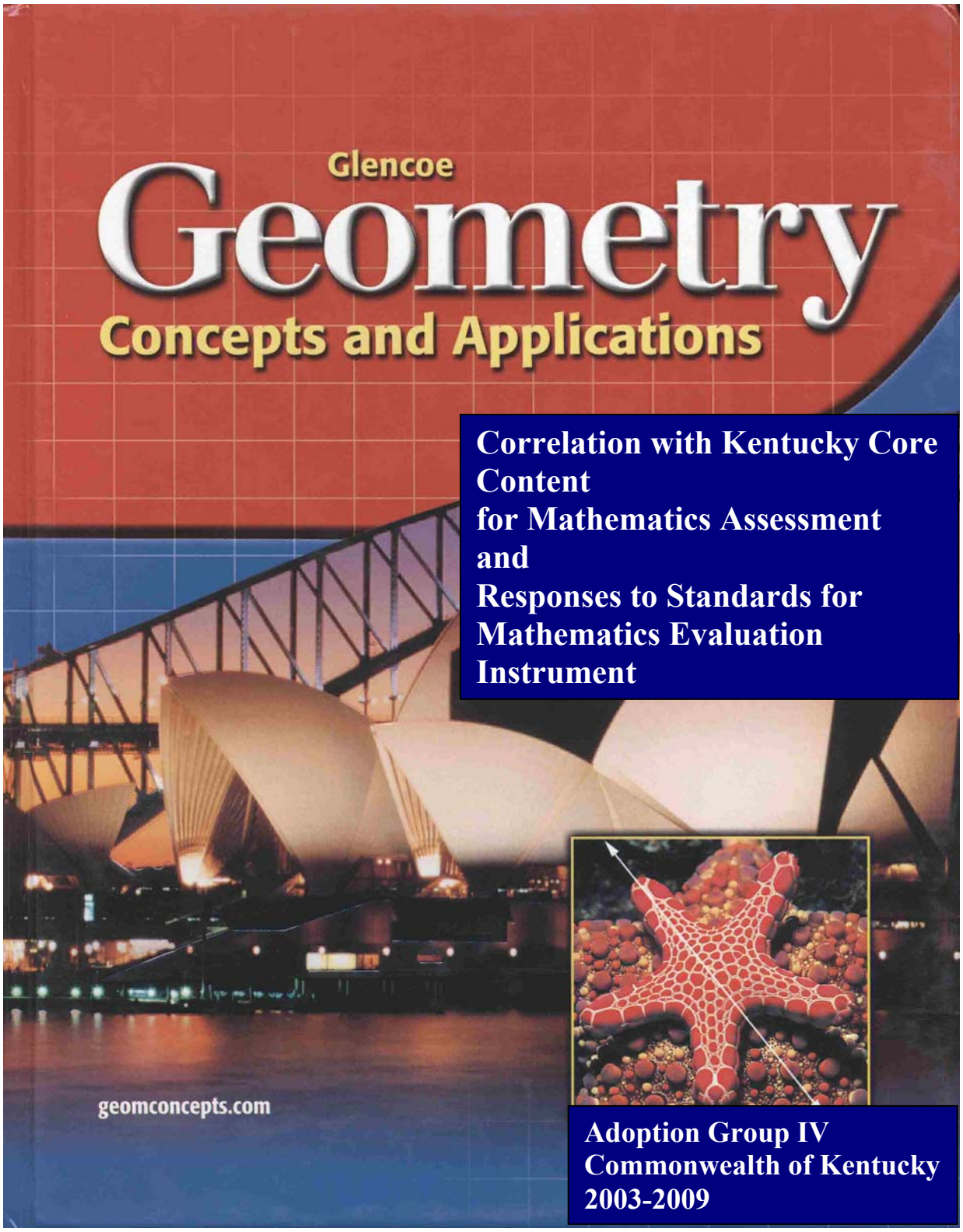
KENTUCKY


Glencoe
Geometry
Concepts and Applications
Correlation with Kentucky Core Content
for Mathematics Assessment
and
Responses to Standards for Mathematics Evaluation Instrument
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Commonwealth of Kentucky
2003-2009

