

## QUICK START GUIDE TO INTERACTIVE MATHEMATICS

This document describes the technical set-up of *Interactive Mathematics* and how to preview the lessons. These activities can be performed prior to the Academic Systems faculty training session.

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## SECTION 1: TECHNICAL ENVIRONMENT

This section describes six basic aspects of the *Interactive Mathematics* technical environment.

- Technical specifications:
  - The following URL is the location for current technical specifications for student and faculty computer workstations: <http://support.academic.com>. Click FAQ and review system requirements under Getting Started.
  - Provide this information to the Information Technologist at your campus. Administrative privileges may be required to install the software.
  - Provide this information to students before they install the *Interactive Mathematics* Client Installer software on their home or work computers.

- Server and database:
  - A server houses the Instructional Support System database that keeps track of student work.
  - The server may be either campus-owned or hosted by Academic Systems.
  - Instructors set up courses and enroll students in *Interactive Mathematics* through the Instructional Support System. Academic Systems consultants provide training.
- Computer workstation (client):
  - *Interactive Mathematics* lessons run on personal computers.
  - An *Interactive Mathematics* Client CD is installed on the computer workstation to enable the Interactive Lessons to run.
  - Headphones or computer speakers are required.
- Internet connection:
  - Students must be connected to the Internet while working on *Interactive Mathematics* lessons. This permits their work to be saved in the Instructional Support System.
  - Internet service is provided through a campus network or by students' home or work Internet Service Providers.
  - Students are responsible for obtaining their own Internet Service Providers.
- Installation software:
  - Server software: Academic Systems sends the server software to the campus Information Technologist if a campus houses the *Interactive Mathematics* server. No server software is shipped if the campus database is on an Academic Systems server ("hosted").
  - *Interactive Mathematics* Lesson Viewer. Only faculty members receive this CD that enables them to preview lessons when not connected to the server. Lesson Viewer use is described in Section 3.
  - *Interactive Mathematics* Client installer. Each user receives this CD that enables them to use *Interactive Mathematics* lessons. Client Installer use is described in Section 5.
- Lesson software:
  - Lessons for each *Interactive Mathematics* course are contained on two CDs.
  - The appropriate lesson CD must be in the CD drive whenever a student works on a lesson or an instructor previews a lesson.
  - When a student works on an *Interactive Mathematics* lesson, his/her progress is saved on the server and a record of student work appears in the Instructional Support System.

## SECTION 2: INTRODUCTION AND OVERVIEW

- *Interactive Mathematics* (IM) uses a computer-based, multimedia approach to teaching mathematics. Online lessons provide
  - Basic instruction in key mathematical concepts
  - Frequent feed-back and recommendations based on student performance
  - Links to homework assignments in the PAN (Personal Academic Notebook)
  - Options for faculty customization
- A more detailed explanation of the *Interactive Mathematics* philosophy, design, features, and teaching approach is in the *Interactive Mathematics Instructor's Guide*.

## SECTION 3: LESSON VIEWER

- The *Interactive Mathematics* Lesson Viewer enables you to preview *Interactive Mathematics* lessons without connection to a server. No progress report is generated. The viewer is useful for:
  - Preparing lessons
  - Showing lessons or sample student reports to faculty members
  - Training faculty members to teach with *Interactive Mathematics*

## INSTALL THE INTERACTIVE MATHEMATICS LESSON VIEWER

- Close all Windows applications before you begin Viewer installation.
- Refer to instructions on the insert, which is included with the IM Lesson Viewer.
- Please consult your campus Information Technology staff before installing the *Interactive Mathematics* Lesson Viewer on your machine. Administrative login privileges may be required to install programs.
- Insert the IM Lesson Viewer CD into your CD-ROM drive. The installation program should start automatically. If Auto play is not enabled on your computer, select **Run** from the Start Menu and type **d:\setup.exe**, where d represents your CD drive. See *Figure 3-1*.

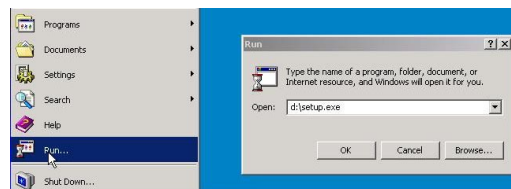


Figure 3-1

- Complete the installation of the IM Lesson Viewer. This will take 5 to 15 minutes depending on the speed of your computer. An icon will be placed on your desktop called **Math Viewer**. See *Figure 3-2*.



Figure 3-2

## ON-GOING USE

- Leave the *Interactive Mathematics* Viewer installed on your computer; the icon will remain visible on the desktop.
- Use the Viewer whenever you would like to review lessons and you are not connected to the Internet.
- The Viewer is a stand-alone application (not networked via the Internet to the database) so your progress is not saved on a server.

## SECTION 4: LESSON REVIEW

For this section, you will need the following materials. (A complete listing of all *Interactive Mathematics* materials and resources is included in Sections 7 and 8.)

- IM PAN(s)
- IM lesson CDs

## COMPLETE THE GETTING STARTED LESSON

The *GETTING STARTED* lesson will acquaint you with the basic navigation and features of an IM lesson. This lesson is included on each Part I lesson CD. *GETTING STARTED* is an excellent tool for student orientation at the start of an IM course.

- Run the **Math Viewer** program by clicking on the Viewer icon on your desktop.
- Click **OK** on the log-on screen (no password required). See Figure 4-1.

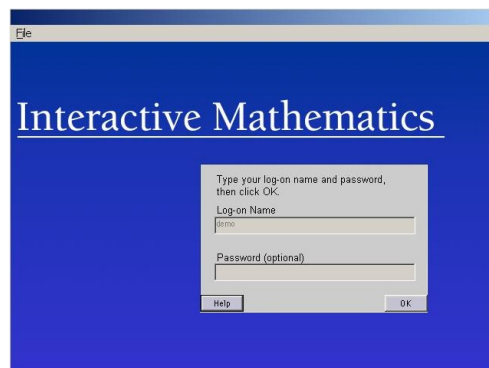
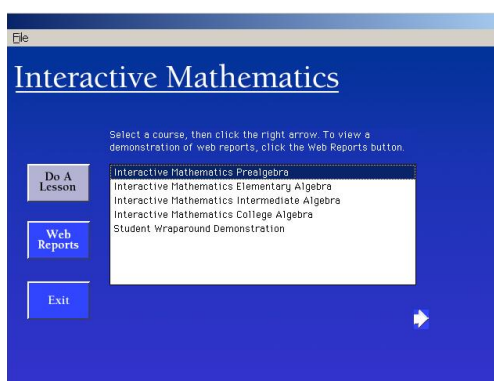


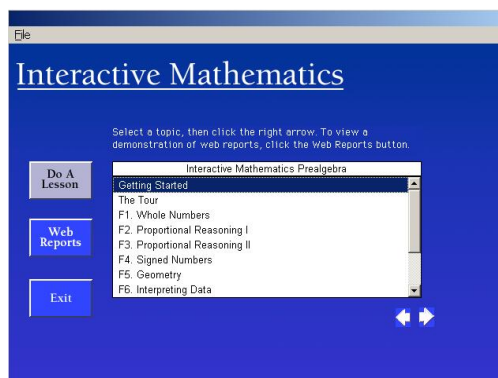
Figure 4-1

- Select your course on the following screen. Double click the title, or click the title once to highlight and click the page-turning arrow in the lower right of the screen. See *Figure 4-2*.



*Figure 4-2*

- Place the PART I lesson CD into your CD-ROM drive.
- Put on your headphones or turn on your speakers.
- Select the *GETTING STARTED* lesson. Double click on the title or click the lesson title once to highlight and click the page-turning arrow in the lower right of the screen. See *Figure 4-3*.



*Figure 4-3*

- Follow the audio instructions and complete the *GETTING STARTED* lesson. This lesson will orient you to the navigation and support features of the *Interactive Mathematics* lessons.
- Exit the lesson by choosing **Quit** from the File menu. Be sure to leave the CD in the drive until you have completely exited the lesson.
- Review of lesson architecture, tools, and customization options is included in Section 6 of this guide.

#### COMPLETE OTHER LESSONS

- Follow the procedure above to complete other lessons. The *Interactive Mathematics* Scope and Sequence document summarizes the lesson objectives. This document is included in Appendix A of this guide.

- Review additional lesson materials in the Personal Academic Notebook (PAN) of the associated course.
- Review architecture, features, and tools in Section 6 of this guide.
- Exit a lesson by choosing **Quit** from the File menu. Be sure to leave the CD in the drive until you have completely exited a lesson. Note: In an active student session, the exiting point from a lesson is book-marked. Students can easily return to the most recent point of work upon the subsequent login.

