

A Bridge to Algebra and Geometry



McDougal Littell / Houghton Mifflin

Mathematical Connections

A Bridge to Algebra and Geometry



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LETTER TO STUDENTS

Dear student,

You're invited . . .

Mathematical Connections is a bridge that will take you from where you are in your study of mathematics to algebra and geometry. Since topics in mathematics are connected, this course will also lead you to data analysis and probability. We have written this textbook because we want you to enjoy your continuing journey into mathematics.

to explore . . .

In this course you're expected to get actively involved in learning: explore, ask questions, discuss alternatives, and make connections between what's new and what's known. Exploration can be done by using mathematical models, by using a calculator or a computer, and by using your active, open mind.

together . . .

If you have difficulty, and you may at times, don't get discouraged. Your teacher wants you to succeed and will be working hard to help you. Your classmates are there with you, and you may be able to solve a problem more easily by working cooperatively in a group. We've also built help for you into the textbook. We encourage you to read the explanations in your book, study the *Examples*, answer the *Check Your Understanding* questions, and compare your answers with those at the back of your book.

for your future . . .

Don't close off any roads to the future at this stage of your journey. In tomorrow's world, the new situations you'll face as a citizen may call for decision-making skills you're building now, and your job may be one that you can't even imagine today. Through the study of mathematics, prepare yourself to cross any bridge along the way.

We wish you a successful, enjoyable journey.



Patricia R. Inge



60 seconds (s) = 1 minute (min)	365 days	} = 1 year
60 minutes = 1 hour (h)	52 weeks (approx.)	
24 hours = 1 day	12 months	} = 1 decade
7 days = 1 week	10 years	
4 weeks (approx.) = 1 month	100 years = 1 century	

USING TECHNOLOGY

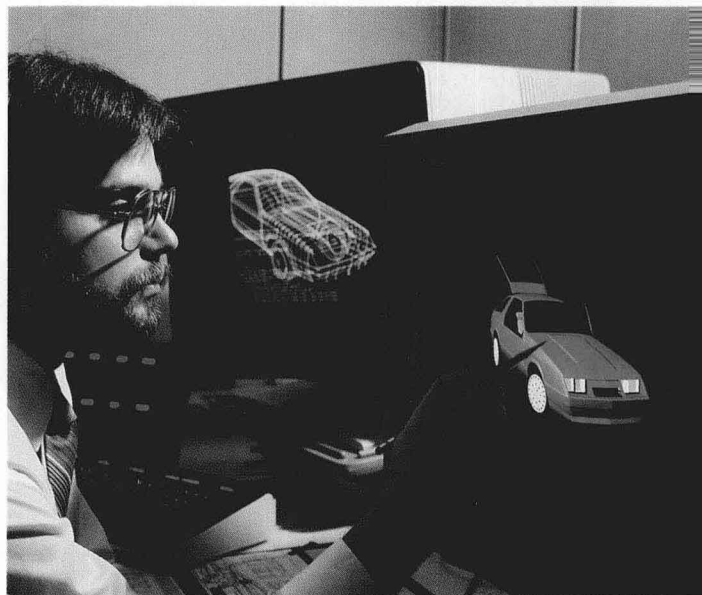
TECHNOLOGY IN OUR DAILY LIVES

Today's World. Over the past 20 years, technology has dramatically changed the way that we live and work. From hand-held calculators to microwave ovens and VCRs to large-scale computers that process financial data or help plan space explorations, calculators and computers have become an important part of our lives.

Computers are well known for their ability to perform numerical calculations quickly. An even more important contribution of computers may be their ability to transmit information (words, pictures, sounds) electronically. By means of computers, information can be shared almost instantly with people throughout the world.



Tomorrow's World. In the 21st century, even more jobs than today will involve the use of calculators or computers. Becoming familiar with these technological tools will help you prepare for your future work. It will also help you become a well-informed citizen. In order to make effective decisions about the public and private uses of technology, every citizen needs a general understanding of what calculators and computers can—and cannot—do.

