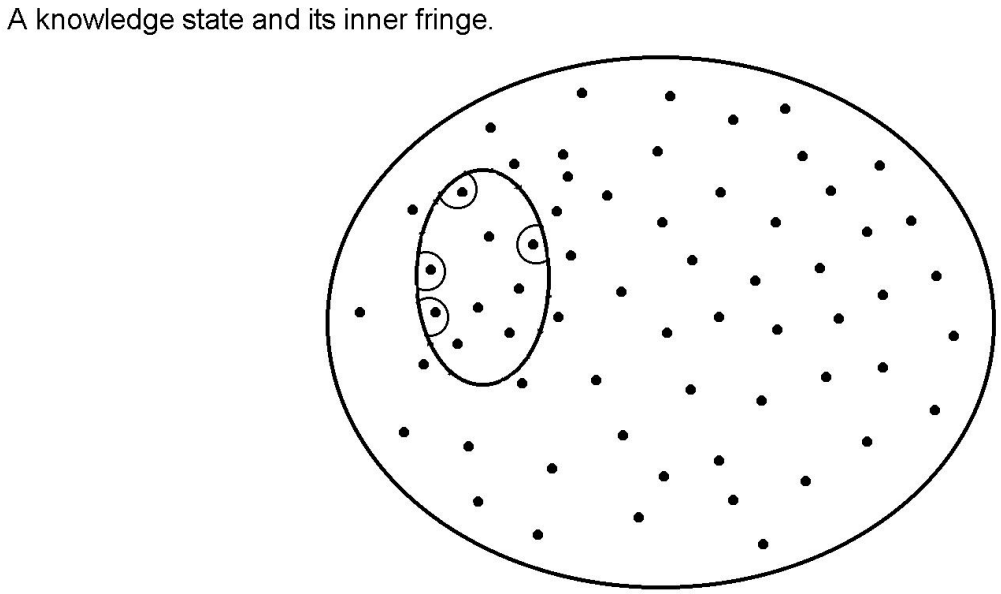


Figure 9.5: Inner Fringe of a Knowledge State

### 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 commonsensical. 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 a 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 quite accurately in a relatively short time. In Arithmetic, for example, approximately 15–25 questions often suffice.

Finally, it should be noted that the assessment report given to students, teachers, 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 comprehensive treatment of Knowledge Space Theory can be found in Doignon & Falmagne, *Knowledge Spaces* (Springer-Verlag, 1999).

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# Chapter 10

# Frequently Asked Questions

## 10.1 General

**What is ALEKS?**

**ALEKS** is the new way to learn math on the World Wide Web. By knowing exactly which math concepts the student has mastered, which are shaky, and which are new but within reach, **ALEKS** enables the student to work on those concepts the student is most ready to learn. **ALEKS** is a full-time automated tutor, including explanations, practice and feedback. **ALEKS** closely interacts 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 World Wide Web, its rigorous and comprehensive educational content, and its class-management module for teachers 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. This means that the students are given neither material that they have already mastered nor material that they are not well suited to work on yet because some prerequisites have yet to be learned.

**ALEKS** is a self-contained learning environment, with complete sets of practice and explanatory units needed for the subjects that it covers. The materials of **ALEKS** are fully correlated with Glencoe Mathematics textbooks; detailed information on these correlations is available in Appendix B. There is an online student mathematics dictionary accessed by clicking on underlined mathematical

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 teachers, **ALEKS** offers a complete administrative and monitoring facility through which individual and group progress can be checked, standards can be 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 *Teacher Module*, in which teachers and administrators are able to monitor student progress and carry out administrative functions, and the *Administrator Module*, which permits management and monitoring of an arbitrary number of separate institutions, such as those making up a school district. There is also a Tutorial (which students take once when first registering with the system), online help, a mathematics Dictionary, 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 a school, at home, or anywhere else. Very little technical preparation must be done to use the system. All you need is a self-installing, self-maintaining "plugin" obtained directly from the **ALEKS** website for K-12 Education. No disks, CD's, peripherals, or backup facilities are required. All data is kept on the ALEKS Corporation server.

## 10.2 Technical

**What are the technical requirements for using ALEKS?**

**[Sec. 3.2]** The following table presents the technical requirements for **ALEKS** in summary form:

| | PC | Macintosh |
|---|---|---|
| Operating System | Windows 95/98/2000/ME/XP/NT4.0+ | MacOS 7.6.1+ |
| Processor | Pentium 133+ MHz (166+ preferred), Pentium II+ | |
| RAM Memory | 32+ MB | 32+ MB |
| Browser | Netscape 4.5-4.8, 6.0+, Explorer 4.0+ | Netscape 4.5-4.8 (6.0+, Explorer 5.2+ OS X only) |
| Modem Speed | 28+ kbps | 28+ kbps |

Your browser should be configured with Java enabled. Both Netscape and Internet Explorer usually ship with Java. You can also install Sun Microsystems' Java® VM, version 1.4.1+, which can be obtained from Sun.

Note that any of the kinds of direct connection (cable, ISDN, DSL) that are 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 LAN administrator, system administrator, or lab technician to install the **ALEKS** plugin.

If you have America Online 4.0 you will have to upgrade to America Online 5.0 or higher in order to use **ALEKS**. You can upgrade from AOL.

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

The **ALEKS** website for K-12 Education provides complete information on the **ALEKS** system, including a Quick Tour, Guest registration, licensing, history and theory, and technical support.

http://www.k12.aleks.com

## 10.3 Theory

**What is the theory behind ALEKS?**

**[Chapter 9] [Sec. 9.3] ALEKS** is based on a field of Cognitive Science (Mathematical Psychology) called "Knowledge 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 & Falmagne, *Knowledge Spaces* (Springer-Verlag, 1999).

**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 Arithmetic. 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 state changes in time, and the goal of learning is that it 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 be shaky.

**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 extensive, computer-aided querying of expert teachers. 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 mathematical 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 mathematics; rather, it is compatible with any pedagogical approach.

## 10.4 Assessments & Reports

**What is an ALEKS assessment?**

[**Chapter 4**] An assessment by the **ALEKS** system consists of a sequence of mathematical problems posed to the student. The answers are in the form of mathematical expressions and constructions produced by the system's input tools (no multiple choice). The student is encouraged to answer "I don't know" where this is appropriate. 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 numerical values. The length of the assessment is variable, between 15 and 35 questions. There are no time constraints, but many assessments can take less than a half-hour and few more than an hour. Students taking an assessment need to have paper and pencil. Calculators are not permitted in assessments for Arithmetic, but simple calculators without graphing or symbolic functions are permitted for Algebra. 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 the **ALEKS** system. It is highly advisable that all assessments from which the teacher uses data in any way (such as for placement) take place under the teacher's supervision. At a minimum, the initial assessment must 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 corresponds to the student's current knowledge. The assessment is probabilistic, so that it is not fooled by 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) 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

(often resulting from lack of concentration) 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 one or more pie charts. 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. Where classes are being taken in sequence, there may be pie charts showing the previous and/or subsequent classes in that sequence. (Experience shows that in such cases learning goes on at different curricular levels simultaneously, so multiple charts are indispensable.)

An extremely important aspect of the pie charts is their 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 charts in an Assessment Report and are also given through the pie charts themselves. When the mouse pointer is placed over a slice of the pie, a list pops out showing the concepts that the student is most "ready to learn" in that part of the curriculum (there may be none). Clicking on any of these concepts takes the student into the Learning Mode to work on it.

The pie charts are displayed following assessments, after a concept has been worked on in the Learning Mode, and 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 most "ready to learn." This number may vary between two and a dozen, depending on what part of the structure is involved.

## 10.5 Learning Mode

**What is the Learning Mode?**

[**Chapter 5**] The Learning Mode in **ALEKS** contains features to help students practice and master specific mathematical 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 mathematical 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 time has been spent in the Learning Mode, or after a certain amount of progress has been made, the student will be reassessed automatically unless the teacher has already requested a new assessment.

**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

**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 teacher. We recommend scheduling regular lab sessions with **ALEKS**, totalling a minimum of three hours per week, as part of your class requirements. Not every lab session need be supervised by the teacher, but the initial assessment certainly should be. Any other interim and concluding assessments scheduled specially by the teacher normally should also be supervised.

This having been said, 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 teachers on the best way to use **ALEKS** with their students.