## EXAMINE SAMPLE REPORTS

The following documentation will walk you through a mock-up of the Web Reports interface. (Details on this feature can be found in the Web Reports section of the Quick-Start Guide to the Instructional Support System.)

- Click **Web Reports** on the left side of the screen. See *Figure 4-4*.

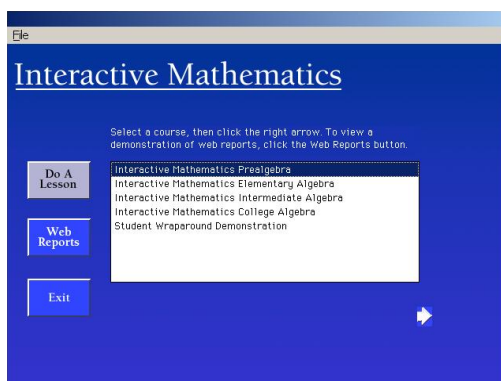


Figure 4-4

- Click **Go On** at the Instructional Support System-Reports screen. (Remember this is a mock-up - campus name, login, and password are not required.) See *Figure 4-5*.

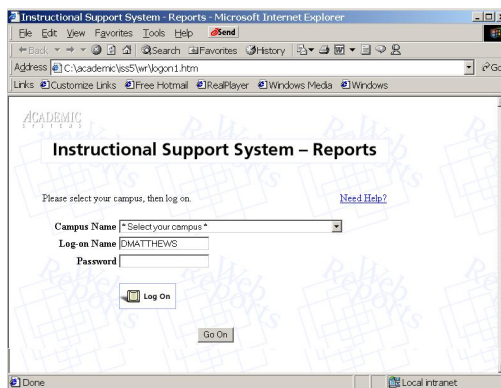


Figure 4-5

- Choose **Print/View Section Report** on the Select a Report screen. See *Figure 4-6* below. This report will display a sample roster of a section with Evaluate scores for assigned lessons.

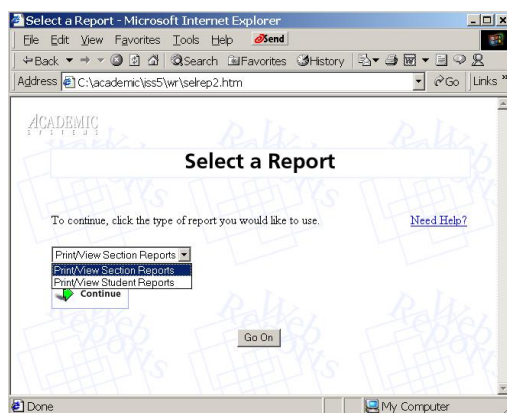


Figure 4-6

- Click **Tina Gomez** from the section report roster to view a sample student report of detailed lesson activity.
- Details on report interpretation and suggestions for monitoring student progress can be reviewed in the *Instructor's Guide*.

#### VIEW LESSON WRAP-AROUND FEATURES

A sample of the lesson wrap-around features can be viewed via the IM Lesson Viewer program. This sample is based on the Prealgebra lesson F3.1, Ratio and Proportion. To view this sample, the Part I Prealgebra CD is required. If you are not using this curriculum sequence, you may examine these features as you build your course within the Instructional Support System. Refer to Section 6 of this guide for an overview of these links. The Quick-Start Guide to the Instructional Support System provides guidance in creating these links.

- Launch the *Interactive Mathematics Viewer* program from your desktop.
- Click **Do a Lesson** on the left side of the screen.
- Click **Student Wraparound Demonstration** on the menu. Click the page turning arrow in the lower right of this screen.
- Place the Prealgebra Part I CD in your CD-ROM drive.

- Click F3.1 Ratio and Proportion on the following screen. Click the page turning arrow in the lower right. You will see the following introductory page to the lesson. See Figure 4-7.

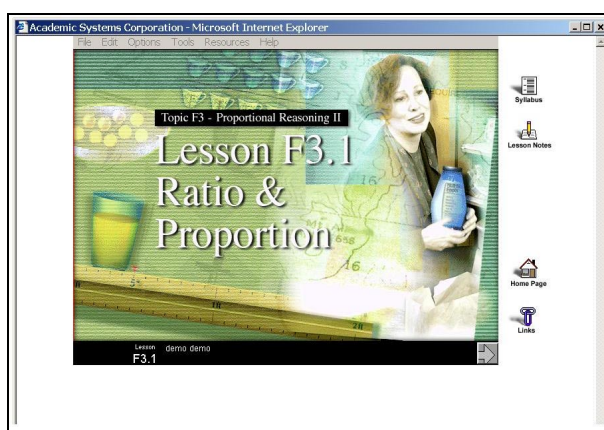


Figure 4-7

- Click the Wrap-around links located on the right of the screen to view sample entries. There are five different links: Syllabus, Lesson Notes, Screen Notes, Home Page, and Links. (Note: The screen note icon does not appear until you are on a lesson content page.)
- Click the page-turning arrow in the lower right. Navigate to screen 2 of 13 in the Ratio concept of the Explain module to view a sample Screen Note.
- Click on the Wraparound links located on the right of the screen to view other sample entries. See Figure 4-8 below.

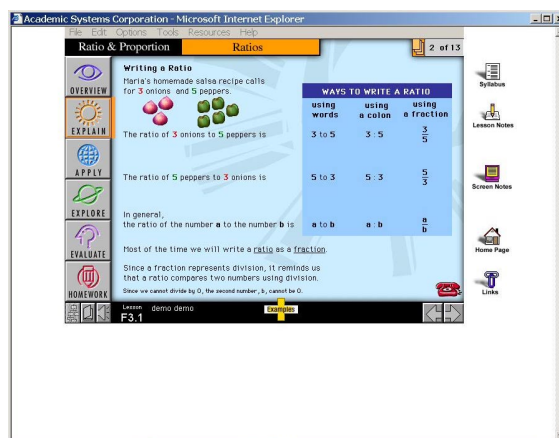


Figure 4-8

- Additional information on these features can be found in Section 6 of this guide and in the Quick-Start Guide to the Instructional Support System.



## SECTION 5: GOING ONLINE

You will need the following items to access IM from your host server. These items were included in your implementation materials. (A complete list of materials and resources is included in Sections 7 and 8.)

- IM Client Installation CD
- IM PAN(s)
- IM lesson CDs

### INSTALL THE CLIENT

- Install the *Interactive Mathematics* Client. Refer to instructions on the insert, which is included with the Client CD.
- Consult your campus Information Technology staff before installing the *Interactive Mathematics* Client on your computer. Administrative login privileges may be required to install programs.
- The *Interactive Mathematics* icon will be placed on your desktop. See *Figure 5-1 a*. (If you are working from a previously installed version, the desktop icon may be as in *Figure 5-1 b*.)



Figure 5-1a



Figure 5-1b

### ACCESS THE INTERACTIVE MATHEMATICS HOMEPAGE

- Connect to the Internet.
- Click the *Interactive Mathematics* icon. This will launch your browser and direct you to the *Interactive Mathematics* homepage. See *Figure 5-2*.

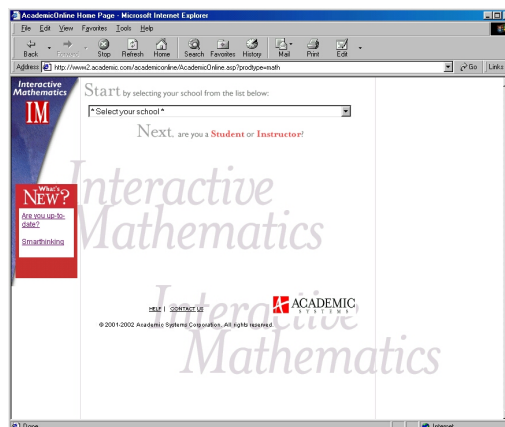


Figure 5-2

## PREVIEWING LESSONS IN THE INSTRUCTIONAL SUPPORT SYSTEM

- Select your campus from the drop down list on the *Interactive Mathematics* homepage.
- Click “Instructor.”
- Click “Course” on the screen in Figure 5-3 below to access the login screen.

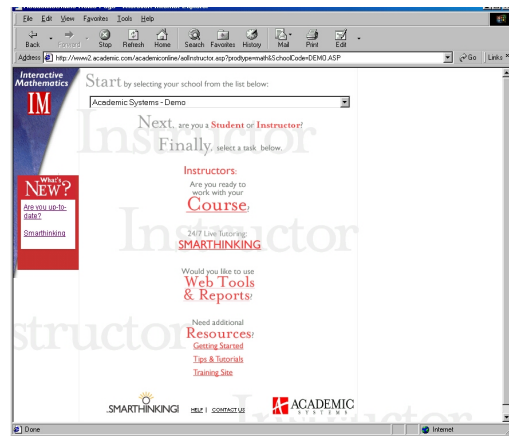


Figure 5-3

- Login to your *Interactive Mathematics* account. Login and password information will be provided to you by the campus lead for this implementation. See Figure 5-4.