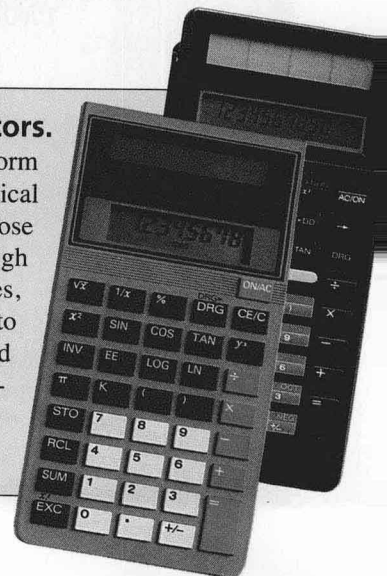


USING CALCULATORS

Calculators for Everyday Use. Since calculators are useful in a wide variety of different situations, specialized calculators have been designed to meet particular home, school, or job needs. For example, a calculator that does arithmetic operations is useful for everyday needs such as checking an itemized bill, balancing a checkbook, or preparing a tax form.

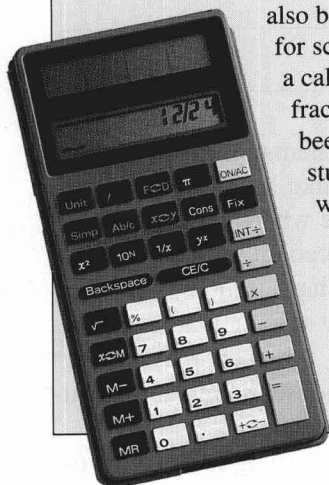
Scientific Calculators.

A calculator that can perform more advanced mathematical operations, such as those studied in advanced high school or college courses, is particularly useful to scientists, engineers, and others who use mathematics in their daily work.

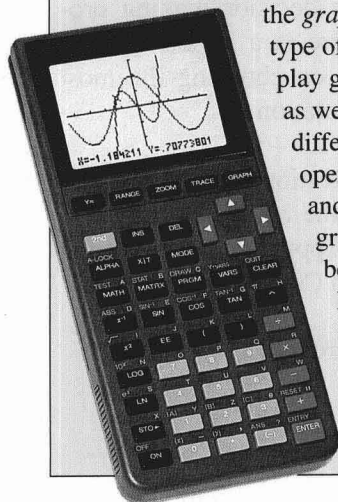


A calculator that can perform financial and statistical operations is especially useful to bankers, financial analysts, and statisticians.

Fraction Calculators. Calculators have also been designed especially for school use. For example, a calculator that performs fraction operations has been developed to help students understand work with fractions.



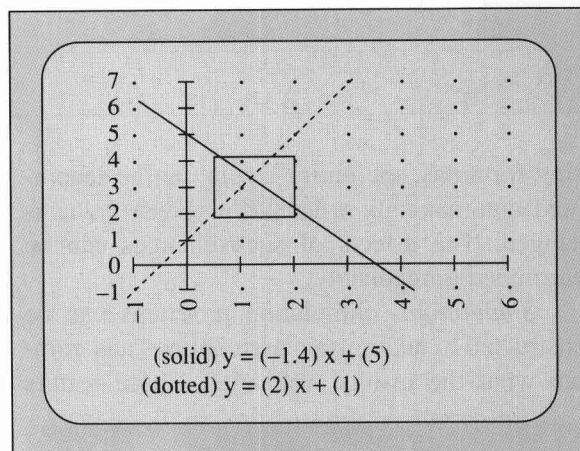
Graphing Calculators. An exciting recent advance in calculator technology is the *graphing calculator*. This type of calculator can display graphs of equations, as well as perform many different mathematical operations, both simple and complex. The graphing calculator has been called a “hand-held computer” because it has capabilities that only much larger computers had in the past.