**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 it says, 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** plugin. Most of the time, however, the lab administrator will need to assist with installation in order to overcome security obstacles (for excellent reasons, school computer labs tend to prevent students from installing their own software). In a few cases, the presence of a "firewall" or other security measures may require some work 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?**

**ALEKS** is designed to be used with any course objectives, curriculum, or textbook. The topics available in **ALEKS** are correlated with relevant sections of Glencoe Mathematics textbooks (See Appendix B). The fundamental idea of the **ALEKS** system is to allow students to pursue individualized paths to mastery of the subject matter. For this reason teachers may very commonly find their students learning material that has not yet been covered in the class. This should be regarded as a sign of the system's effective use.

**Does ALEKS have special features for educators?**

**[Chapters 6, 7, 8]** Students' use of **ALEKS** and their progress toward mastery can be monitored using the facilities of the Teacher Module. The Teacher Module (called Administrator Module when it includes more than one school) also enables teachers and administrators to establish the course objectives and standards used by **ALEKS**, to configure accounts, to find statistics on school district use, and to exchange messages. A teacher or administrator who has been registered with **ALEKS** enters the Teacher Module immediately upon login.

**What are Results & Progress? What are Standards & Course Objectives?**

There are two parts of the Teacher Module, "Results & Progress" and "Standards & Course Objectives." The former is by far the more commonly used. It contains information on system use and progress by students and groups, as well as all necessary facilities for account and database management. The latter is used strategically, to define the standards and course objectives that will be used over extended periods of time by schools. Actions taken in "Standards & Course Objectives" should be the outcome of well-considered school district decisions.

**How does ALEKS define standards and course objectives?**

**[Chapter 6, 8]** In **ALEKS**, course objectives are a set of items belonging to a domain that is determined to be the goal for mastery in a particular class. The course objectives are, if not equivalent to the entire domain, are defined by selection of a particular subset of the domain. This is done in the Course Objectives Editor by adding and removing checkmarks next to the names of items. A "Standard" in **ALEKS** is a group of sets of course objectives considered to constitute a logical, integrated sequence.

**How can I use ALEKS Corporation Customer Support?**

**[Sec. 11]** You can contact ALEKS Corporation using the information in Chapter 10 of this manual. We request that this information not be given to students. Students should approach their teacher first with any questions or problems regarding the use of **ALEKS**. Questions the teacher is unable to answer can then be brought to our attention.

# Chapter 11

# Support

**NOTE. Troubleshooting information is found in Appendix A.10 of this Teacher's Guide. Most problems can be resolved using this brief reference.**

Current information on **ALEKS** is available at the **ALEKS** website for K-12 Education:

http://www.k12.aleks.com

Technical support and consultation on the effective use of **ALEKS** is provided to educators by Glencoe / McGraw-Hill Customer Support. Please contact us by email:

epgtech@mcgraw-hill.com

by telephone:

**(800) 282-4123**

or by fax:

**Toll Free (866) 508-7666, Local (614) 430-6311**

In reporting problems and seeking support, please make a photocopy of the form provided and gather complete information as a preliminary to contacting us (See Sec. 11.1). This will help us to resolve any difficulties as quickly and completely as possible. Teachers should have their students fill out these forms for problems that occur in accessing **ALEKS** from home. In many cases the information provided by students should enable teachers or school administrators to resolve the problems

themselves. If this is not possible, the teacher should contact Glencoe / McGraw-Hill Customer Support with all relevant information.

**NOTE.** We ask that students using **ALEKS** not contact us directly, but approach their teachers first. It is hoped that the information in this *Teacher's Guide* will enable teachers 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
K-12 Customer Support
400 North Tustin Avenue, Suite 300
Santa Ana, CA 92705

## 11.1 Form for Reporting Problems

**Please use the following form to gather information before reporting a problem:** (Make a copy to avoid writing in the book.)

**Customer Support FAX Toll Free (866) 508-7666, Local (614) 430-6311**

**USER** (K-12 Education)

Name: _____ Telephone: _____ Email: _____
School: _____ Teacher: _____ Class: _____
Best time to call: _____

**COMPUTER ON WHICH PROBLEM OCCURRED** (App. A.2)

Computer make and model name or number: _____
Processor type and speed (MHz): _____ RAM (MB): _____
Connection: Modem ☐ Speed: _____
Cable ☐ DSL ☐ ISDN ☐ Other: _____ ☐
Browser: Netscape 4.5 ☐ 4.6 ☐ 4.7 ☐ ____ ☐
Internet Explorer 4.____ ☐ 5.____ ☐ ____ ☐
AOL 4.____ ☐ 5.____ ☐ ____ ☐
Other: _____
Operating System: Windows 95 ☐ 98 ☐ _____ ☐
Windows NT 4.0 ☐ _____ ☐
MacOS 7.____ ☐ 8.____ ☐ ____ ☐
Other: _____

**WHERE PROBLEM OCCURRED** (App. A.10)

(URL used to access **ALEKS**: _____ )
1. going to the **ALEKS** website (App. A.3) ☐
2. installing the plugin (App. A.3,A.7) ☐
3. logging on to **ALEKS** (App. A.3,A.6) ☐
4. using **ALEKS** in:
   Registration (App. A.3) ☐ Tutorial (App. A.4) ☐
   Assessment (App. A.5.1) ☐ Report (App. A.5.2) ☐
   Learning Mode (App. A.5.3) ☐

**PRECISE ERROR MESSAGE (if any):**

**DESCRIPTION OF PROBLEM:** (Recurrent? Yes ☐ No ☐ )

My technical proficiency: Beginner ☐ Intermediate ☐ High ☐

# Appendix A

# ALEKS Student User's Guide

## A.1 Preface

Welcome to **ALEKS**! You are about to discover one of the most powerful educational tools available for learning mathematics. Combining advanced learning technology with the flexibility of the World Wide Web, the **ALEKS** system provides a "smart" interactive tutoring system with unmatched features and capabilities. Richly supplied with illustrations and reference materials, **ALEKS** constantly challenges you and supplies extensive feedback on what you have accomplished. **ALEKS** will always help you select the ideal topic to work on now. That way you learn concepts in the order that's best for you. **ALEKS** provides individualized, one-on-one instruction that fits your schedule. It is available wherever you access the Web.

**ALEKS** was developed with support from the National Science Foundation. It is based on a field of Mathematical Cognitive Science called "Knowledge Spaces." The purpose of research in Knowledge Spaces is to model human knowledge of any subject for quick and precise assessment by interactive computer programs.

The **ALEKS** system is self-explanatory and includes online instructions and feedback. This booklet contains basic information to help you begin using **ALEKS**. Teachers using **ALEKS** with their classes are provided with a Teacher's Guide containing complete information on the system's operation. They should be able to answer any questions beyond those dealt with in these pages.

**NOTE. ALEKS is designed for use without help from a manual. Your teacher will assist you in registering with the system and beginning to use it. If questions arise, or if you want to learn more about ALEKS, use this Guide. It is intended as a convenient and concise reference.**

**Only registered users can keep an account on ALEKS. (Anyone may try the system as a guest.) Two or more persons cannot use the same**

**ALEKS account. The system will regard them as a single person and give incorrect guidance.**

## A.2 Technical Requirements

**PC Requirements**

You can use **ALEKS** on any PC with a Pentium or equivalent (AMD, etc.) processor of 133 MHz or more (166+ MHz preferred) or any Pentium II, III, or later processor. At least 32 MB of RAM are required. Your operating system must be Windows 95 / 98 / 2000 / ME / XP / NT4.0 or higher.

The following popular web browsers are compatible with **ALEKS** on PCs: Netscape Communicator 4.5-4.8, 6.0 or higher, Internet Explorer 4.0 or higher.

**Macintosh Requirements**

**ALEKS** can be used on a PowerMac or iMac with at least 32 MB of RAM. If your operating system is MacOS 7.6.1 or higher, you can use Netscape Communicator 4.5-4.8. If your operating system is MacOS X or higher, you can also use Netscape Communicator 6.0 or higher and Internet Explorer 5.2 or higher.

**Internet Access**

**ALEKS** is used over the World Wide Web. You must have an Internet connection by dialup modem (at least 28k) or any other kind of access to the Internet (cable, ISDN, DSL, etc.).

**America Online Subscribers**

If you have America Online 4.0 you will have to upgrade to America Online 5.0 or higher in order to use **ALEKS**. You can upgrade from AOL.