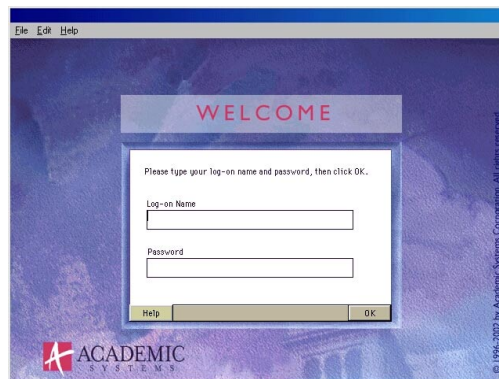


Figure 5-4

- You are logged on when the following Instructional Support System screen appears. See Figure 5-5.

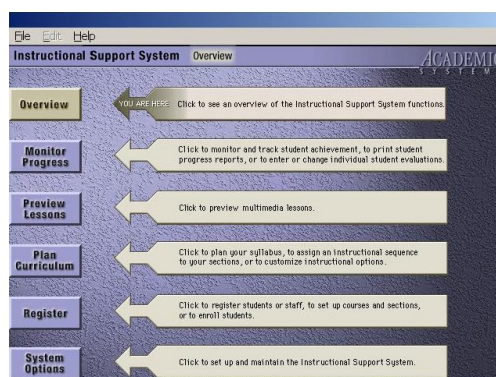


Figure 5-5

- Click Preview Lessons and select a curriculum path from the drop down menu. See Figure 5-6

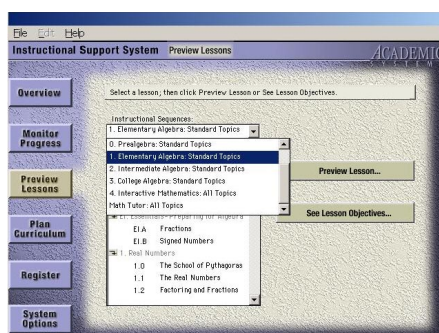


Figure 5-6

- Insert an *Interactive Mathematics* CD in the CD drawer.
- Select the lesson you plan to preview and click Preview Lesson on the right of the screen.
- The lesson will launch. Review lesson architecture, tools, and customization features in Section 6 of this guide.
- Other features of the Instructional Support System can be reviewed in the Quick-Start Guide to the Instructional Support System.

## SECTION 6: LESSON ARCHITECTURE, TOOLS, AND CUSTOMIZATION OPTIONS

### LESSON ARCHITECTURE

- Each *Interactive Mathematics* lesson has identical architecture. Students quickly come up to speed with navigational strategies. Key architectural features are
  - Lesson modules
  - Support Features
  - Audio Control
  - Screen Information

#### Lesson Modules

Each IM lesson has six modules: Overview, Explain, Apply, Explore, Evaluate, and Homework. Figure 6-1 depicts a typical lesson screen; note the module buttons on the left. Table 1 provides a brief description of each module.

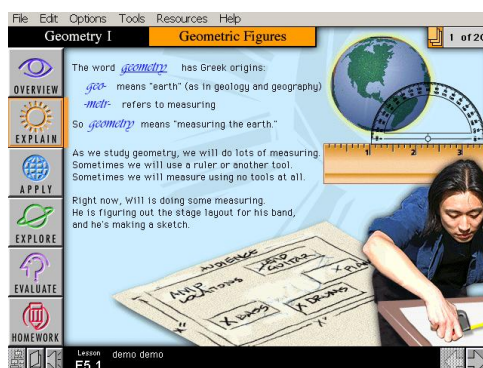


Figure 6-1







SYMBOL	NAME	DESCRIPTION
	Overview	<i>Overview</i> introduces the content of a lesson and provides students with an opportunity to take a pretest. A customized Learning Plan is generated based on the Pretest score.
	Explain	<i>Explain</i> presents mathematical concepts and provides opportunities to check understanding as students learn. Each lesson introduction includes a video that connects the mathematical concepts in the lesson to real-world applications.
	Apply	<i>Apply</i> provides an opportunity to practice concepts learned in <i>Explain</i> .
	Explore	<i>Explore</i> encourages students to further investigate mathematical concepts and observe mathematical relationships. These investigations help students develop their understanding of underlying principles. Not all lessons have an Explore module.
	Evaluate	<i>Evaluate</i> tests what students have learned in a lesson. Through the Instructional Support System, faculty can set the number of <i>Evaluate</i> attempts to 1, 2, or 3.
	Homework	Homework refers students to their Personal Academic Notebook (PAN) for practice on the concepts covered in the lesson.

Table 1

## Support Features

Interactive Mathematics lesson screens provide links for additional instructional support. Table 2 summarizes these support features.






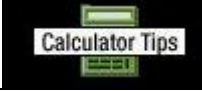

SYMBOL	DESCRIPTION	MODULE
	The <b>Helpline</b> offers the student hints and explanations of concepts in colloquial terms.	<i>Explain</i> <i>Explore</i>
	<b>Take a Closer Look</b> provides the student with additional examples, alternative explanations, and other information to help students study a concept in greater detail.	<i>Explain</i>
	<b>Link to Explain</b> takes students back to the section of <i>Explain</i> where the concepts were first introduced. After reviewing in <i>Explain</i> , students can return to <i>Apply</i> or <i>Explore</i> by clicking the Go Back icon in the lower right.	<i>Apply</i> <i>Explore</i>
<u>slope</u>	Students can click underlined words or phrases to review its definition and view an example.	<i>Explain</i> <i>Explore</i>
	<b>Examples</b> offer students additional examples and practice exercises.	<i>Explain</i>
	The <b>Journal</b> allows students to take notes online. These notes can be saved, edited, and printed. The instructor does not have access to the student Journal	<i>Explain</i> <i>Explore</i> Options menu
	<b>Calculator Tips</b> provide helpful tips on proper use of a calculator in problem solving.	<i>Explain</i>
	The <b>Expression Editor</b> is an answer-processing tool which enables students to write complex mathematical expressions, equations, or inequalities.	<i>Explain</i> <i>Apply</i> <i>Explore</i> <i>Evaluate</i>

Table 2

## Audio Control

- Interactive Mathematics lessons include audio. Students can adjust the audio by selecting **Adjust Volume** from the Options menu. See Figure 6-2.
- Although the use of audio is highly recommended, students can choose to turn it off by selecting **Turn Audio Off** from the Options menu. See Figure 6-2.

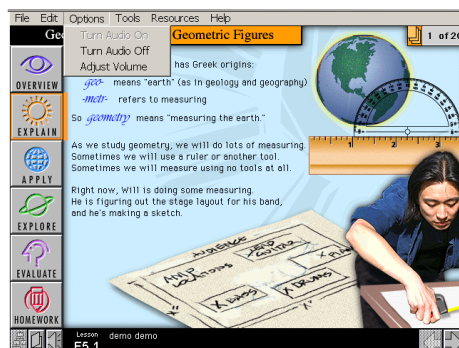


Figure 6-2

- Students can also repeat or stop the audio on each screen by clicking the megaphone icon in the lower left of the screen. See Figure 6-3.

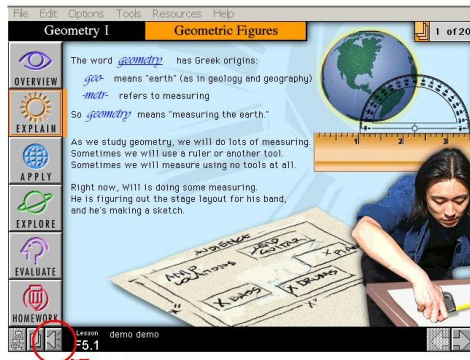


Figure 6-3

### Screen Information

- Each *Interactive Mathematics* screen contains information to assist the classroom instructor with student lesson location. See Figure 6-4 below.