Number/Computation	
Concepts	
OBJECTIVES	**PAGE REFERENCES**
MA-H-1.1.1 Students will describe properties of, define, give examples of, and apply real numbers to both real-world and mathematical situations, and understand that irrational numbers cannot be represented by terminating or repeating decimals.	SE: **Sample Demonstrator: 50** 50-55, 56-60, 82, 83, 478-482, 483-487, 490, 548-553, 578 *Problem-Solving Workshop* 453 TWE: A 61 MC 62, 554
MA-H-1.1.2 Students will recognize, define, give examples of, and apply to both real-world and mathematical situations finite arithmetic and geometric sequences and series.	SE: 4-9, 42, 45, 101, 726 *Problem-Solving Workshop* 3 TWE: MC 12
MA-H-1.1.3 Students will understand how matrices are used to represent real-world data.	See *Algebra: Concepts and Applications.*

See page 29 for a list of codes used for TWE pages.

Sample Demonstrator
Number/Computation: Concepts
MA-H-1.1.1 to MA-H-1.1.3

2–1 Real Numbers and Number Lines

What You'll Learn
You'll learn to find the distance between two points on a number line.

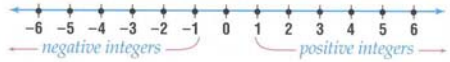
Why It's Important
Weather
Meteorologists use the Ruler Postulate to determine the difference between temperatures on a thermometer.
See Exercise 30.

Numbers that share common properties can be *classified* or grouped into sets. Different sets of numbers can be shown on number lines.

Whole Numbers

This figure shows the set of **whole numbers**. The whole numbers include 0 and the **natural**, or counting, **numbers**. The arrow to the right indicates that the whole numbers continue indefinitely. Zero is the least whole number.

Integers



A number line can be used to represent the set of **integers**. Integers include 0, the positive integers, and the negative integers. The arrows indicate that the numbers go on forever in both directions.

Rational Numbers

A number line can also show **rational numbers**. A rational number is any number that can be written as a fraction, $\frac{a}{b}$, where a and b are integers and b cannot equal 0. The number line above shows some of the rational numbers between −2 and 2. In fact, there are infinitely many rational numbers between any two integers.

Rational numbers can also be represented by decimals.

$\frac{3}{8} = 0.375$ $\frac{2}{3} = 0.666\ldots$ $\frac{0}{5} = 0$

Decimals may be **terminating** or **nonterminating**.

0.375 and 0.49 are terminating decimals.
0.666 . . . and −0.12345 . . . are nonterminating decimals.

The three periods following the digits in the nonterminating decimals indicate that there are infinitely many digits in the decimal.

Number/Computation	
Skills	
OBJECTIVES	**PAGE REFERENCES**
MA-H-1.2.1 Students will perform addition, subtraction, multiplication, and division with real numbers in problem-solving situations to specified accuracy.	SE: 50-55, 56-61, 82, 83, 719, 720, 721, 728 TWE: MM 48c
MA-H-1.2.2 Students will simplify real number expressions such as those containing opposites, reciprocals, absolute values, exponents (integer), roots (square, cube), and factorials.	SE: **Sample Demonstrator: 548** 50-55, 82, 548-553, 578, 719, 720, 721, 728, 750 TWE: MC 56, 554
MA-H-1.2.3 Students will use matrix addition, subtraction, multiplication (no larger than 2 by 2), and scalar multiplication to solve real-world problems.	See *Algebra: Concepts and Applications.*
MA-H-1.2.4 Students will determine a specific term of a sequence given an explicit formula and write an explicit rule for the nth term of arithmetic and geometric sequences.	See *Algebra: Concepts and Applications.*
MA-H-1.2.5 Students will use simple combinations and permutations to count discrete quantities.	SE: *Preparing for Standardized Tests* 138-139 Also see *Algebra: Concepts and Applications.*

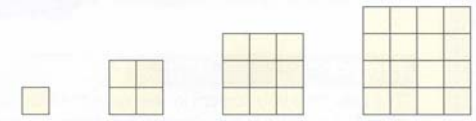
Sample Demonstrator
Number/Computation: Skills
MA-H-1.2.1 to MA-H-1.2.5

13–1 Simplifying Square Roots

What You'll Learn
You'll learn to multiply, divide, and simplify radical expressions.