## A.3 Registration & Installation

**Before You Begin.** In order to register as an **ALEKS** user you need a **Class Code** provided by your teacher. When you register with the **ALEKS** system your name is entered into the database and records of your progress are kept. If the **ALEKS** plugin has not been installed on the computer being used for registration, it will be installed automatically as part of this procedure.

**Step 1.** Go to the **ALEKS** website for K-12 Education by typing in the following address:

http://www.k12.aleks.com

**NOTE.** If you are typing this URL by hand, pay careful attention to the spelling "aleks." Also, the other **ALEKS** websites you might find using a search engine will


Figure A.1: The **ALEKS** Website for K-12 Education

not work for you. You will be able to register *only* at the address given above.

For your convenience, add a "Bookmark" or "Favorite" at this location. This is the site where you will log in to your account.

**Step 2.** Click on "Register with ALEKS" (See Figure A.1).

**Step 3.** You will see instructions for students and teachers registering with **ALEKS**. Click on "Register" where it says "For Students" (on the left-hand side).

**NOTE.** If you do not have a current plugin, 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) and open your Web browser again. Then go back to the **ALEKS** website for K-12 Education (use your Bookmark/Favorite). Return to Step 1, above, to begin registration.

**Step 4.** At the beginning of registration you will be asked for your **Class Code**. It is provided to you by your teacher. Enter the Class Code in the spaces provided and click on "Next" (See Figure A.2).


Figure A.2: Class Code

**Step 5.** Answer the questions to complete your registration. Among other questions, you will be asked to enter your email address. 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. (Both email and Student ID are optional information.)

**Step 6.** At the end of registration you will be given a Login Name and Password. Write these down and keep them in a safe place. You will need them to return to the system (See Sec. A.6). Your Login Name is not the same as your name. It usually consists of the first letter of your first name plus your whole last name run together, with no spaces or punctuation. Thus "Jane Smith" may have the Login Name "jsmith"; if there is more than one "Smith" in the database whose first name begins with "J," a numeral will be appended, as "jsmith2." You can change your password at any time (See Sec. A.5.5).

**NOTE.** 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 but you did enter your email address in **ALEKS**, click on the link underneath the Password field on the **ALEKS** home page ("Did you forget your password?").

**Step 7.** You will need to wait for your teacher's authorization before starting to use your new account. If you need to log off now, you can log back on later using your Login Name and Password. As soon as your teacher authorizes your registration, you will be able to start using **ALEKS** by beginning the Tutorial.

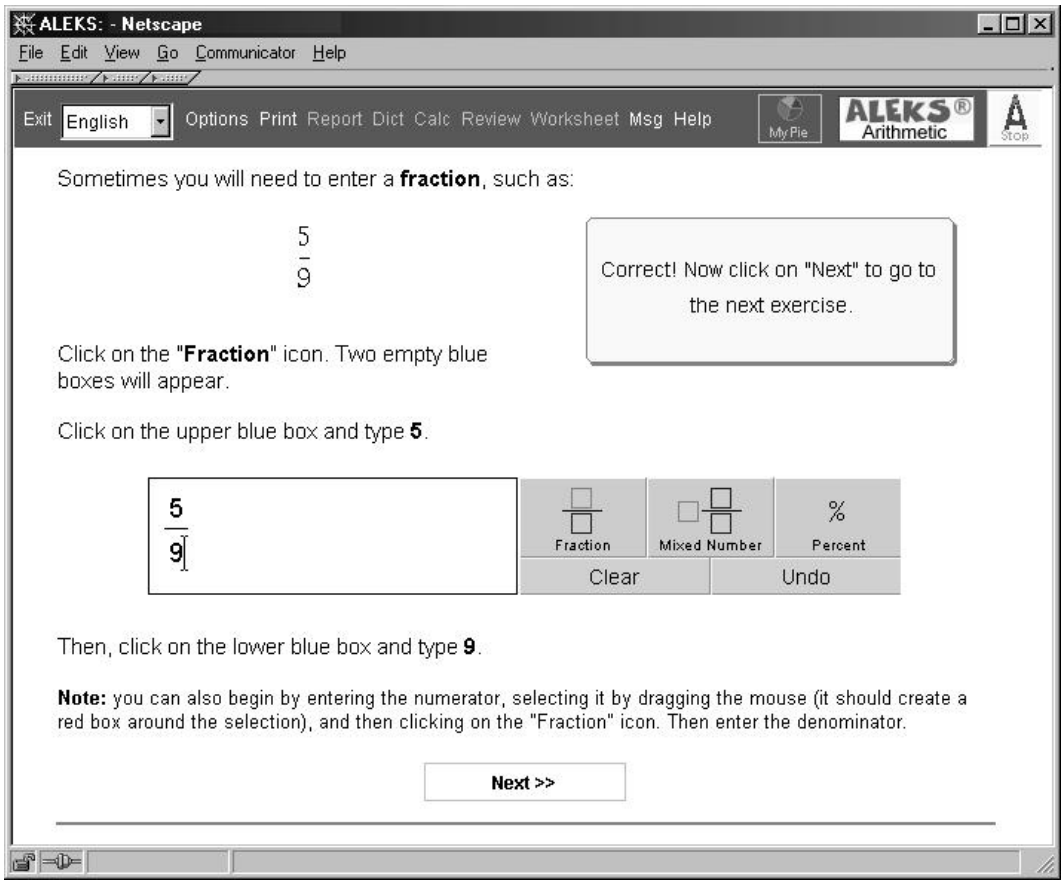


Figure A.3: The Answer Editor (Tutorial)

## A.4 Tutorial

The **ALEKS** system does not use multiple-choice questions. All answers are mathematical expressions and constructions. After registration, the **ALEKS** Tutorial will teach you to use the simple tools needed for your class (See Figure A.3). There is plenty of feedback to help you complete it successfully.

**NOTE.** The Tutorial is not intended to teach mathematics. It just trains you to use the **ALEKS** input tool (called the "Answer Editor"). The correct input is always shown, and you simply enter what you see. Online help is also available while you are using **ALEKS** by clicking the "Help" button, which gives you access to the sections of the Tutorial (See Sec. A.5.5).

## A.5 Assessments and Learning

### A.5.1 Assessments

Instruction through **ALEKS** is guided by precise understanding of your knowledge of the subject. This information is obtained by assessments in which the system asks you to solve a series of problems. (The system's estimate of your knowledge is also updated when you make progress in the Learning Mode.) Your first assessment occurs immediately after the Registration and Tutorial.

**NOTE.** Your teacher 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 teacher wants you to take it.** Additional assessments may be scheduled for you by the teacher. These may or may not need to be supervised, depending on the teacher's preference. The **ALEKS** system also prompts "automatic" assessments when you have spent a certain amount of time on the system or have made a certain amount of progress.

### A.5.2 Results

Assessment results are presented in the form of color-coded pie charts. Slices of the pie charts correspond to parts of the course objectives. The relative size of the slices represents the importance of each topic for the course objectives. The solidly colored part of a slice indicates how close you are to mastering that part of the course objectives.

**NOTE.** You may see more than one pie chart displayed following an assessment when you are progressing through a series of classes or units. (Your knowledge in the previous and/or subsequent units is also displayed.)

### A.5.3 Learning Mode

Following the presentation of assessment results, the system will display a combined pie chart ("MyPie"). This pie chart shows the entire course objectives through the end of your current class (See Figure A.4). 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. The system will help you in seeking to master that concept and "add it to your pie."