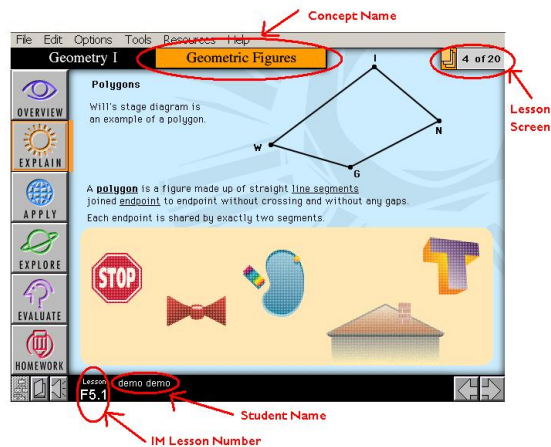


Figure 6-4

### LESSON TOOLS

*Interactive Mathematics* supports student work and problem solving with the following tools:

- Calculator
- Journal
- Grapher
- Expression Editor



These tools can be accessed via the Tools menu. See *Figure 6-5*. (The Expression Editor icon is displayed on the lesson screen when needed.)

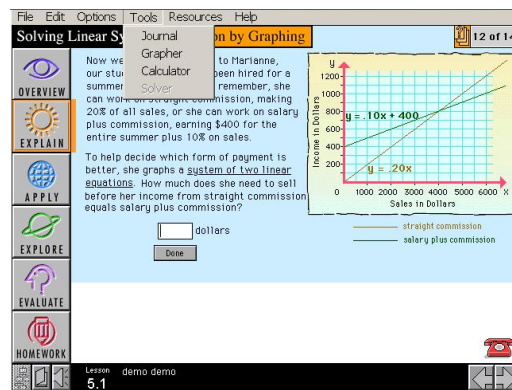


Figure 6-5

### **Calculator**

- A scientific calculator is available to students at any time from the Tools menu. It opens in a separate window and can be repositioned on the screen for ease of use.
- The Fundamentals lessons contain the Calculator Tips feature that models how to use a calculator for certain problems.
- The calculator cannot be “turned off.” It is always accessible to students while in the IM lesson.

### **Journal**

- The *Journal* tool allows students to take notes online. These notes can be saved and printed for future reference.
- The program includes prompts to use the Journal on every lesson summary screen.
- Students may open their Journals at any time from the Tools menu or clicking the *Journal* icon on a summary screen. See *Figure 6-6*.

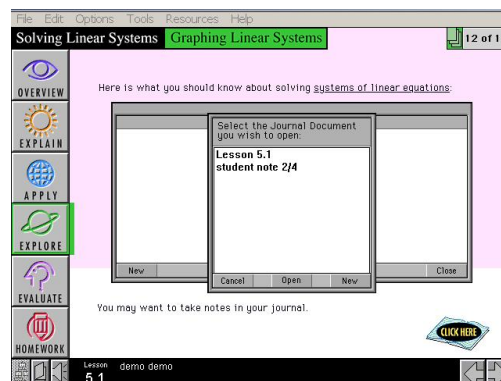


Figure 6-6

### **Grapher**

- The *Grapher* enables students to plot points and graph linear equations, linear inequalities, quadratic functions, circles, and other relations.
- User entered information is represented both algebraically and graphically.

- Students can access online help for using the *Grapher* from the Help menu.
- The *Grapher* is integrated into relevant *Explore* modules and can be available for use at other times by selecting *Grapher* from the Tools menu. See Figure 6-7.

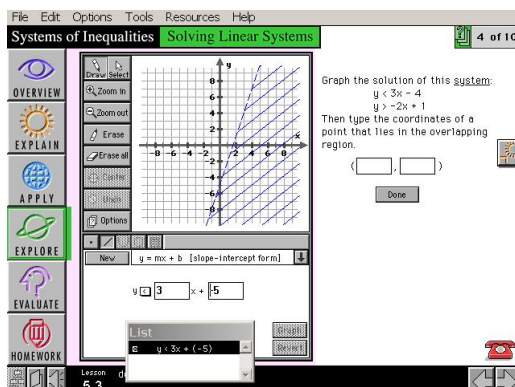


Figure 6-7

### **Expression Editor**

- This tool allows students to enter expressions, equations, or inequalities as answers to questions.
- The *Expression Editor* uses answer-processing algorithms to support recognition of most alternate forms of correct answers.
- An icon prompts the user when this tool is required for answer entry. Clicking on this icon opens the *Expression Editor*. See Figure 6-8.

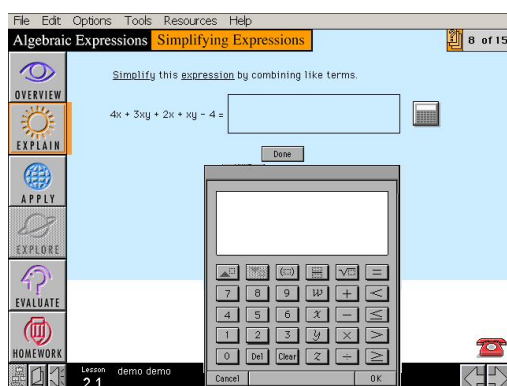


Figure 6-8



- Help using this tool can be found in the Help menu.
- A tutorial on the *Expression Editor* can be accessed from the *Interactive Mathematics* homepage. Click Tips and Tutorials in the Resources menu. See Figure 6-9.

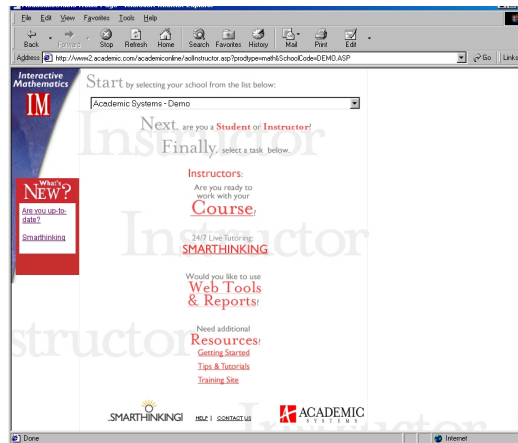


Figure 6-9

- Click “Expression Editor Tutorial” from the following menu. See Figure 6-10.

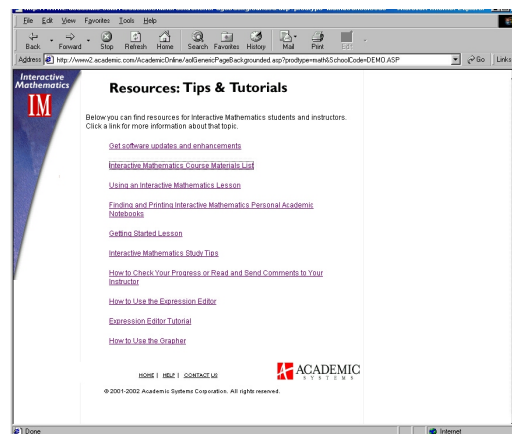


Figure 6-10

- To use the Expression Editor Tutorial, you will first need to download the tutorial files. This should take about six minutes using a 56 Kbps modem. Follow the directions on the Download Expression Editor Tutorial screen. See Figure 6-11.

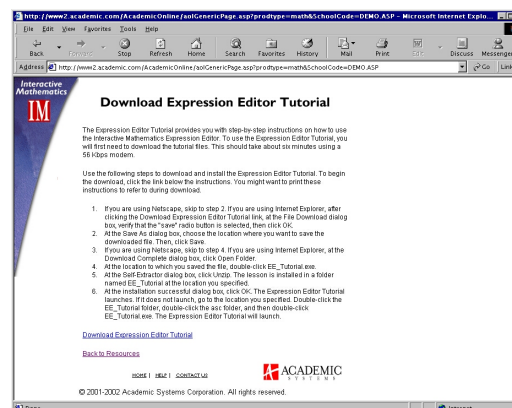


Figure 6-11

## CUSTOMIZATION OPTIONS

- Instructors can provide students course specific information within the *Interactive Mathematics* lessons. Five types of instructor-created information can be included on the lesson screen. Table 3 contains a list of the links and possible uses.






SYMBOL	NAME	DESCRIPTION
 Syllabus	SYLLABUS	A course syllabus, outline, or calendar can be attached. The link for this document will be on every screen of instruction for student reference.
 Lesson Notes	LESSON NOTE	A note can be created and will be posted on every screen of instruction of the selected lesson. This is a global note and might be used as a reminder to students about due dates or a particular classroom procedure.
 Screen Notes	SCREEN NOTE	An individual note can be posted on each screen of instruction. These notes can be used to reinforce particular techniques that are presented or to caution students regarding pitfalls.
 Home Page	HOME	This link can be used to link students to an instructor's or course website.
 Links	LINKS	This link allows instructors to create up to 5 links to websites that are useful to students as they work through IM lessons.

Table 3

- The wrap-around links are created within the Instructional Support System. Not all links have to be used. Any link that is not customized will not display an icon on the student lesson page. Figure 6-12 shows a lesson screen which has incorporated all of the wrap-around features.