Why It's Important
Aviation Pilots use a formula with a radical expression to determine the distance to the horizon.
See Example 9.

Squaring a number means multiplying a number by itself. The area of a square is found by squaring the measure of a side.



The numbers 1, 4, 9, and 16 are called **perfect squares** because $1 = 1^2$, $4 = 2^2$, $9 = 3^2$, and $16 = 4^2$. Note that perfect squares are products of two equal factors.

The inverse (opposite) of squaring is finding a **square root**. To find a square root of 16, find two equal factors whose product is 16. The symbol $\sqrt{\ }$, called a **radical sign**, is used to indicate the positive square root.

$\sqrt{16} = 4$ because $4^2 = 16$

Read the symbol $\sqrt{16}$ as the square root of 16.

Examples

Simplify each expression.

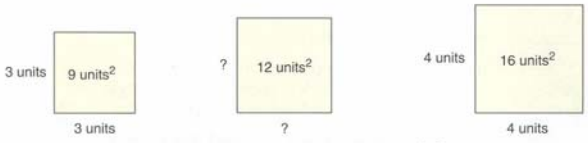
1. $\sqrt{49}$
   $\sqrt{49} = 7$ because $7^2 = 49$.

2. $\sqrt{64}$
   $\sqrt{64} = 8$ because $8^2 = 64$.

Your Turn

a. $\sqrt{25}$ b. $\sqrt{144}$

There are many squares that have area measures that are *not* perfect squares. For example, the center square has an area of 12 square units.



Look Back
Irrational Number: Lesson 2–1

However, there are no whole number values for $\sqrt{12}$. It is an irrational number. You can use a calculator to find an approximate value for $\sqrt{12}$.

2nd [$\sqrt{\ }$] 12 ENTER 3.464101615

Number/Computation	
Relationships	
OBJECTIVES	**PAGE REFERENCES**
MA-H-1.3.1 Students will understand how the following subsets of real numbers relate to each other: natural, whole, integers, rational, irrational, reals.	SE: 50-55 TWE: MC 56 Also see *Algebra: Concepts and Applications.*
MA-H-1.3.2 Students will understand how real number properties (identity, inverse, commutative, associative, distributive, closure) are used to simplify expressions and solve equations.	SE: 56-61, 822, 718, 723, 724 TWE: T 57 Also see *Algebra: Concepts and Applications.*
MA-H-1.3.3 Students will understand how to use equivalence relations (reflexive, symmetric, transitive) and order relations (less than, greater than, equal to) to solve problems using real numbers.	SE: 276-281 TWE: EM 61, 281 Also see *Algebra: Concepts and Applications.*
MA-H-1.3.4 Students will understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems.	SE: **Sample Demonstrator: 350** 350-355, 356-361, 362-367, 368-373, 374-378, 380-382, 382-387, 388-393, 394, 395, 396 *Chapter Investigation* 380-381 *Math in the Workplace* 379 TWE: MM 348c

Sample Demonstrator
Number/Computation: Relationships
MA-H-1.3.1 to MA-H-1.3.4

9–1 Using Ratios and Proportions

What You'll Learn
You'll learn to use ratios and proportions to solve problems.

Why It's Important
Medicine Nurses solve proportions to determine the amount of medication to give a patient.
See Exercise 45.

In 2000, about 180 million tons of solid waste was created in the United States. Paper made up about 72 million tons of this waste. The **ratio** of paper waste to total solid waste is 72 to 180. This ratio can be written in the following ways.