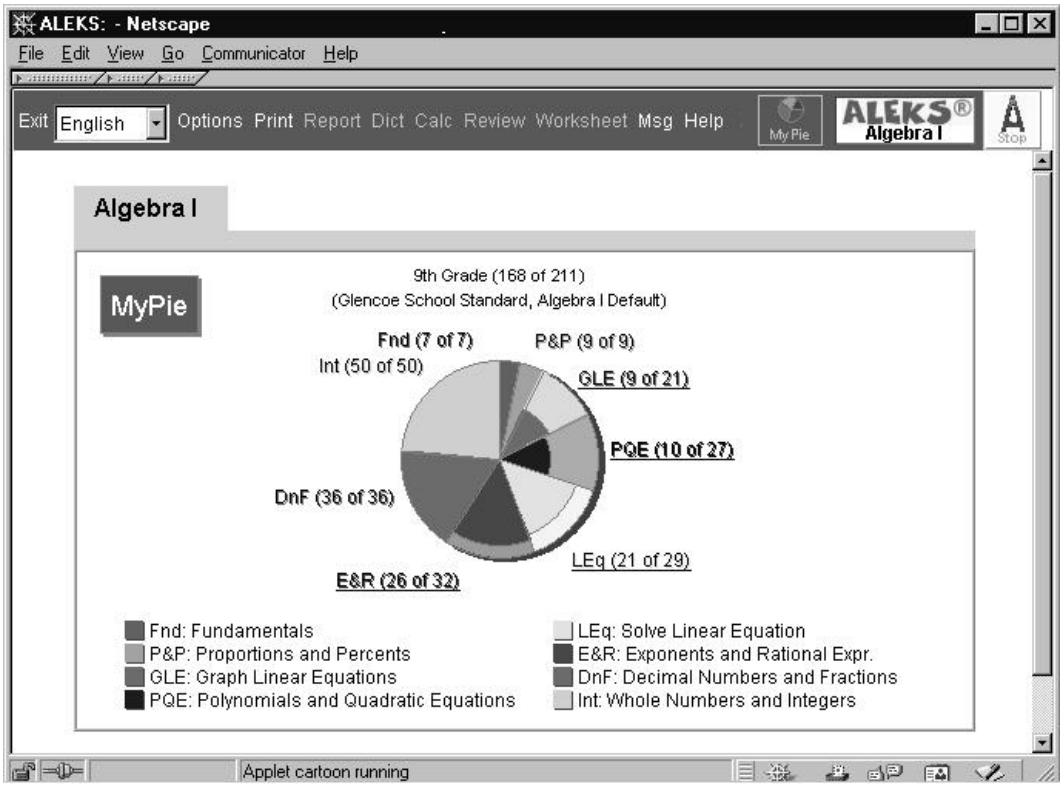


Figure A.4: Assessment Report

### A.5.4 Progress in the Learning Mode

In the Learning Mode, you are given practice problems based on the chosen topic. You also get explanations of how to solve this kind of problem and you get access to a dictionary of mathematical concepts. Underlined mathematical terms are links to the dictionary. Click on any term to get a complete definition. The system will require a number of correct answers before it assumes that you have mastered the concept. Then it "adds it to your pie." At this 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 this topic and wish to choose another, click on "MyPie" near the top of the window. This will make you exit the topic and you will get the pie chart for a new choice. If you make repeated errors on a given concept, the system will conclude that the concept was not mastered. It will offer you a new choice of more basic concepts.

**NOTE.** Let **ALEKS** do its job! It is normal to have trouble mastering new concepts the first time around. When this happens, the system responds by revising its view of your knowledge and offers new choices. Keep in mind that the system does not "drill" you on concepts it believes you already know. The concepts presented as

most "ready to learn" are always those just at the edge of your current knowledge. These are the topics you are completely prepared to learn.

### A.5.5 Additional Features

All buttons described below are available in the Learning Mode. In the Assessment Mode, only the "Options," "Exit," and "Help" buttons are active.


**Options**

If you want to change your Password, click on the "Options" button. This page also shows the total number of hours you have spent using **ALEKS**.


**Report**

Any time you wish to look at your assessment reports, click on "Report." Choose any date from the menu and click "Graph."


**Dictionary**

To search the online dictionary of mathematical terms, click "Dictionary."


**Review**

To review past material, use the "Review" button.


**Worksheet**

To print out an individualized homework sheet based on your most recent work in **ALEKS**, use the "Worksheet" button.


**Quiz**

To see the results of quizzes you have taken in **ALEKS** or to begin a quiz assigned to you by your teacher, use the "Quiz" button.


**Messages**

Your teacher can send you messages via **ALEKS**. You see new messages when you log on. You can also check for messages by clicking on the "Message" button. Your teacher can choose to let you reply to messages as well.


**Help**

For online help with the use of the Answer Editor, click "Help."


**MyPie**

Clicking "MyPie" gives you a pie chart summarizing your current mastery. You can use this pie chart to choose a new concept.

## A.6 Logging on to Your Account

**Step 1.** You always log on from the **ALEKS** website for K-12 Education:

http://www.k12.aleks.com

Use the "Bookmark" or "Favorite" for this site if you made one (See Sec. A.3). Remember that you may find other **ALEKS** websites via a search engine, but this is the only one with your account.

**Step 2.** On the login page enter the Login Name and Password provided at the time of registration (See Sec. A.3, Step 5). Be sure to type these correctly, without any spaces or punctuation.

**Step 3.** If you enter your Login Name and Password correctly, your browser will begin accessing the plugin to start **ALEKS**. This takes a few seconds. You will then come to the place you left off in your previous **ALEKS** session.

**NOTE.** If you forget your Login Name or Password, use the link on the **ALEKS** home page marked "Did you forget your password?" If you entered an email address at registration time and you remember your Login Name, your password will be sent to you by email. Otherwise, contact your teacher. It is a good idea to change your Password to one you will remember easily but is difficult for others to guess (See Sec. A.5.5).

## A.7 Installation on Additional Machines

**Before You Begin.** Installing **ALEKS** means installing the **ALEKS** plugin. This is the software used by your web browser to access and run **ALEKS**. You can access your **ALEKS** account from any computer that meets the technical requirements and has had the **ALEKS** plugin installed. You cannot use **ALEKS** without the **ALEKS** plugin that is installed over the World Wide Web.

**Step 1.** Go to the **ALEKS** website for K-12 Education:

http://www.k12.aleks.com

Add a "Bookmark" or "Favorite" at this location.

**Step 2.** Use your Login Name and Password to log in (See Sec. A.3, Step 5).

**Step 3.** When you log on to **ALEKS**, the system will automatically check to see if your system is compatible and if you have the most recent version of the **ALEKS** plugin. If you do not have a current plugin, it will download the plugin and ask your permission to install. After you grant permission, it will install the (new) plugin. Do not interrupt the installation process until a message appears stating that the installation is complete and asks you to restart your browser. 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 for K-12 Education (use your Bookmark/Favorite).

## A.8 Guidelines for Effective Use

**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, nor receive any help during assessments. Not even explanations or rephrasing of problems are permitted. If you receive help, the system will get a wrong idea of what you are most ready to learn, and this will hold up your progress. If you think you don't know the answer, click "I don't know." (Don't guess!)

**Learning Mode**

You should learn to use the special features of the Learning Mode, especially the explanations and the mathematical dictionary. A button marked "Ask a Friend" may also appear from time to time. Clicking on this button will prompt the system to suggest the name of a classmate who has mastered the concept.

**Regular Use**

Nothing is more important to your progress than regular use of the system. Three hours per week is a recommended minimum.

## A.9 Frequently Asked Questions

**What are the rules for taking an assessment in ALEKS?**

[**Sec. A.8**] You must have paper and pencil when taking an assessment in **ALEKS**. For Arithmetic, no calculator is permitted. For Algebra, you should also have a simple calculator with no graphing or symbolic functions. A basic calculator is part of **ALEKS**. No help whatsoever is permitted, not even to the extent of rephrasing a problem. During the assessment, you are not told if your answer is right or wrong. In the Learning Mode, however, you are always told if you make a mistake, and often what that mistake was. *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 progress possible toward mastery.

**How do I add concepts to my pie?**

[**Sec. A.5.4**] 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 says I still 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. That is, 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 category if I haven't filled in that category yet?**

[**Sec. A.5.3**] You are completely "ready to learn" a set of concepts or skills when you have mastered all the prerequisite concepts or skills that they demand. To take an elementary 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, they have prerequisites you have not yet mastered. For this reason, your pie chart may show that you have only mastered 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 you have 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 become "available."

**What is the difference between "Explain" and "Practice"?**

When you begin working on a particular concept in the Learning Mode, you will be shown the name of the concept, a sample problem, and a choice between "Practice" and "Explain." If you think you know how to solve the problem, click "Practice." You will be given a chance to solve the same problem that was initially displayed. If you are not sure, click "Explain" to produce an explanation of how to solve the displayed sample problem. At the bottom of the Explanation page you have the "Practice" button, and sometimes other options for more detailed explanations and help. 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, click the "MyPie" button on the **ALEKS** menu bar.

**How does the Learning Mode help me learn?**

[**Sec. A.5.4**] In the Learning Mode, do your best to solve the problems that are offered you. Do not lightly change topics or stop before the system tells you that you are done or suggests

choosing another concept. Get to know the features of the Learning Mode, especially the explanations and the Dictionary. 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. Pay attention to this feedback and be sure you understand it.