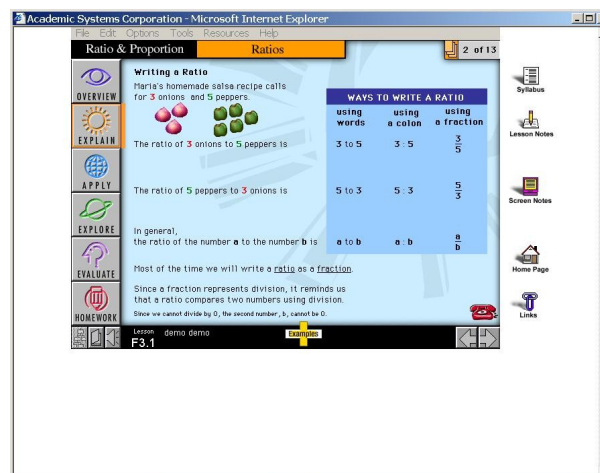


Figure 6-12

- Instructions on building these links in your lessons can be reviewed in the *Quick-Start Guide to the Instructional Support System*.

## SECTION 7: FACULTY MATERIALS AND RESOURCES

Faculty materials exist in several formats and locations. A summary follows:

### Print Materials

- **Personal Academic Notebooks (PANs)** – There are four PANs, one for each *Interactive Mathematics* course. These contain study notes, sample worked problems, homework and practice problems, and practice tests for every lesson. They are designed for students to use as a companion text to the online lessons.
- **Instructor's Guide** - A reference which provides the instructor with supporting information for IM implementations. The guide includes: an overview of Mediated Learning; a description of the course structure and content; sample syllabi; a scope and sequence of IM topics and lesson; descriptions of special features of the courseware; and suggestions for classroom management, student monitoring and evaluation.
- **Answer and Solution Guide** – This book contains the answers and solutions to all homework and practice problems in the Personal Academic Notebook.

### CD-Based Materials

- **Mathematics Instructor's CD**
  - *Test Items and Answers* – A resource that contains a variety of test items that you can use to create your own quizzes and/or exams. The Test Items and Answers book is a Microsoft Word document that is fully editable.
  - *Personal Academic Notebooks (PANs)*
  - *2001 Update*- This document outlines corrections that were made to each PAN in April 2001.
  - *Answers and Solutions Guide*
  - *Instructional Support System User's Guide* – This book serves as a step-by-step reference guide to assist you in using the Instructional Support System.
  - *Instructor Guide*
  - *Enrichment Activities* – This book contains activities that examine lesson concepts in greater depth or apply concepts in new situations
  - *Collaborative Learning* – This book contains activities for each topic with challenging questions for students to investigate in groups.
  - *Software Feedback Report*
- **IM Lesson Viewer** – The Viewer CD is an instructor resource that allows teachers to preview IM lessons. No connection to the IM server is required; no reports are generated.
- **Lesson CDs** – The lesson CDs contain the IM content. Each course has two CDs: Part I and Part II.
- **Test Check** – A program that allows faculty to create tests, quizzes, and other handouts. The items are algorithmically generated; faculty can customize and create individual questions. The created documents can be distributed in print form or via a LAN.

- **Interactive Mathematics Client Installer** – The program on this CD configures a computer to access the server running *Interactive Mathematics*. Along with your ISP, it is also the tool which supports access to the program and the management system off campus, provided that the server for *Interactive Mathematics* is internet accessible.

## Online Materials

- Materials to assist with your knowledge of the *Interactive Mathematics* courseware and to assist in training other faculty can be found at <http://training.academic.com>. See Figure 7-1.

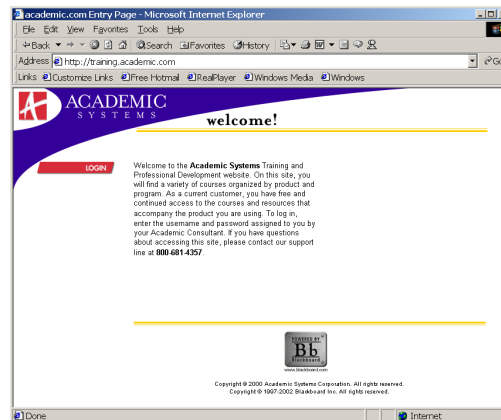


Figure 7-1

- Click LOGON.
- Log in with the following information. See Figure 7-2.
  - Username: math
  - Password: math

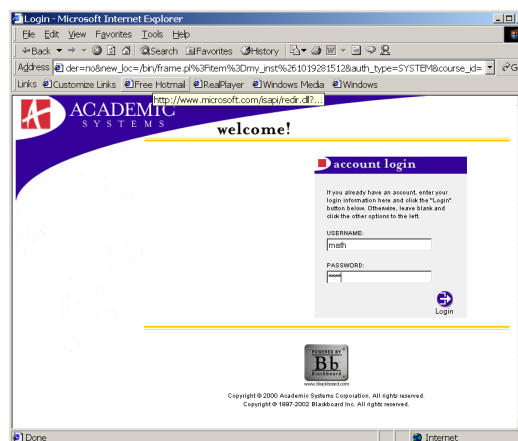


Figure 7-2

- Click courses in which you are enrolled: ASCI000 - *Interactive Mathematics* (link on right of screen.)

- Resources are available on the *Interactive Mathematics* homepage. Click links to “Getting Started” and “Tips and Tutorials” on the home page. See Figure 7-3.

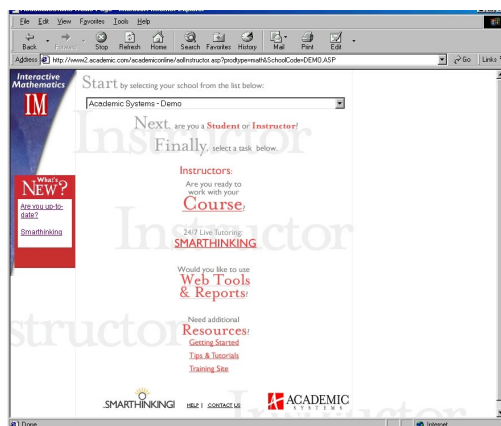


Figure 7-3

- The Tips and Tutorials link under Resources provides access to the following:
  - *Interactive Mathematics* Course Materials List
  - Using the *Interactive Mathematics* Lesson
  - Finding and Printing *Interactive Mathematics* Personal Academic Notebooks
  - Getting Started Lesson
  - *Interactive Mathematics* Study Tips
  - How to Check Your Progress and Read and Send Comments to Your Instructor
  - How to Use the Expression Editor
  - Expression Editor Tutorial
  - How to Use the Grapher
  - Patch Manager

## SECTION 8: STUDENT MATERIALS AND RESOURCES

Student materials are a combination of print, CD, and online support. A summary follows:

### **Print Materials**

- ***Personal Academic Notebooks (PANs)*** – There are four PANs, one for each *Interactive Mathematics* course; students receive the PAN aligned for their course. These contain study notes, sample worked problems, homework and practice problems, and practice tests for every lesson. They are designed for students to use as a companion text to the online lessons.

### **CD-Based Materials**

- **Lesson CDs** – The lesson CDs contain the IM content. Each course has two CDs: Part I and Part II.
- **Interactive Mathematics Client Installer** – The program on this CD configures a computer to access the server running *Interactive Mathematics*. Along with your ISP, it is also the tool which supports access to the program off campus, provided that the server for *Interactive Mathematics* is internet accessible.

### **Online Materials**

- A variety of resources are available on the *Interactive Mathematics* homepage. Click links to “Getting Started” and “Tips and Tutorials” on the home page. See listing of resources from the IM homepage in the Faculty Online Materials in Section 7.