72 to 180 72:180 $\frac{72}{180}$ $72 \div 180$

Definition of Ratio	
	Words: A ratio is a comparison of two numbers by division.
	Symbols: a to b, $a:b$, $\frac{a}{b}$, or $a \div b$, where $b \neq 0$

All ratios should be written in simplest form. Because all fractions can be written as decimals, it is sometimes useful to express ratios in decimal form.

Examples

Write each ratio in simplest form.

1. $\frac{45}{340}$

$\frac{45}{340} = \frac{45 \div 5}{340 \div 5}$ *Divide the numerator and denominator by 5.*

$= \frac{9}{68}$

Reading Geometry
Read 45:340 as *45 to 340.*

2. **six days to two weeks**

To write this as a ratio, the units of measure must be the same. Write both using days. There are seven days in one week, so two weeks equal 14 days. The ratio is $\frac{6}{14}$ or $\frac{3}{7}$.

Your Turn

a. $\frac{18}{24}$ b. 10 kilometers to 20,000 meters

Geometry/Measurement	
Concepts	
OBJECTIVES	**PAGE REFERENCES**
MA-H-2.1.1 Students will describe properties of and give examples of geometric transformations and apply geometric transformations (translations, rotations, reflections, dilations), with and without a coordinate plane, to both real-world and mathematical situations.	SE: 198-202, 221, 440-444, 687-690, 692-696, 697-702, 703-707, 711, 712, 734, 756, 757 *Chapter Investigation* 708-709 *Math in the Workplace* 691 TWE: MC 203 TM 348c
MA-H-2.1.2 Students will define, describe properties of, give examples of, and apply to both real-world and mathematical situations spatial relationships such as betweenness, parallelism, and perpendicularity.	SE: **Sample Demonstrator: 142** 56-61, 83, 128-133, 136, 142-147, 148-153, 156-161, 162-167, 180, 181, 182, 234-239, 640, 728, 731, 732, 733 *Problem-Solving Workshop* 141 TWE: MC 62
MA-H-2.1.3 Students will define, describe properties of, give examples of, and apply to both real-world and mathematical situations angle relationships such as linear pairs, vertical, complementary, supplementary, corresponding, and alternate interior angles.	SE: 96-101, 110-114, 116-121, 122-127, 135, 136, 148-153, 156-161, 181, 645, 650-652, 730, 732 TWE: MC 122 TM 88c, 140c
MA-H-2.1.4 Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations ratio measures including slope and rate.	SE: 168-173, 182, 351-355, 356-361, 362-367, 368-373, 374-378, 382-387, 388-393, 394, 395, 396, 733, 741, 742, 743 *Chapter Investigation* 380-381 *Math in the Workplace* 379 TWE: MC 174 MM 348c TM 348c

OBJECTIVES	PAGE REFERENCES
MA-H-2.1.5 Students will describe properties of, define, give examples of, and apply to both real-world and mathematical situations right triangle trigonometric measures (sine, cosine, tangent).	SE: 564-569, 572-577, 579, 580, 751 *Chapter Investigation* 570-571 TWE: TM 546c

Sample Demonstrator
Geometry/Measurement: Concepts
MA-H-2.1.1 to MA-H-2.1.5

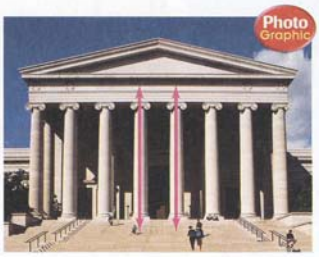
4–1 Parallel Lines and Planes

What You'll Learn
You'll learn to describe relationships among lines, parts of lines, and planes.

Why It's Important
Construction
Carpenters use parallel lines and planes in the construction of furniture.
See Exercise 11.

Suppose you could measure the distance between the columns of a building at various points. You would find that the distance remains the same at all points. The columns are parallel.

In geometry, two lines in a plane that are always the same distance apart are **parallel lines**. No two parallel lines intersect, no matter how far you extend them.