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 practice problems?**

**ALEKS** creates both Assessment and Practice problems 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 the case of applied problems) differing in other ways as well. With **ALEKS**, you cannot "learn the test" or "teach to the test."

**What happens if I don't learn a concept (or get tired of working on a concept)?**

[**Sec. A.5.4**] You must answer what the system judges to be an appropriate number of Practice problems correctly to add a concept to your pie. If you make mistakes, you must answer more. **ALEKS** will always tell you when you have mastered the concept. You cannot make this decision for yourself. If you wish to stop working on a concept and choose another one, you can click on "MyPie." It is usually better to do your best to master the concept you are working on, unless the system tells you to switch. If you are clearly not making progress, **ALEKS** will suggest that you choose something else to work on.

**Why is ALEKS giving me things we haven't done in the class or that are too hard?**

[**Sec. A.5.4**] The most common reason that problems seem too difficult is that you received some help in the assessment, and **ALEKS** has an incorrect estimate of your actual knowledge. The problem, however, corrects itself as soon as you stop getting help. When you fail to master several concepts, **ALEKS** will quickly bring you back to a more comfortable place.

Remember that **ALEKS** is designed to give you material that you are ideally prepared to learn. It will not "drill" what has already been mastered, except in the sense that old knowledge is continually being exercised in the acquisition of new knowledge. **ALEKS** has no idea what you have done or are doing in class from one week to the next. In **ALEKS** you follow an individualized path through the curriculum that is produced by your own learning and your own choices.

**Why is ALEKS giving me a new assessment?**

[**Sec. A.5.1**] New assessments are automatically prompted by **ALEKS** when you have spent sufficient time in the Learning Mode or when you have made adequate progress. Your teacher may also request an assessment for you personally, or for everyone in the class. In this case it may be stipulated that the assessment must be taken at school. (If you attempt to work at

home when an assessment has been ordered to be done at school, **ALEKS** will deny access and tell you that you need to log on from school.)

**How can I get a new assessment in ALEKS?**

You cannot initiate a new assessment. **ALEKS** or your teacher must make the request.

**Why do I need to take a Tutorial to use ALEKS?**

[**Sec. A.4**] The Tutorial is a brief interactive training program that teaches you to use the **ALEKS** input tools, or "Answer Editor." **ALEKS** does not use multiple-choice questions. Rather, it requires that answers be given in the form of numbers, mathematical expressions and geometrical and other constructions. 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, 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 was 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?**

The icon buttons are used to enter mathematical symbols and to create forms for mathematical expressions. In some cases the keyboard equivalents for icon buttons can be used.

**Why doesn't anything appear when I type?**

[**Sec. A.10**] In order to type input in the Answer Editor you must first click on a blue box. Each blue box in the input area corresponds to a mathematical expression. When you click on an icon button for a complex expression, it may place more than one blue box in the space, one for each part of the expression. Each blue box must be filled in for a complete expression. For instance, when you click on the "Exponent" icon button, you get two blue boxes. The big one is for entering the base, and a smaller one that is raised and to the right is used to enter the exponent.

**How do I get help while using ALEKS?**

[**Sec. A.5.5**] You can get help using the Answer Editor by clicking the "Help" button on the **ALEKS** menu bar.

**Can my teacher or friend help me (or can I use a calculator) in the Learning Mode?**

[**Sec. A.8**] 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. As a general rule, you can get help with one Practice problem, but you should solve the others yourself.

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 (See Sec. A.5.5).

**Why are some of the words I see underlined?**

[**Sec. A.5.5**] Underlined words in the Learning Mode are links to the online mathematics dictionary. Click on any underlined word to see its definition. You can also access the Dictionary by clicking the "Dictionary" button on the **ALEKS** menu bar. The Dictionary is not available during assessment.

Note that the Dictionary is opened in a new window. When you are finished reading the definition, close or "Minimize" the window, and you will see the previous screen. Clicking "Back" on the browser won't work.

**What is the "Ask a Friend" button for?**

[**Sec. A.8**] 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 mastered the concept and may be able to help you.

**How can I change my Password?**

[**Sec. A.5.5**] You can change your Password by clicking the "Options" button on the **ALEKS** menu bar.

**How can I review material I have already worked on?**

[**Sec. A.5.5**] Click on the "Review" button to work on material you have already spent time on.

**How can I see the reports from previous assessments?**

[**Sec. A.5.5**] To see any of your assessment reports, click on "Report" (on the **ALEKS** menu bar).

**How can I choose a new topic to work on?**

[**Sec. A.5.5**] To see your current pie chart and choose a new concept in the Learning Mode, click on "MyPie" (on the **ALEKS** menu bar), move around on the pie, and choose.

**How can I print something in ALEKS?**

[**Sec. A.10**] To print the contents of the screen, click "Print" on the **ALEKS** menu bar. This produces a new, printable window (**ALEKS** output is not normally printable). Depending on your browser, you may also have to click the browser's "Print" button. When you are done, close the new window.

**What do I do if it's taking too long for a new page to load (or if the program freezes)?**

[**Sec. A.10**] 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, your first step is to click on the small "A" button at upper right. If this doesn't work, click your browser's "Reload" or "Refresh" button. If this doesn't work, close your browser and restart it. In extreme cases use Ctrl-Alt-Delete (Cmd-Opt-Esc on Macintosh). You will come back to the exact place you left off after you log back on.

**How do I exit the ALEKS program?**

To leave **ALEKS**, click the "Exit" button on the **ALEKS** menu bar or simply close your browser. **ALEKS** always remembers where you left off and brings you back to that place.

**Why do I have to log on to ALEKS?**

[**Sec. A.1**] The fact that **ALEKS** is used over the World Wide Web means that you can access it from your school or from home. As a registered user of **ALEKS**, you have an account on the server that contains a record of all the work you have done. Your teacher and administrators at your school have access to these records. They can monitor your progress and use of the system as well as carry out administrative functions. Web access also means that there is almost no maintenance or technical preparation required—no disks, CDs, peripherals, or backup procedures.

**What if I have a question or problem using ALEKS?**

If you have a question or problem using **ALEKS** that is not answered here, contact your teacher. Your teacher has been provided with extensive information on the operation of **ALEKS** and should be able to answer almost any question you may have.

**What if I forget my Login Name or Password?**

If you forget your Login Name or Password, use the link on the **ALEKS** home page marked "Did you forget your password?" If you entered an email address at registration time and you remember your Login Name, your password will be sent to you by email. Otherwise, contact your teacher.

## A.10 Troubleshooting

**Login Not Successful**

First of all, be careful to type your Login Name and Password correctly, with no spaces or punctuation. Then, be sure you have accessed the **ALEKS** K-12 website. There is more than one **ALEKS** website, and only the one at which you registered contains your account. Use the URL provided in this booklet rather than looking for "aleks" via a search engine.

**Typed Input Does Not Appear**

If you have trouble entering numbers or symbols in the Answer Editor, be sure that you have

clicked on a blue box and that the pointer is within the answer area (the rectangle containing the blue boxes).

**NOTE.** It is not always possible to use the number keys on your keyboard's right-hand "keypad" (check that "Num Lock" has been pressed).

### Mixed Number Difficulties

The Answer Editor is easy to use. One warning, however: 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, one of the following three actions may help (try them in the order given):

1. click on the small "A" in the upper right-hand corner of the **ALEKS** window;
2. click on your browser's "Reload" (or "Refresh") button;
3. 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 all else fails).

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 teacher.

### Lengthy Assessment

It is impossible to know how many questions will be asked in an assessment. The number of questions asked does not reflect your knowledge of the subject matter. It may reflect the consistency of your effort or concentration.

### Reduction of Pie Chart

You may observe a loss of concepts in your pie chart either in the Learning Mode or following an assessment. This is not a malfunction in the system, but results from errors made by you on material you had previously seemed to master. 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 (bad mood, distractions, etc.), does not reflect your actual knowledge. **ALEKS** will quickly bring you back to where you belong.

### Problems Too Difficult

It is important to keep in mind that **ALEKS** will not offer concepts that it considers you to have already mastered. Rather, it presents material that you are currently most ready to learn. When the system gives problems that are too hard, the reason is often that you received help or guidance during the assessment or in the Learning Mode. This situation will

soon correct itself if you have difficulty with the proposed concepts. The system will revise its estimate of your knowledge and offer concepts that you are more ready to learn.