## SECTION 9: APPENDIX

### A: Interactive Mathematics Scope and Sequence

Lesson	Concept	Objectives	Hours
<b>Topic F1: Whole Numbers</b>			
F1.1 Whole Numbers I	Adding and Subtracting	a) Number line and ordering symbols b) Place value c) Adding whole numbers d) Subtracting whole numbers e) Solving $x \pm a = b$ f) Applications	6-8 hours
	Multiplying and Dividing	a) Multiplying whole numbers b) Dividing whole numbers c) Prime factorization d) Solving $ax = b$ e) Applications	
	Rounding and Divisibility	a) Rounding and estimating b) Divisibility c) Applications	
F1.2 Whole Numbers II	Exponential Notation	a) Base b) Exponent c) Roots d) Applications	4-6 hours
	Order of Operations	a) Grouping symbols b) Order of operations c) Distributive property and other properties of whole numbers d) Combining similar terms e) Applications	

<b>Topic F2: Proportional Reasoning I</b>			
F2.1 Fractions I	Equivalent Fractions	a) Fraction notation b) Equivalent fractions (with larger or smaller denominators) c) Simplify fractions (reducing to lowest terms) d) Greatest common factor (GCF) e) Applications	4-6 hours
	Multiplying and Dividing	a) Mixed numerals and improper fractions b) Multiplying fractions c) Finding reciprocals d) Dividing fractions e) Solving $px = q$ f) Applications	

F2.2	Fractions II	Common Denominators	a) Least common multiple (LCM) b) Common denominators c) Least common denominator (LCD) d) Ordering fractions e) Applications	4-6 hours
		Adding and Subtracting	a) Fractions with the same denominators b) Fractions with different denominators c) Mixed numerals d) Order of operations e) Properties of rational numbers f) Combining similar terms g) Solving $x \pm p = q$ h) Applications	
F2.3	Decimals I	Notation	a) Place value b) Ordering decimals c) Rounding and estimating d) Applications	4-6 hours
		Converting	a) Converting decimals to fractions b) Converting fractions to decimals c) Irrational numbers d) Applications	
F2.4	Decimals II	Adding and Subtracting	a) Adding decimals b) Subtracting decimals c) Combining similar terms d) Solving $x \pm r = s$ e) Applications	4-6 hours
		Multiplying and Dividing	a) Multiplying decimals b) Dividing decimals c) Multiplying and dividing by powers of 10 d) Converting fractions to decimals e) Irrational numbers f) Order of operations g) Properties of real numbers h) Solving $rx = s$ i) Applications	

Topic F3: Proportional Reasoning II				
F3.I	Ratio and Proportion	Ratios	a) Notation b) Equivalent ratios c) Rates d) Applications	4-6 hours
		Proportions	a) Setting up a proportion b) Solving a proportion c) Similar triangles d) Applications	



F3.2	Percent	Definition	a) Percent as a fraction b) Percent as a decimal c) “Benchmark” percents d) Applications	6-8 hours
		Converting	a) Converting among fractions, decimals and percents b) Percent increase and decrease c) Applications	
		Solving Percent Problems	a) Setting up and solving proportions b) Setting up and solving other equations c) Applications	

#### Topic F4: Signed Numbers

F4.1	Signed Numbers I	Adding	a) Signed numbers b) Ordering signed numbers c) Absolute value d) Adding signed numbers e) Applications	4-6 hours
		Subtracting	a) Subtracting signed numbers b) Solving $x \pm a = b$ c) Applications	
F4.2	Signed Numbers II	Multiplying and Dividing	a) Multiplying signed numbers b) Dividing signed numbers c) Solving $ax = b$ d) Applications	4-6 hours
		Combining Operations	a) Order of operations b) Distributive property and other properties of real numbers c) Combining similar terms d) Applications	

#### Topic F5: Geometry

F5.1	Geometry I	Geometric Figures	a) Point, line, line segment, ray b) Polygons c) Measuring angles d) Angles: acute, right, obtuse, straight e) Relationships between angles: complementary, supplementary, adjacent, vertical f) Applications	4 hours
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F5.2	Geometry II	Perimeter and Area	a) Perimeter of a polygon b) Area of a polygon c) Area of a rectangle, square, parallelogram, triangle, trapezoid d) Circumference of a circle e) Area of a circle f) Perimeter and area of composite figures g) Applications	4-6 hours
		Surface Area and Volume	a) Surface area of a solid b) Volume of a solid c) Surface area and volume of a rectangular prism d) Surface area and volume of a cylinder e) Volume of a cone f) Volume of a sphere g) Composite figures h) Applications	
F5.3	Geometry III	Triangles and Parallelograms	a) Angle sum of a triangle b) Congruent triangles c) Isosceles and equilateral triangles d) Right triangles e) The Pythagorean Theorem f) Parallel lines and transversals g) Properties of parallelograms h) Applications	4-6 hours
		Similar Polygons	a) Similar polygons b) Similar triangles c) Applications	

Topic F6: Interpreting Data				
F6.1	Units of Measurement	US/English Units	a) Measures: length, weight, time, volume b) Converting from one unit to another c) Adding and subtracting measurements d) Applications	4-6 hours
		The Metric System	a) The metric system: length, mass, volume b) Fahrenheit and Celsius scales c) Converting between US and metric units d) Applications	
F6.2	Interpreting Graphs	Data and Graphs	a) Reading data from graphs b) Graphing data c) Pictographs d) Bar graphs e) Circle graphs f) Line graphs g) Applications	2-3 hours
F6.3	Introduction to Statistics	Statistical Measures	a) Mean b) Median c) Mode d) Box-and-whisker plots e) Applications	2-3 hours

Topic EI: Essentials — Preparing for Algebra				
EI.A	Fractions (reviews F2.1, F2.2)	Multiplying and Dividing	a) Equivalent fractions b) Prime factorization c) Reducing to lowest terms d) The greatest common factor (GCF) e) Multiplying fractions f) Finding reciprocals g) Dividing fractions	4 hours
		Adding and Subtracting	a) Fractions with the same denominators b) The least common multiple (LCM) c) The least common denominator (LCD) d) Fractions with different denominators	
EI.B	Signed Numbers (reviews F4.1, F4.2)	Adding and Subtracting	a) Adding signed numbers b) Subtracting signed numbers	4 hours
		Multiplying and Dividing	a) Multiplying and dividing signed numbers b) Exponential notation c) Distributive property and other properties of real numbers d) Order of operations	

Topic I: Real Numbers				
I.1	The Real Numbers	Number Line and Notation	a) Sets b) Subsets of real numbers: natural numbers, integers, rationals, irrationals c) Graphing real numbers on a number line d) Ordering symbols: $=$ , $<$ , $>$ , $\leq$ , $\geq$ e) The absolute value of a real number f) Grouping symbols g) Exponents	2 hours
I.2	Factoring and Fractions	The GCF and LCM	a) Prime factors b) Greatest common factor c) Least common multiple	3 hours
		Fractions	a) Reducing to lowest terms b) Multiplication and division c) Addition and subtraction	
I.3	Arithmetic of Numbers	Operations on Numbers	a) Addition b) Subtraction c) Multiplication d) Division e) Order of operations f) Commutative law g) Associative law h) Distributive law i) Additive and multiplicative identities j) Inverses	2 hours

Topic 2: Solving Linear Equations and Inequalities				
2.1	Algebraic Expressions	Simplifying Expressions	a) Constants and variables b) Terms and coefficients c) Combining like or similar terms d) Parentheses e) Evaluating expressions f) Formulas: Substitution	2 hours
2.2	Solving Linear Equations	Solving Equations I	a) Recognizing a linear equation b) The addition and subtraction principles for solving a linear equation c) The multiplication and division principles for solving a linear equation d) Combining the principles	3 hours
		Solving Equations II	a) Equations with fractions as coefficients b) Equations with no solutions or infinitely many solutions c) Formulas: Solving for a particular unknown	
2.3	Problem Solving	Number and Age	a) Translating words into algebraic expressions b) Number problems c) Age problems	4 hours
		Geometry	a) Geometry problems	
2.4	Linear Inequalities	Solving Inequalities	a) Recognizing solutions of linear inequalities b) Graphing solutions of inequalities in one variable c) The addition and subtraction principles for solving a linear inequality d) The multiplication and division principles for solving a linear inequality e) Combining the addition, subtraction, multiplication, and division principles f) Solving problems using inequalities	2 hours

Topic 3: Introduction to Graphing				
3.1	Introduction to Graphing	Plotting Points	a) The xy-plane b) The x-axis and y-axis c) The origin d) Ordered pairs e) The x-coordinate (abscissa), the y-coordinate (ordinate) f) Plotting ordered pairs of numbers g) Labeling the four quadrants h) Determining the quadrant in which a point lies i) The signs of the coordinates in each quadrant	3 hours
		Rise and Run	a) Subscript notation b) Geometric interpretation of rise and run c) Algebraic definition of rise and run	
		The Distance Formula	a) Pythagorean Theorem b) The distance formula c) The equation of a circle	

Topic 4: Graphing Linear Equations and Inequalities				
4.1	Graphing Equations	Graphing Lines I	a) Definition of a linear equation in two variables b) Recognizing linear equations in two variables c) Solutions of linear equations d) Graphing a linear equation by plotting ordered pairs	5 hours
		Graphing Lines II	a) Equations and graphs of horizontal and vertical lines b) The intercepts of a line c) Graphing a linear equation by finding the intercepts	
		Slope of a Line	a) Definition of the slope of a line b) Positive slope, negative slope, zero slope, undefined slope c) Graphing a line given a point and the slope d) Parallel and perpendicular lines	
4.2	The Equation of a Line	Finding the Equation I	a) Finding the equation of a line given a point on the line and the slope of the line b) The point-slope form of the equation of a line c) Finding the equation of a line given two points on the line	3 hours
		Finding the Equation II	a) The slope-intercept form of the equation of a line b) Finding the equation of a horizontal line c) Finding the equation of a vertical line d) Finding the equation of a line parallel or perpendicular to a given line	
4.3	Graphing Inequalities	Linear Inequalities	a) Ordered pairs as solutions of linear inequalities b) Graphing inequalities	2 hours