National Gallery of Art, Washington, D.C.

Definition of Parallel Lines	Two lines are parallel if and only if they are in the same plane and do not intersect.

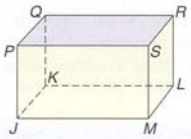
Since segments and rays are parts of lines, they are considered parallel if the lines that contain them are parallel.

Reading Geometry
Read the symbol ∥ as *is parallel to.*
Arrowheads are often used in figures to indicate parallel lines.

$\overline{AB} \parallel \overline{CD}$
$\overline{AB} \parallel \overline{CD}$
$\overline{AB} \parallel \overline{CD}$
$\overline{BA} \parallel \overline{DC}$

Planes can also be parallel. The shelves in a bookcase are examples of parts of planes. The shelves are the same distance apart at all points, and do not appear to intersect. They are parallel. In geometry, planes that do not intersect are called **parallel planes**.

plane *PSR* ∥ plane *JML*
plane *JMS* ∥ plane *KLR*
plane *PJK* ∥ plane *SML*



Recall that plane PSR refers to the plane containing points P, S, and R.

Geometry/Measurement	
Skills	
OBJECTIVES	**PAGE REFERENCES**
MA-H-2.2.1 Students will perform transformations (reflections, translations, rotations, dilations) on figures.	SE: 198-202, 221, 440-444, 687-690, 692-696, 697-702, 703-707, 711, 712, 734, 756, 757 *Chapter Investigation* 708-709 *Math in the Workplace* 691 TWE: MC 203 TM 348c
MA-H-2.2.2 Students will classify two-dimensional and three-dimensional geometric figures according to their characteristics such as lengths of sides; angle measures; and number of sides, faces, edges, and vertices. Students will describe the intersection of a plane with a three-dimensional geometric figure.	SE: **Sample Demonstrator: 193** 19-21, 188-192, 193-197, 220, 221, 251-255, 290-295, 296-300, 310-315, 316-321, 322-326, 327-332, 333-338, 342, 343, 344, 402-407, 408-412, 446, 447, 496-501, 540, 639-643, 647, 734, 739, 740, 744, 748 *Chapter Investigation* 340-341, 502-503 TWE: EM 521 MC 198, 413 TM 186c, 308c
MA-H-2.2.3 Students will determine height and distance using methods of indirect measurement such as similar triangles (including shadow or mirror method) and right triangle relationships (including trigonometric ratios).	SE: 251-255, 362-367, 395, 564-569, 572-577, 579, 580, 742, 751 *Chapter Investigation* 570-571 TWE: MM 348c TM 546c
MA-H-2.2.4 Students will use Pythagorean relationships to solve problems in real-world and mathematical situations.	SE: 256-261, 262-267, 270, 554-558, 559-563, 737, 738 *Problem-Solving Workshop* 227 TWE: MC 262

OBJECTIVES	PAGE REFERENCES
MA-H-2.2.5 Students will apply the concepts of congruence and similarity to solve real-world and mathematical problems (not including proofs).	SE: 203-207, 210-214, 215-219, 221, 222, 356-361, 362-368, 369-373, 374-378, 388-393, 395, 396, 644-648, 653-658, 735, 741, 742 *Chapter Investigation* 208-209 *Math in the Workplace* 379 TWE: MM 348c TM 186c
MA-H-2.2.6 Students will calculate surface area and volume of rectangular prisms, pyramids, cylinders, cones, and spheres in problem settings using given formulas.	SE: 504-509, 510-515, 516-521, 522-527, 528-533, 541, 542, 748, 749 TWE: MM 494c
MA-H-2.2.7 Students will apply formulas for the slope of a line, distance between two points, and midpoint of a segment to solve problems.	SE: 62-67, 76-81, 83, 84, 168-173, 182, 262-267, 270, 728, 733, 737 TWE: TM 48c

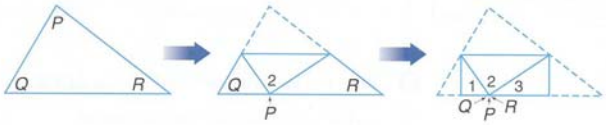
Sample Demonstrator
Geometry/Measurement: Skills
MA-H-2.2.1 to MA-H-2.2.7

5–2 Angles of a Triangle

What You'll Learn
You'll learn to use the Angle Sum Theorem.