**Repeated Final Assessments**

You may need to take more than one final assessment even after you have filled in your pie (in the Learning Mode). This is normal, since mastery is determined by the assessment, not by the Learning Mode. The system needs to confirm (in the assessment) that the entire curriculum has been mastered.

**Printing Problems**

To print **ALEKS** output (for instance, an Assessment 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

# Correlations of ALEKS Objectives to Glencoe Mathematics Textbooks

## B.1 Arithmetic

| ALEKS Objective | MAC 1[1] | MAC 2[2] | MAC 3[3] | Pre-Alg.[4] |
|---|---|---|---|---|
| **Whole Numbers** | | | | |
| Add Two 2-Digit Numbers Without Carry (arith001) | Prerequisite knowledge | | | |
| Add 2-Digit Numbers With Carry in Sentence Format (arith011) | Prerequisite knowledge | | | |
| Add 2-Digit Numbers With Carry (arith050) | Prerequisite knowledge | | | |
| Add 2-, 3-, and 4-Digit Numbers With Carry (arith012) | Prerequisite knowledge | | | |
| Estimate a Sum by Rounding (arith101) | 1-3 | | | |
| Find the Perimeter of a Polygon (geom009) | 9-4 | 7-6 | | 13-4 |

[1]**MAC 1 = Glencoe** *Mathematics: Applications and Connections, Course 1*
[2]**MAC 2 = Glencoe** *Mathematics: Applications and Connections, Course 2*
[3]**MAC 3 = Glencoe** *Mathematics: Applications and Connections, Course 3*
[4]**Pre-Alg. = Glencoe** *Pre-Algebra: An Integrated Transition to Algebra and Geometry*

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| | | | | |
| Find the Perimeter of a Rectangle (geom015) | 4-4, 4-4B, 9-4 | 7-6 | 1-8 | 3-5 |
| Multiply a 2-Digit Number by a 1-Digit Number Without Carry (arith003) | Prerequisite knowledge | | | |
| Multiply a 2-Digit Number by a 1-Digit Number With Carry (arith004) | Prerequisite knowledge | | | |
| One-Digit Multiplication (arith008) | Prerequisite knowledge | | | |
| Multiply a 3-Digit Number by a 2-Digit Number With Carry (arith014) | Prerequisite knowledge | | | |
| Find the Area of a Rectangle (geom018) | 4-4, 4-4B | 1-7A, 1-7 | 1-8 | 3-5 |
| Find the Area of a Figure Composed of Rectangles (geom089) | 10-1A, 10-6 | 10-5 | | 13-4 |
| Find the Volume of a Rectangular Solid (geom030) | 10-5, 10-6B | 12-2 | 11-3 | 12-7 |
| Subtract 2-Digit Numbers With Carry (arith006) | Prerequisite knowledge | | | |
| Subtract 2-Digit Numbers Without Carry (arith007) | Prerequisite knowledge | | | |
| Subtraction in Word Problem Format (arith021) | Prerequisite knowledge | | | |
| Subtraction in Sentence Format (arith025) | Prerequisite knowledge | | | |
| Estimate a Difference (arith102) | 1-3 | | | |
| Divide a 2-Digit Number by a 1-Digit Number (arith005) | Prerequisite knowledge | | | |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Divide a 2-Digit Number by a 1-Digit Number Without carry (arith052) | Prerequisite knowledge | | | |
| 2-Digit Division (arith075) | Prerequisite knowledge | | | |
| Divide a 3-Digit Number by a 2-Digit Number (arith018) | Prerequisite knowledge | | | |
| Word Problems on Long Division (arith023) | Prerequisite knowledge | | | |
| Division: Quotient with a Remainder (arith062) | Prerequisite knowledge | | | |
| Numeral Translation: Words to Numerals: Problem Type 1 (arith028) | Prerequisite knowledge | | | |
| Numeral Translation: Words to Numerals: Problem Type 2 (arith060) | Prerequisite knowledge | | | |
| Factors (arith056) | 5-2 | 4-4 | 1-2, 6-3 | 4-4B, 4-5 |
| Greatest Common Factor of $a$ and $b$ (arith033) | 5-3 | 4-4 | 6-3 | 4-5 |
| Prime Numbers Between Two Integers (arith034) | | 4-2 | 6-2 | 4-4 |
| Prime Factorization of an Integer (arith035) | 5-2 | 4-2 | 6-2 | 4-4 |
| Least Common Multiple (arith070) | 5-7 | 4-9, 4-10 | 6-7 | 4-7 |
| Order of Operations: Problem Type 1 (arith048) | 1-4 | 1-2 | 1-3 | 1-2 |
| Order of Operations: Problem Type 2 (arith051) | | 1-2 | 1-3 | 1-2 |
| Rounding (arith061) | 1-3 | | | |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Rounding to the Nearest Ten (arith078) | 1-3 | | | |
| Expanded Notation (arith066) | | | | 4-2 |
| Ordering Numbers Through Hundred Thousands (arith077) | Prerequisite knowledge | | | |
| Find the Average of Two Numbers (arith103) | 2-7 | 3-4, 3-4B | 4-4, 4-4B | 6-6A, 6-6, 6-6B |
| | | **Decimals** | | |
| Add Decimals With Carry (arith013) | 3-6 | 2-3, 2-3B | | 5-3 |
| Subtract Decimals in Sentence Format (arith027) | 3-5 | 5-5 | | 5-3 |
| Subtract Decimals With Regrouping (arith041) | 3-6 | 2-3 | | 5-3 |
| Multiply a Decimal by a Whole Number (arith017) | 4-1A, 4-1 | 2-4, 2-5 | | 6-5A, 6-5 |
| Divide and Multiply by Powers of Ten (arith045) | 4-9 | 2-5 | 6-9 | 6-9 |
| Multiply a Decimal by a Decimal: Problem Type 1 (arith055) | 4-3A, 4-3 | 2-4 | | 6-5 |
| Multiply a Decimal by a Decimal: Problem Type 2 (arith046) | 4-3A, 4-3 | 2-4 | | 6-5 |
| Multiply a Decimal by 10, 100, or 1000 (arith082) | 4-9 | 2-5 | 6-9 | 6-9 |
| Decimal Division: Writing Zero in the Dividend (arith019) | 4-7 | 2-6 | | 6-5A, 6-5 |
| Divide a Decimal by a Whole Number (arith081) | 4-5 | 2-6 | | 6-5 |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Divide a Decimal by 10, 100, or 1000 (arith083) | 4-9 | 2-5 | 6-9 | 6-9 |
| Decimals as Fractions (arith087) | 5-9 | 2-7 | 3-4 | 5-1 |
| Fractions as Repeating Decimals (arith089) | 5-10 | 2-7 | 6-5 | 6-1 |
| Add Positive and Negative Decimals (arith057) | | | | |
| **Fractions** | | | | |
| Reduce a Fraction to Lowest Terms (arith067) | 5-4 | 4-4, 4-5 | 7-1, 7-2, 7-3, 7-4, 7-8 | 4-6, 4-7 |
| Order Three Fractions Having a Common Denominator (arith044) | | 4-10 | 6-8 | 5-4 |
| Order Three Fractions Having a Common Numerator (arith091) | 5-8 | 4-10 | 6-8 | 5-1 |
| Compare Three Fractions (arith092) | 5-8 | 4-10 | 6-8 | 5-1 |
| Fractional Parts of a Circle (arith100) | 5-4A, 6-4, 6-5 | 11-3A, 11-3 | 4-2 | 11-2 |
| Multiply Fractions: Problem Type 1 (arith009) | 7-2A, 7-2 | 7-4A, 7-4 | 7-3 | 6-3 |
| Multiply Fractions: Problem Type 2 (arith053) | 7-3 | 7-4 | 7-3 | 6-3 |
| Word Problems With Fractions (arith095) | 5-5, 6-2, 6-3, 6-4, 6-5 | 7-1, 7-2, 7-4, 7-6, 7-7 | 7-2, 7-3, 7-8, 7-9, 7-10 | 5-4, 5-5, 5-6, 5-7 |
| Multiply a Whole Number by a Unit Fraction (arith079) | 7-1 | 7-4 | 7-3 | 6-3 |
| Multiply a Fraction by a Whole Number (arith086) | 7-1 | 7-4 | 7-3, 7-9, 7-10 | 6-3 |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Add Fractions With the Same Denominator (arith010) | 6-3 | 7-2 | 7-1 | 5-4 |
| Add Fractions With Different Denominators (arith054) | 6-4A, 6-4 | 7-2 | 7-2 | 5-5 |
| Subtract Fractions With Different Denominators (arith080) | 6-4 | 7-3 | 7-2 | 5-5 |
| Subtract Fractions With the Same Denominator (arith096) | 6-3 | 7-2 | 7-1 | 5-4 |
| Reciprocals of Whole Numbers (arith088) | 7-5, 7-6 | 7-8, 7-9 | 7-4 | 6-4 |
| Divide Proper Fractions (arith022) | 7-5A, 7-5 | 7-9 | 7-8, 7-9, 7-10 | 6-4 |
| Write an Improper Fraction as a Mixed Number (arith015) | 5-5 | 7-4A, 7-4, 7-8, 7-9 | 6-4 | 5-4, 5-5 |
| Multiply Mixed Numbers: Problem Type 1 (arith020) | 7-3 | 7-4, 7-5, 7-6, 7-7 | 7-3, 7-9, 7-10 | |
| Multiply Mixed Numbers: Problem Type 2 (arith076) | 7-3 | 7-4 | 7-3, 7-9, 7-10 | 6-3 |
| Divide Mixed Numbers (arith068) | 7-6 | 7-9 | 7-8 | 6-4 |
| Add Mixed Numbers With the Same Denominator (arith084) | 6-5 | 7-3 | 7-1 | 5-4 |
| Subtract Mixed Numbers (arith085) | 6-5, 6-6 | 7-3 | 7-1, 7-2 | 5-5 |
| **Proportions and Percents** | | | | |
| Write Fractions as Percents (arith002) | 8-4 | 4-7 | 3-2, 3-4 | 9-7 |
| Write the Percentage of a Whole Number as a Decimal Number (arith030) | 8-7 | 8-8, 8-9 | 3-5, 3-6A, 3-6 | 9-5, 9-7, 9-9, 9-10 |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Percentage (arith069) | 8-7 | 11-2 | 8-2, 8-4, 8-5 | 9-5, 9-9, 9-10 |
| Word Problems on Percentage: Problem Type 1 (arith074) | | 11-5, 11-6 | 8-2, 8-3, 8-4, 8-5, 8-5B | 9-4, 9-5, 9-9, 9-10 |
| Word Problems on Percentage: Problem Type 2 (arith031) | | 8-8, 8-9 | 3-5, 3-6A, 3-6 | 9-5, 9-9, 9-10 |
| Percent to Fraction (arith090) | 8-4 | 8-5 | 3-4 | 9-7 |
| Word Problems With Clocks (arith063) | 6-7 | | | |
| Word Problems: Division With Decimals (arith064) | 8-1 | 2-6 | | 6-5 |
| Word Problems With Inversely Proportional Quantities (arith073) | 8-2 | 8-3, 8-3B, 8-4 | 3-3, 3-5, 5-6, 8-7, 8-9 | 9-4, 9-5, 9-9, 9-10 |
| | | **Integers** | | |
| Absolute Value/Order Integers (arith058) | | | 2-1 | 2-3 |
| Absolute Value of a Negative Integer (arith071) | | 5-1 | 2-1 | 2-1 |
| Add Negative and Positive Integers in Sentence Format (arith026) | 11-3 | 5-4 | 2-3, 2-4 | 2-4 |
| Add Negative Integers (arith059) | 11-3 | 5-4 | 2-3, 2-4 | 2-4 |
| Add Positive and Negative Integers (arith072) | 11-3 | 5-4A, 5-4 | 2-3, 2-4 | 2-4 |
| Subtract Negative Integers (arith040) | 11-4 | 5-5 | 2-5 | 2-5 |
| Multiply Negative Integers (arith038) | 11-5 | 5-6 | 2-7 | 2-7 |
| Multiply Negative and Positive Integers (arith065) | 11-5 | 5-6 | 2-7 | 2-7 |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| | | | | |
| Divide a Negative Integer by a Positive Integer (arith097) | 11-6 | 5-7 | 2-8 | 2-8 |
| Divide a Positive Integer by a Negative Integer (arith098) | 11-6 | 5-7 | 2-8 | 2-8 |
| Divide a Negative Integer by a Negative Integer (arith099) | 11-6 | 5-7 | 2-8 | 2-8 |
| | **Exponents** | | | |
| Square Root of an Integer (arith016) | | 10-1, 10-2, 10-3 | 9-1, 9-2, 9-3, 9-4, 9-5 | 13-1, 13-3, 13-4 |
| Order Numbers With Negative Exponents (arith024) | | | | 4-9 |
| Write a Positive Number Without a Negative Exponent (arith042) | | | | 4-9 |
| Write a Negative Number Without a Negative Exponent (arith043) | | | | Glencoe Algebra 1, 9-2 |
| Order Numbers With Exponents (arith029) | | | | 4-2 |
| Multiply Two Squared Negative and Positive Numbers (arith047) | | | 1-2 | 4-2 |
| Multiply a Negative Integer to the 3rd Power by a Positive Integer to the 2nd or 3rd Power (arith049) | | | 1-2 | 4-2 |
| Write a Number in Scientific Notation With a Positive Exponent (arith036) | | 2-9 | 6-9 | 6-9 |
| Write a Number in Scientific Notation With a Negative Exponent (arith037) | | | 6-9 | 6-9 |