Topic 5: Solving Linear Systems				
5.1	Solving Linear Systems	Solution by Graphing	a) The solution of a linear system b) Graphing linear systems c) Systems with a unique solution d) Systems with no solutions e) Systems with an infinite number of solutions	3 hours
		Solution by Algebra	a) Solving linear systems by the substitution method: one solution, no solution, and an infinite number of solutions b) Solving linear systems by the elimination method: one solution, no solution, and an infinite number of solutions	
5.2	Problem Solving	Using Linear Systems	a) Number problems b) Interest problems c) Coin problems d) Mixture problems	2 hours
5.3	Systems of Inequalities	Solving Linear Systems	a) Solving systems of linear inequalities by graphing	2 hours

Topic 6: Exponents and Polynomials				
6.1	Exponents	Properties of Exponents	a) Definition of exponent, power, and base b) Multiplication property c) Division property d) Powers raised to powers e) Products raised to powers f) Quotients raised to powers g) The zero exponent	2 hours
6.2	Polynomial Operations I	Adding and Subtracting	a) Definition of polynomial, term, and coefficient b) Evaluating a polynomial c) The degree of a term and a polynomial d) Writing the terms of a polynomial in descending order e) Definition of a monomial, binomial, and trinomial f) Recognizing like or similar terms g) Combining like or similar terms h) Polynomial addition i) Polynomial subtraction	4 hours
		Multiplying and Dividing	a) Multiplying a monomial by a monomial b) Multiplying a polynomial by a monomial c) Dividing a monomial by a monomial d) Dividing a polynomial by a monomial	
6.3	Polynomial Operations II	Multiplying Binomials	a) Multiplying binomials by the "FOIL" method b) Perfect squares, product of the sum and difference of two terms	4 hours
		Multiplying and Dividing	a) Multiplying a polynomial by a polynomial b) Dividing a polynomial by a polynomial	

Topic 7: Factoring				
7.1	Factoring Polynomials I	Greatest Common Factor	a) Finding the greatest common factor (GCF) of a set of monomials b) Factoring a polynomial by finding the GCF when the GCF is a monomial	4 hours
		Grouping	a) Factoring a polynomial by finding the GCF when the GCF is a binomial b) Factoring a polynomial with four terms by grouping	
7.2	Factoring Polynomials II	Trinomials I	a) Factoring trinomials of the form $x^2 + bx + c$ ; $x^2 + bxy + cy^2$	4 hours
		Trinomials II	a) Factoring trinomials of the form $ax^2 + bx + c$ , $a \neq 1$ , by trial-and-error b) Factoring trinomials of the form $ax^2 + bx + c$ , $a \neq 1$ , by grouping c) Solving quadratic equations by factoring	
7.3	Factoring by Patterns	Recognizing Patterns	a) Factoring a perfect square trinomial b) Factoring a difference of two squares c) Factoring a sum and difference of two cubes d) Factoring using a combination of methods	2 hours

Topic 8: Rational Expressions				
8.1	Rational Expressions I	Multiplying and Dividing	a) Determining when a rational expression is undefined b) Writing a rational expression in lowest terms c) Multiplying rational expressions d) Dividing rational expressions e) Simplifying a complex fraction	2 hours
		Adding and Subtracting	a) Adding rational expressions with the same denominator b) Subtracting rational expressions with the same denominator	
8.2	Rational Expressions II	Negative Exponents	a) Notation b) Scientific notation	3 hours
		Multiplying and Dividing	a) Reducing a rational expression of the form $(a-b)/(b-a)$ b) Multiplying rational expressions c) Dividing rational expressions d) Simplifying a complex fraction	
		Adding and Subtracting	a) Finding the least common denominator of two or more rational expressions b) Adding rational expressions with different denominators c) Subtracting rational expressions with different denominators d) Simplifying a complex fraction	
8.3	Equations with Fractions	Solving Equations	a) Solving equations with rational expressions b) Solving for an unknown in a formula involving a rational expression	2 hours
8.4	Problem Solving	Rational Expressions	a) Ratio and proportion b) Distance problems c) Work problems d) Variation	2 hours

Topic EII: Essentials of Algebra				
EII.A	Real Numbers and Exponents (reviews 1.1, 1.3, 6.1)	Real Numbers and Notation	a) Number line and notation: sets, ordering symbols, grouping symbols, exponents, and absolute value b) Operations on signed numbers c) Properties of real numbers: commutative law, associative law, distributive law, additive and multiplicative identities, inverses	2 hours
		Integer Exponents	a) Nonnegative integer exponents b) Properties of exponents	

EII.B	Polynomials (reviews 2.1, 6.2, 7.1, 7.2)	Polynomial Operations	a) Algebra building blocks: constants, variables, terms and coefficients b) Evaluating polynomials c) Adding and subtracting polynomials d) Multiplying and dividing polynomials	2 hours
		Factoring Polynomials	a) Factoring out the greatest common factor b) Factoring by grouping c) Factoring trinomials d) Factoring a difference of 2 squares e) Factoring sums and differences of 2 cubes f) Factoring using a combination of methods	
EII.C	Equations and Inequalities (reviews 2.2, 2.4)	Linear	a) Solving linear equations b) Solving linear inequalities	2 hours
EII.D	Rational Expressions (reviews 8.1, 8.2)	Rational Expressions	a) Negative integer exponents b) Writing rational expressions in lowest terms c) Multiplying and dividing rational expressions d) Adding and subtracting rational expressions	2 hours
		Rational Equations	a) Solving equations that contain rational expressions	
EII.E	Graphing Lines (reviews 3.1, 4.1, 4.2)	Graphing Lines	a) The coordinate system b) Graphing lines	2 hours
		Finding Equations	a) Slope and intercepts b) Finding the equation of a line	
EII.F	Absolute Value (New material)	Solving Equations	a) Solving $ x  = a$ b) Solving $ Ax + B  = a$ c) Solving $ Ax + B  =  Cx + D $	3 hours
		Solving Inequalities	a) Solving absolute value inequalities	

### Topic 9: Rational Exponents and Radicals

9.I	Roots and Radicals	Square Roots and Cube Roots	a) Definition of square root and cube root b) Radicand, radical c) Principal square root d) Multiplication and division properties e) Simplifying a square root or a cube root of a whole number f) Simplifying a square root or a cube root of simple monomial expression	3 hours
		Radical Expressions	a) Simplifying radical expressions b) Like radical terms c) Simplifying a sum or difference of radical expressions d) Multiplying radical expressions e) Conjugates f) Rationalizing the denominator g) Solving radical equations	



9.2	Rational Exponents	Roots and Exponents	a) The $n$ th root of a number b) Definition of $a^{1/n}$ and $a^{m/n}$ c) Properties of rational exponents	4 hours
		Simplifying Radicals	a) Simplifying radicals	
		Operations on Radicals	a) Multiplying radical expressions b) Dividing radical expressions c) Adding and subtracting radical expressions	

#### Topic 10: Quadratic Equations

10.1	Quadratic Equations I	Solving by Factoring	a) The standard form of a quadratic equation b) Putting a quadratic equation into standard form $ax^2 + bx + c = 0$ ; $a \neq 0$ c) Solving quadratic equations of the form $ax^2 + bx = 0$ by factoring d) Solving quadratic equations of the form $ax^2 + bx + c = 0$ by factoring	2 hours
		Solving by Square Roots	a) Finding square roots b) Solving quadratic equations of the form $ax^2 = b$ c) Solving quadratic equations of the form $(ax + b)^2 = c$	
10.2	Quadratic Equations II	Completing the Square	a) Solving quadratic equations of the form $x^2 + bx + c = 0$ by completing the square b) Solving quadratic equations of the form $ax^2 + bx + c = 0$ , $a \neq 1$ , by completing the square	3 hours
		The Quadratic Formula	a) Introducing the quadratic formula b) Using the quadratic formula to solve quadratic equations of the form $ax^2 + bx + c = 0$ c) Using the discriminant of a quadratic equation to determine the nature of the solutions of the equation	
10.3	Complex Numbers	Complex Number System	a) Definition of complex numbers b) Powers of $i$ c) Operations on complex numbers	2 hours