Why It's Important
Construction
Builders use the measure of the vertex angle of an isosceles triangle to frame buildings.
See Exercise 21.

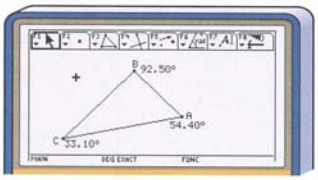
If you measure and add the angles in any triangle, you will find that the sum of the angles have a special relationship. Cut and fold a triangle as shown below. Make a conjecture about the sum of the angle measures of a triangle.



You can use a graphing calculator to verify your conjecture.

Graphing Calculator Exploration

Step 1 Use the Triangle tool on the F3 menu. Move the pencil cursor to each location where you want a vertex and press ENTER. The calculator automatically draws the sides. Label the vertices *A*, *B*, and *C*.



Step 2 Use the Angle tool on the F6 menu to measure each angle.

Try These

1. Determine the sum of the measures of the angles of your triangle.
2. Drag any vertex to a different location, measure each angle, and find the sum of the measures.
3. Repeat Exercise 2 several times.
4. **Make a conjecture** about the sum of the angle measures of any triangle.

TI–92 Tutorial
See pp. 758–761.

The results of the activities above can be stated in the Angle Sum Theorem.

Theorem 5–1 Angle Sum Theorem

Words: The sum of the measures of the angles of a triangle is 180.

Model:

Symbols: $x + y + z = 180$

Geometry/Measurement	
Relationships	
OBJECTIVES	**PAGE REFERENCES**
MA-H-2.3.1 Students will solve real-world geometry problems by using algebra.	SE: 35-40, 276-281, 413-418, 462-467, 600-605, 606-611 *Algebra Link* 57, 64, 70, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357-358, 369, 371, 375-376, 383-384, 389, 456, 471, 475, 588, 589, 593, 612, 614, 661 TWE: IE 57, 64, 70, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357, 369, 371, 375, 383, 389, 456, 471, 475, 588, 589, 593, 612, 614, 661
MA-H-2.3.2 Students will apply algebra to solve problems involving geometric figures in a coordinate plane.	SE: 168-173, 174-179, 182, 618-622, 660-665, 670, 733, 755 TWE: EM 665
MA-H-2.3.3 Students will understand how figures in a coordinate plane and their resulting images under a transformation are algebraically and geometrically related. Students will describe elements that change and elements that do not change under these transformations.	SE: **Sample Demonstrator: 692** 687-690, 692-696, 697-702, 703-707, 711, 712, 756, 757 *Chapter Investigation* 708-709 *Math in the Workplace* 691 TWE: MM 674c TM 674c
MA-H-2.3.4 Students will understand how a change in one or more dimensions of a geometric shape affects perimeter, area, volume, or surface area.	SE: 388-393, 396, 422, 525, 534-539, 542, 743, 750 *Hands-On Geometry* 415, 510 TWE: HG 415

Sample Demonstrator
Geometry/Measurement: Relationships
MA-H-2.3.1 to MA-H-2.3.4

16–4 Reflections

What You'll Learn
You'll learn to investigate and draw reflections on a coordinate plane.

Why It's Important
Printing The use of reflections is important in some types of printing.
See Exercise 15.

The photograph at the right shows the reflection of an ancient Roman bridge in the Tiber River. Every point on the bridge has a corresponding point on the water. In mathematics, this type of one-to-one correspondence is also called a **reflection**.

In the following activity, you'll investigate reflections over coordinate axes.