| **ALEKS Objective** | **MAC 1**[1] | **MAC 2**[2] | **MAC 3**[3] | **Pre-Alg.**[4] |
|---|---|---|---|---|
| Add Two Expressions With Square Roots (arith032) | | | | Glencoe Algebra 1, 13-3 |
| Multiply Two Expressions With Square Roots (arith039) | | | | Glencoe Algebra 1, 13-2 |
| Square Root Simplification (arith093) | | | | Glencoe Algebra 1, 13-2 |
| Cube Root of an Integer (arith094) | | | | Glencoe Algebra 2, 5-5 |

## B.2 Algebra

| ALEKS Objective | MAC 3[1] | Pre-Alg.[2] | Alg. 1[3] | Alg. 2[4] |
|---|---|---|---|---|
| **Fundamentals** | | | | |
| Properties of Addition (alge187) | 1-4 | 1-4 | 1-6 | 1-2 |
| Properties of Real Numbers (alge188) | 1-2, 1-4, 1-5, 1-7 | 1-4 | 1-6, 1-7A, 1-7, 1-8 | 1-2 |
| Evaluate a Linear Expression in Two Variables (alge005) | 1-3, 1-3B | 4-2, 4-2B | 1-3 | 1-1A, 1-1 |
| Evaluate a Polynomial in One Variable (alge004) | 1-3, 1-3B | 4-2, 4-2B | 1-3 | 1-1A, 1-1 |
| Write a Linear Equation (alge016) | 1-6 | 7-3 | 2-9 | 1-4 |
| Write an Inequality (alge015) | 1-9 | 7-7 | 2-8, 7-1 | 1-6 |
| Integer and Rational Numbers (alge001) | 6-4, 9-3 | 5-1 | 2-8 | 1-2 |
| Integer, Rational, and Irrational Numbers (alge002) | 6-4, 9-3 | 5-1 | 2-8 | 1-2 |
| Write a Compound Inequality (alge186) | 7-10 | | 7-4 | 1-6 |
| **Solving Linear Equations and Inequalities** | | | | |
| Addition Property of Equality: Problem Type 1 (alge009) | 1-4 | 3-2 | 3-1 | 1-4 |
| Addition Property of Equality: Problem Type 2 (alge010) | 1-4 | 3-2 | 3-1 | 1-4 |
| Addition Property of Equality: Problem Type 3 (alge007) | 1-4 | 3-2 | 3-1 | 1-4 |