USING COMPUTERS

Computer Software. Programmers can write special programs to solve particular problems. However, many programs used in schools and businesses are written in a general form, with instructions for inserting formulas or values. Such programs may be supplied on disks to be transferred to the computer’s memory. Here are some general categories:

Function Graphing and Automatic Drawing. Function graphing software allows the user to quickly plot graphs of functions by entering an equation or a formula.



Most function graphing programs contain options for changing the scale, or “zooming,” to better investigate small portions of the graph, such as the region where the graph crosses an axis. Automatic drawing software can be used to draw and measure geometric figures.

Word Processing. A word processing program accepts typed text and makes corrections as requested, adjusting the lines to fit. The text may be divided into paragraphs and pages, and words may be made italic or boldface. The methods of page make-up can produce pages ready to be printed directly. This process is called “desktop publishing.”

Manipulating databases. With database software, collections of data, such as membership lists with addresses, telephone numbers, and other information, can be sorted and analyzed in various ways. For instance, mailings can be sorted by zip codes.

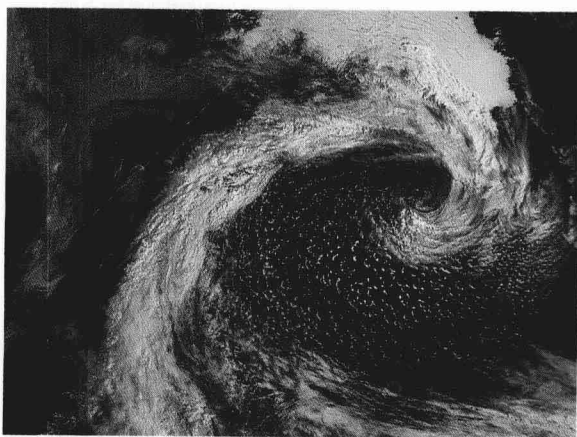
Spreadsheets. With an electronic spreadsheet like the one pictured on the next page, a user can enter a number, a formula, or a label (word) into each compartment, or *cell*. Such a program can be used to produce financial statements, solve equations, or determine function values. An especially useful feature is that by

Spreadsheet program provides a network of cells.

	A	B	C	D	E	F	G
1							
2							
3							

using formulas, the entire layout can be recomputed automatically whenever a given value is changed. The effects of such changes can be determined immediately.

Simulations. Simulation programs can be constructed to take certain assumptions and compute what the results would be. These results



can then be used to predict what will happen in the real-world situation. Simulation techniques are currently used in a wide range of fields, including financial forecasting, astronaut training, consumer-buying patterns, and building and city planning. Automobile manufacturers often use wind-tunnel simulations to investigate the effects of different design modifications. Simulations are particularly useful when the situation under consideration is difficult, impossible, costly, or very dangerous to observe directly.

USING TECHNOLOGY IN THIS COURSE

Tools for Learning. Calculators and computers can help you learn mathematics. They

can help you explore mathematical concepts as well as do calculations. Like a typewriter, they are *tools*. You must decide when and how to use them. Just as a typewriter cannot tell you what to write or whether what you have written is good, a calculator cannot tell you which mathematical operation to perform or whether the answer makes sense. You must choose the mathematical operations and interpret the result.

An important part of learning to use technological tools is deciding when it is efficient to use them and when it is better to use some other method, such as mental math, paper and pencil, or estimation. Since this decision-making process is so important, there is a lesson right in Chapter 1 (see page 28) on choosing the most efficient method of computation.

Computers. Applications of computers are included throughout the book—in the exercises called “Computer Application” and in the sections called “Focus on Computers.”

Here are some page references:

BASIC Programs	6, 298, 485, 567, 688
CAD Software	631
Database Software	220, 349
Geometric Drawing Software	270, 470
Graphing Software	
Function Graphing	596, 598
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Statistical Graphing	212, 512, 521
Logo Programs	265
Spreadsheets	55, 70, 174, 411

Calculators. Calculators are featured in many places in this course—in the lessons, in the exercises, and in special explorations. The fol-

lowing chart lists some topics and the associated calculator keys that you will learn about in this course.