Tiber River, Rome

Hands-On Geometry

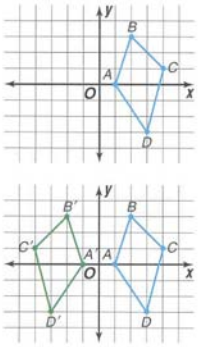
Materials: grid paper, tracing paper, straightedge

Step 1 On a coordinate graph, use a straightedge to draw a quadrilateral with vertices $A(1, 0)$, $B(2, 3)$, $C(4, 1)$, and $D(3, -3)$.

Step 2 Fold a piece of tracing paper twice to create coordinate axes. Unfold the paper and label the x- and y-axes.

Step 3 Place the tracing paper on top of the coordinate graph, lining up the axes on both pieces of paper. Trace quadrilateral $ABCD$.

Step 4 Turn over the tracing paper so that the figure is flipped over the y-axis.



Try These

1. Name the coordinates for the reflected quadrilateral $A'B'C'D'$ from Step 4.
2. Repeat Step 4, but this time flip $ABCD$ over the x-axis. Name the coordinates for this reflected quadrilateral $A''B''C''D''$.
3. Compare the coordinates of the original quadrilateral with the coordinates of each reflection. What do you notice?

The results of this activity are stated in the following definition.

Probability/Statistics	
Concepts	
OBJECTIVES	**PAGE REFERENCES**
MA-H-3.1.1 Students will understand how standard deviation measures the scatter of a discrete set of real-world data.	See *Algebra: Concepts and Applications.*
MA-M-3.1.2 Students will recognize that curve fitting (linear, quadratic, exponential) can be used as a method of describing and predicting from a set of data or scatter plot. Students will recognize the appropriate curve for a particular set of data.	See *Algebra: Concepts and Applications.*
MA-M-3.1.3 Students will describe and give examples of various sampling techniques and biases in data collection.	See *Algebra: Concepts and Applications.*
MA-H-3.1.4 Students will understand the differences between combinations and permutations.	SE: *Preparing for Standardized Tests* 138-139 Also see *Algebra: Concepts and Applications.*
MA-H-3.1.5 Students will understand differences between theoretical and experimental probability.	SE: **Sample Demonstrator: 484** 438, 484, 486-487 *Preparing for Standardized Tests* 185, 347, 451, 545, 629 TWE: RA 486

Sample Demonstrator
Probability/Statistics: Concepts
MA-H-3.1.1 to MA-H-3.1.5

Example 2 If $\odot A$ has a circumference of 10π inches, find the area of the circle to the nearest hundredth.

Use the circumference formula to find r.

$C = 2\pi r$ *Theorem 11–7*
$10\pi = 2\pi r$ *Replace C with 10π.*
$\frac{10\pi}{2\pi} = \frac{2\pi r}{2\pi}$ *Divide each side by 2π.*
$5 = r$

Now find the area of the circle.

$A = \pi r^2$ *Theorem 11–8*
$= \pi(5)^2$ *Replace r with 5.*
$= 25\pi$
≈ 78.54

To the nearest hundredth, the area is 78.54 square inches.

Your Turn

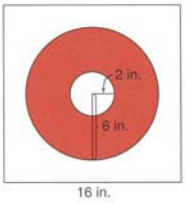
b. Find the area of the circle whose circumference is 6.28 meters. Round to the nearest hundredth.

Real World

Example 3 **Probability Link**

You can use the area of a circle to solve problems involving probability.

To win a dart game at a carnival, the dart must land in the red section of the square board. What is the probability that a dart thrown onto the square at random will land in the red section? Assume that all darts thrown will land on the dartboard.



To find the probability of landing in the red section, first subtract the area of the white circle from the area of the large circle.

$\underbrace{\text{area of red section}}_{A} = \underbrace{\text{area of large circle}}_{\pi r^2} - \underbrace{\text{area of white circle}}_{\pi r^2}$

$= \pi(6^2) - \pi(2^2)$
$= 36\pi - 4\pi \text{ or } 32\pi$

Use a calculator. 32 [×] [2nd] [π] [=] *100.5309649*

The area of the red section is about 101 square inches. The area of the board is 16^2 or 256 square inches. So, find the probability as follows.