[1] **MAC 3 = Glencoe** *Mathematics: Applications and Connections, Course 3*
[2] **Pre-Alg. = Glencoe** *Pre-Algebra: An Integrated Transition to Algebra and Geometry*
[3] **Alg. 1 = Glencoe** *Algebra 1: Integration, Applications, Connections*
[4] **Alg. 2 = Glencoe** *Algebra 2: Integration, Applications, Connections*

| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
|---|---|---|---|---|
| | | | | |
| Multiplication Property of Equality: Problem Type 1 (alge008) | 1-5 | 3-3 | 3-2 | 1-4 |
| Multiplication Property of Equality: Problem Type 2 (alge012) | 1-5 | 6-7 | 3-2 | 1-4 |
| Solve a Linear Equation: Problem Type 1 (alge006) | 1-3, 1-3B, 1-4, 1-5, 1-6 | 1-8, 3-2, 3-3 | 3-1, 3-2, 3-3A | 1-4 |
| Solve a Linear Equation: Problem Type 2 (alge208) | 10-4 | 6-7 | 5-3 | 2-7 |
| Solve a Linear Equation: Problem Type 3 (alge200) | | 8-4 | 6-2, 6-4 | 2-2 |
| Solve a Linear Equation With Several Occurrences of the Variable: Problem Type 1 (alge011) | | 7-5 | 3-3 | 1-4 |
| Solve a Linear Equation With Several Occurrences of the Variable: Problem Type 2 (alge061) | | | 12-8 | 9-5 |
| Solve a Linear Equation With Several Occurrences of the Variable: Problem Type 3 (alge013) | | | 3-1, 3-2, 3-3 | 1-4 |
| Solve a Linear Equation With Several Occurrences of the Variable: Problem Type 4 (alge209) | | | 3-3 | 2-2 |
| Solve a Linear Equation With Several Occurrences of the Variable: Problem Type 5 (alge179) | | 7-5 | 3-5, 3-6 | 1-4 |
| Word Problems on Linear Equations: Problem Type 1 (alge014) | | 7-5 | 3-5, 3-6 | 1-4 |

| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
|---|---|---|---|---|
| Word Problems on Linear Equations: Problem Type 2 (alge219) | | | 8-1 | 9-5 |
| Solve a Linear Inequality: Problem Type 1 (alge019) | 7-10 | 8-9A, 8-9 | 7-1, 7-2 | 2-7A, 2-7 |
| Solve a Linear Inequality: Problem Type 2 (alge020) | 7-10 | 8-9A, 8-9 | 7-1, 7-2 | 2-7A, 2-7 |
| Solve a Linear Inequality: Problem Type 3 (alge021) | 7-10 | 8-9A, 8-9 | 7-1, 7-2 | 2-7A, 2-7 |
| Solve a Linear Inequality: Problem Type 4 (alge207) | | | 7-1, 7-2, 7-3 | 2-7 |
| Graph a Linear Inequality on a Number Line (alge017) | 1-9 | 1-9, 3-6, 3-7, 3-8 | 7-1, 7-2 | 1-6 |
| Graph a Compound Linear Inequality on a Number Line (alge166) | 7-10 | 7-7 | 7-4 | 1-7 |
| Word Problems With Linear Inequalities (alge022) | 7-10 | 8-9 | 7-1, 7-2 | 2-7 |
| Solve a Linear Equation With Absolute Value: Problem Type 1 (alge103) | | | 7-6 | 1-5 |
| Solve a Linear Equation With Absolute Value: Problem Type 2 (alge167) | | | 7-6 | 1-5 |
| Solve a Linear Inequality With Absolute Value (alge169) | | | 7-6 | 2-7 |
| Graph a Linear Inequality With Absolute Value on the Number Line (alge170) | | | | 1-7 |
| Word Problems on Proportions: Problem Type 1 (alge063) | 8-1, 8-2, 8-8, 8-9 | 9-4 | 4-1 | 9-2, 9-4, 9-5 |

| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
|---|---|---|---|---|
| Word Problems on Proportions: Problem Type 2 (alge218) | 8-1 | 9-4 | 4-1 | 9-5 |
| Word Problems With Percent and Money: Problem Type 1 (alge173) | | 9-9, 9-10 | 4-4, 4-5 | |
| Word Problems With Percent and Money: Problem Type 2 (alge172) | | 9-5, 9-9, 9-10 | 4-4, 4-5 | |
| Solve a System of Linear Equations (alge076) | 10-5 | 8-8 | 8-3, 8-4 | 3-1A, 3-1, 3-2 |
| Inconsistent System of Linear Equations (alge077) | | 8-8 | 8-1 | 3-2 |
| Word Problems on Systems of Linear Equations: Problem Type 1 (alge078) | 10-5 | 8-8 | 8-1 | 3-2, 3-5, 3-6 |
| Word Problems on Systems of Linear Equations: Problem Type 2 (alge184) | 10-5 | 8-8 | 8-1 | 2-2, 2-4 |
| Word Problems on Systems of Linear Equations: Problem Type 3 (alge224) | | | 8-1 | 3-2 |
| Word Problems on Systems of Linear Equations: Problem Type 4 (alge192) | | 8-8 | | 3-1, 3-2 |

**Graphing Linear Equations and Inequalities**

| | | | | |
|---|---|---|---|---|
| Read a Point in the Coordinate Plane (alge064) | 2-10 | 1-7 | 5-1 | 2-1 |
| Plot a Point in the Coordinate Plane (alge067) | 2-10 | 1-7 | 5-1 | 2-1 |
| Midpoint of a Line Segment in the Plane (alge191) | | | 6-7 | 7-1 |

| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
|---|---|---|---|---|
| Solve a Linear Equation in Two Variables: Problem Type 1 (alge066) | 10-4A, 10-4, 10-4B | 8-3, 8-4 | 5-4 | 2-2 |
| Solve a Linear Equation in Two Variables: Problem Type 2 (alge216) | | 8-8 | 8-1 | 3-1A, 3-1 |
| Graph a Line Given the $x$- and $y$- Intercepts (alge197) | | | 6-4 | |
| Graph a Line Given the Equation in Slope-Intercept Form (alge194) | | 8-7 | 6-4 | 2-4 |
| Graph a Line Given the Equation in Standard Form (alge195) | | | 6-2 | 2-2 |
| Graph the Line Through a Given Point With a Given Slope (alge196) | | 8-7 | 6-4 | 2-4 |
| Graph a Vertical or Horizontal Line (alge198) | | | 6-1 | 2-3, 2-4 |
| $y$-Intercept of a Line (alge069) | | 8-7 | 6-2, 6-3, 6-5 | 2-2 |
| $x$- and $y$-Intercepts of a Line Given the Equation in Standard Form (alge210) | | | 6-2 | 2-4 |
| Write the Equation of a Line Given the Slope and the $y$-Intercept (alge070) | | 8-6, 8-7 | 6-2, 6-4, 6-5 | 2-3, 2-4 |
| Write the Equation of a Line Given the Slope and a Point (alge071) | | 8-6 | 6-2, 6-4 | 2-3, 2-4 |
| Write the Equation of the Line Through Two Given Points (alge072) | | | 6-2 | 2-3, 2-4 |
| Write the Equations of Vertical and Horizontal Lines Through a Given Point (alge073) | | | 6-2 | 2-3, 2-4 |

| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
|---|---|---|---|---|
| | | | | |
| Write the Equation of the Line Through a Given Point and Parallel to a Given Line (alge074) | | 11-3B | 6-6 | 2-3 |
| Write the Equation of the Line Through a Given Point and Perpendicular to a Given Line (alge217) | | | 6-6 | 2-3 |
| Graph a Linear Inequality in the Plane: Problem Type 1 (alge018) | | 8-9A, 8-9 | 7-3A, 7-3 | 2-7A, 2-7 |
| Graph a Linear Inequality in the Plane: Problem Type 2 (alge225) | | | 7-8 | 2-7A, 2-7 |
| Graph a Linear Equation With Absolute Value in the Plane (alge168) | | | 6-5A | 2-6 |
| Graph a System of Linear Equations (alge075) | 10-5 | 8-8 | 8-1A, 8-1 | 3-1A, 3-1 |
| Graph a System of Linear Inequalities (alge079) | | | 8-5 | 3-4A, 3-4 |
| Distance between Two Points in the Plane (alge132) | 9-6 | | 13-5 | 7-1 |

**Exponents and Rational Expressions**

| | | | | |
|---|---|---|---|---|
| Restriction on the Variable in a Denominator (alge049) | | | 12-1 | 9-5 |
| Order Fractions (alge059) | 6-8 | 6-1 | | 9-5 |
| Word Problems on Proportions: Problem Type 3 (alge220) | 8-1 | 9-4 | 4-1 | 9-5 |
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| **ALEKS Objective** | **MAC 3**[1] | **Pre-Alg.**[2] | **Alg. 1**[3] | **Alg. 2**[4] |
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