Topics	Keys	Explained, Pages
Using Memory	M+ M- MR MC	xviii
Basic Operations	+ - × ÷ =	7–8, 11–12
Exponents	y^x x²	31, 453
Order of Operations	()	37
Repeated Operations	K	63
Scientific Notation	EE EXP	81
Operations with Integers	+/-	108
Finding Statistics	Σx n \bar{x}	231
Fraction Operations	a^b/_c	341
Finding Reciprocals	1/x	345
Finding Percents	%	409
Geometric Measurement	π	441
Finding Square Roots	√x	476
Finding Permutations	x!	561
Graphing Functions	Y= X T GRAPH (-) ^	586, 617
Trigonometric Functions	SIN COS TAN INV	719, 723

Getting Started with Your Calculator

Calculators can help you to do complicated computations easily. In order to use a calculator effectively, you should become familiar with its basic keys. Some particularly useful keys are those that control the memory.

- M+** adds the number displayed to the number in the memory.
- M-** subtracts the number displayed from the number in the memory.
- MR** or **MRC** recalls the number stored in the memory.
- MC** clears the memory by setting it to zero.

Activity I *Using the Memory Keys*

- 1 Turn on your calculator and be sure that the display and memory are clear.
- 2 Store the number 101 in the memory using the following key sequence:
1 **0** **1** **M+**
- 3 Clear the display, then multiply the number in the memory by 53 using the following key sequence:

5 **3** **×** **MR** **=**

Record the result on a piece of paper.

- 4 Repeat Step 3 using other two-digit numbers. What pattern do you notice in the results?
- 5 Predict what might happen when you multiply a three-digit number by the number 1001. Test your prediction using your calculator.
- 6 What number should you store in memory to obtain a similar pattern when you multiply a four-digit number? Use a calculator to test your prediction.

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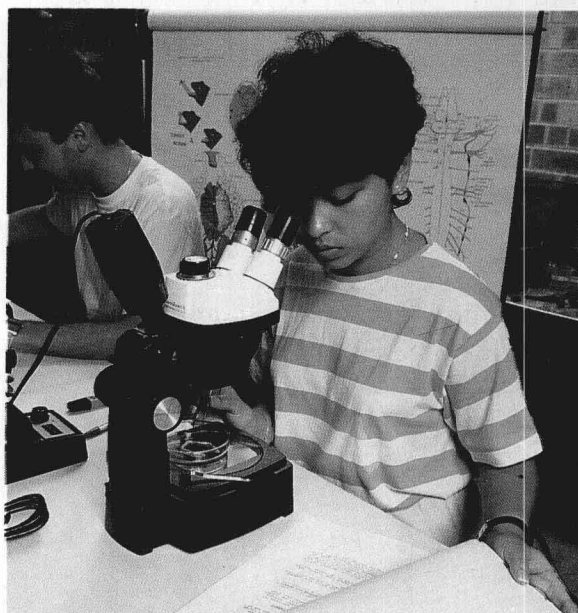


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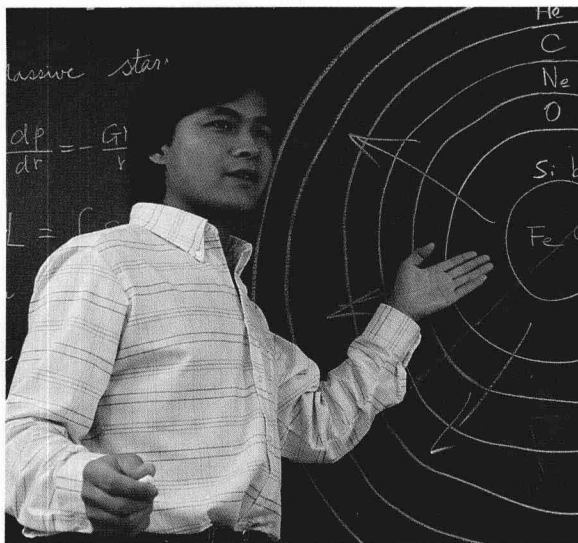


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