#### Topic 11: Functions and Graphing

11.1	Functions	Functions and Graphs	a) Definition of a function b) Function as an ordered pair of numbers c) Finding function values given a formula d) Function notation: $y = f(x)$ e) Graphing simple functions f) Domain and range of a function g) The vertical line test	4 hours
		Linear Functions	a) Graphs of linear functions b) Graphs of absolute value functions	
		Quadratic Functions	a) Graphs of quadratic functions b) Intercepts of quadratic functions	

11.2	The Algebra of Functions	The Algebra of Functions	a) The sum and difference of functions b) The product and quotient of functions c) The composition of functions	4 hours
		Inverse Functions	a) Finding the inverse and the equation of the inverse b) Defining one-to-one and checking whether a function has an inverse that is a function c) Graphing inverse functions	

### Topic 12: The Exponential and Logarithmic Functions

12.1	Exponential Functions	The Exponential Function	a) Recognizing and graphing an exponential function b) Applications of the exponential function c) The algebra of exponential functions	2 hours
12.2	Logs and Their Properties	The Logarithmic Function	a) Converting from exponents to logarithms and from logarithms to exponents b) Recognizing and graphing a logarithmic function	2 hours
		Logarithmic Properties	a) The algebra of logarithmic functions	
12.3	Applications of Logs	Natural and Common Logs	a) Base e and natural logarithms b) Finding logs in base 10 and finding powers of 10, using a calculator c) Finding logs in base e and powers of e, using a calculator d) Change of base formula	2 hours
		Solving Equations	a) Solving exponential equations b) Solving logarithmic equations	

### Topic 13: More Nonlinear Equations and Inequalities

13.1	Nonlinear Equations	Solving Equations	a) Solving polynomial equations by factoring b) Solving quadratic-type equations by factoring or by substitution	3 hours
		Radical Equations	a) Solving $\sqrt{ax+b} = cx + d$ b) Solving $\sqrt{ax+b} + \sqrt{cx+d} = ex + f$ c) Solving $\sqrt[n]{ax+b} = \sqrt[n]{cx+d}$ d) Solving equations that contain rational exponents	
13.2	Nonlinear Systems	Solving Systems	a) The solution of a nonlinear system b) Solving nonlinear systems by graphing c) Solving nonlinear systems by the addition method d) Solving nonlinear systems by the substitution method	2 hours
13.3	Inequalities	Quadratic Inequalities	a) Solving quadratic inequalities	4 hours
		Rational Inequalities	a) Solving rational inequalities	

Topic EIII: Essentials of Algebra			
EIII.A Algebra Building Blocks (reviews 1.1, 1.3, 6.1, 8.1, 9.1)	Real Numbers and Notation	a) Number line and notation: sets, ordering symbols, absolute value and distance b) Operations on signed numbers c) Properties of real numbers: commutative law, associative law, distributive law, additive and multiplicative identities, inverses	3 hours
	Exponents and Radicals	a) Nonnegative integer exponents b) Negative integer exponents c) Roots and rational exponents d) Properties of exponents e) Operations on radicals	
EIII.B Algebraic Expressions (reviews 2.1, 6.2, 7.1, 7.2, 8.1, plus **new material)	Polynomials	a) Algebra building blocks: constants, variables, terms and coefficients b) Adding and subtracting polynomials c) Multiplying and dividing polynomials d) Factoring out the greatest common factor e) Factoring by grouping f) Factoring trinomials g) Factoring a difference of 2 squares h) Factoring sums and differences of 2 cubes i) Factoring other algebraic expressions **	3 hours
	Rational Expressions	a) Writing rational expressions in lowest terms b) Multiplying and dividing rational expressions c) Adding and subtracting rational expressions	
EIII.C Equations and Inequalities (reviews 2.2, 2.4, 3.1, 4.1, 4.2, EII.F, 10.1, 10.2, plus **new material)	Linear and Absolute Value	a) Solving linear equations b) Interval notation** c) Solving linear inequalities d) Solving absolute value equations e) Solving absolute value inequalities	3 hours
	Quadratic	a) Solving quadratic equations: by factoring, by the square root method, by completing the square, by the quadratic formula b) Complex numbers c) The discriminant d) Solving other polynomial equations	
	Linear Equations	a) Cartesian coordinate system b) Distance formula c) Midpoint of a line segment** d) Finding the equation of a line: point-slope form, standard form, slope-intercept form, horizontal line, vertical line, line parallel or perpendicular to a given line	

EIII.D	Functions (reviews 11.1, 11.2, plus **new material)	Functions and Graphs	a) Function notation b) Difference quotients** c) Graphing functions d) Domain and range of a function e) Linear functions f) Absolute value functions g) Quadratic functions: vertex and intercepts	3 hours
		The Algebra of Functions	a) Sum, difference, product, and quotient of two functions b) Composition of functions c) Inverse functions	
EIII.E	Exponents and Logarithms (reviews 12.1, 12.2, 12.3)	Exponential Functions	a) Graphing exponential functions b) Applications of exponential functions c) Solving some exponential equations	3 hours
		Logarithmic Functions	a) Exponential and logarithmic form b) Graphing logarithmic functions c) Properties of logarithms	
		Solving Equations	a) Using a calculator to approximate common and natural logarithms b) Change of base formula c) Solving logarithmic equations d) Solving exponential equations	
EIII.F	Finding Solutions (reviews 13.1, 13.3)	Equations and Inequalities	a) Solving quadratic inequalities b) Solving rational inequalities c) Solving equations which contain radical expressions	3 hours

#### Topic 14: Nonlinear Functions and the Theory of Equations

14.1	Nonlinear Functions	Polynomial Functions	a) Recognizing polynomial functions b) Symmetry c) Even and odd functions d) Graphing polynomial functions e) Translations and reflections	6 hours
		Rational Functions	a) Recognizing rational functions b) Determining vertical and horizontal asymptotes c) Graphing rational functions	
14.2	Theory of Equations	Polynomial Division	a) Dividing a polynomial by a polynomial (polynomial long division) b) Synthetic division c) The Remainder Theorem	8 hours
		The Factor Theorem	a) The Factor Theorem b) The Fundamental Theorem of Algebra	
		Zeros of Polynomials	a) Rational zeros of a polynomial b) Complex zeros of a polynomial c) Descartes' Rule of Signs d) Bounds on the zeros of a polynomial e) The Intermediate Value Theorem f) Irrational zeros of a polynomial	

Topic 15: Conic Sections				
15.1	Graphs of Conic Sections	Circles and Parabolas	a) The equation of a circle b) Finding the center and radius of a circle by completing the square c) Graphing a circle d) The equation of a parabola e) Finding the vertex and orientation of a parabola by completing the square f) Graphing a parabola g) The focus, directrix, and latus rectum of a parabola	6 hours
		Ellipses	a) The equation of an ellipse b) Writing the equation of an ellipse in standard form by completing the square c) Graphing an ellipse	
		Hyperbolas	a) The equation of a hyperbola b) Writing the equation of a hyperbola in standard form by completing the square c) Finding the fundamental rectangle and asymptotes of a hyperbola d) Graphing a hyperbola	

Topic 16: Matrices and Determinants				
16.1	Determinants	Determinants	a) Definition of matrix b) Definition of a determinant c) Basic properties of determinants	6 hours
		Cramer's Rule	a) Solution of a linear system by Cramer's Rule	
		Partial Fractions	a) Partial fractions	
16.2	Matrices	The Algebra of Matrices	a) Basic properties of matrices b) Equality of matrices and addition, subtraction, and scalar multiplication of matrices c) Product of matrices d) The inverse of a matrix	4 hours
		The Gauss-Jordan Method	a) Linear systems and matrices b) The Gauss-Jordan Method	

Topic 17: Induction, Sequences and Counting				
17.1	Sequences and Series	Arithmetic	a) Definition and notation for a sequence b) Arithmetic sequences and finding the $n$ th term c) Sum of the first $n$ terms of an arithmetic sequence	4 hours
		Geometric	a) Geometric sequences and finding the $n$ th term b) Sum of the first $n$ terms of a geometric sequence c) Sigma notation for a sum d) Finding an “infinite sum” for certain geometric sequences	
17.2	Induction; Binomial Theorem	Mathematical Induction	a) Proof by mathematical induction	4 hours
		Binomial Theorem	a) Binomial expansions and Pascal’s Triangle b) Definition of $n!$ c) Finding binomial coefficients d) The Binomial Theorem	
17.3	Counting and Probability	Methods of Counting	a) Multiplication principle of counting b) Permutations c) Combinations	4 hours
		Probability	a) Basics of probability b) How to calculate the probability that one event or another event occurs c) How to calculate the probability that one event and another event occur	