$P(\text{landing in the red section}) = \frac{\text{area of the red section}}{\text{area of the board}}$ or about $\frac{101}{256}$

The probability of landing in the red section is about $\frac{101}{256}$ or 0.395.

In Example 3, we used **theoretical probability**. The solution was based on the formulas for the areas of a circle and a square. This is different from **experimental probability**, in which the probability is calculated by repeating some action. To find the experimental probability for this situation, you would have to throw darts at a board like the one described above many times and record how many times the red section was hit and how many times it was not.

www.geomconcepts.com/extra_examples

Probability/Statistics	
Skills	
OBJECTIVES	**PAGE REFERENCES**
MA-H-3.2.1 Students will analyze, interpret results, make decisions, and draw conclusions based on a set of data.	SE: **Sample Demonstrator: 184** 7, 133, 219, 267, 347, 473 *Preparing for Standardized Tests* 184-185, 225, 347
MA-H-3.2.2 Students will plot a set of bivariate data and select an appropriate curve (linear, quadratic, exponential) of best fit.	See *Algebra: Concepts and Applications.*
MA-H-3.2.3 Students will organize, display and interpret statistical models (tables, graphs) of bivariate data.	SE: **Sample Demonstrator: 184** 7, 133, 219, 267, 347, 473 *Preparing for Standardized Tests* 184-185, 225, 347, 715 Also see *Algebra: Concepts and Applications.*
MA-H-3.2.4 Students will interpret the results of a probability simulation, draw conclusions, and make predictions.	SE: 438, 484, 486-487 *Preparing for Standardized Tests* 185, 347, 451, 545, 629 TWE: RA 486
MA-H-3.2.5 Students will represent probabilities in multiple ways such as fractions, decimals, percentages, and geometric area models.	SE: 438, 484, 486-487 *Preparing for Standardized Tests* 185, 347, 451, 545, 629 TWE: RA 486
MA-H-3.2.6 Students will determine probabilities in situations involving replacement and non-replacement.	SE: 438, 484, 486-487 *Preparing for Standardized Tests* 185, 347, 451, 545, 629 TWE: RA 486

Sample Demonstrator
Probability/Statistics: Skills
MA-H-3.2.1 to MA-H-3.2.6

CHAPTER 4

Preparing for Standardized Tests

Data Analysis Problems

Proficiency tests usually include several problems on interpreting graphs and creating graphs from data. The SAT and ACT may include a few questions on interpreting graphs. Often a graph is used to answer two or more questions.

You'll need to understand these ways of representing data: bar graphs, circle graphs, line graphs, stem-and-leaf plots, histograms, and frequency tables.

The Princeton Review

If a problem includes a graph, first look carefully at its axis labels and units. Then read the question(s) about the graph.

State Test Example

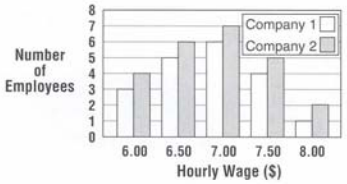
The table below shows the number of employees who earn certain hourly wages at two different companies.

Hourly Wage ($)	Number of Employees	
	Company 1	Company 2
6.00	3	4
6.50	5	6
7.00	6	7
7.50	4	5
8.00	1	2

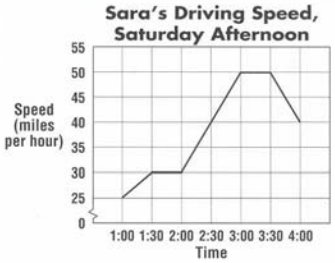
Construct a double-bar graph to show the number of employees at each company who earn the given hourly wages.

Hint Decide what quantities will be shown on each axis of your graph. Label the axes.

Solution Draw the double-bar graph. Put the wages on the horizontal axis and the number of employees on the vertical axis.



SAT Example



For what percent of the time was Sara driving 40 miles per hour or faster?

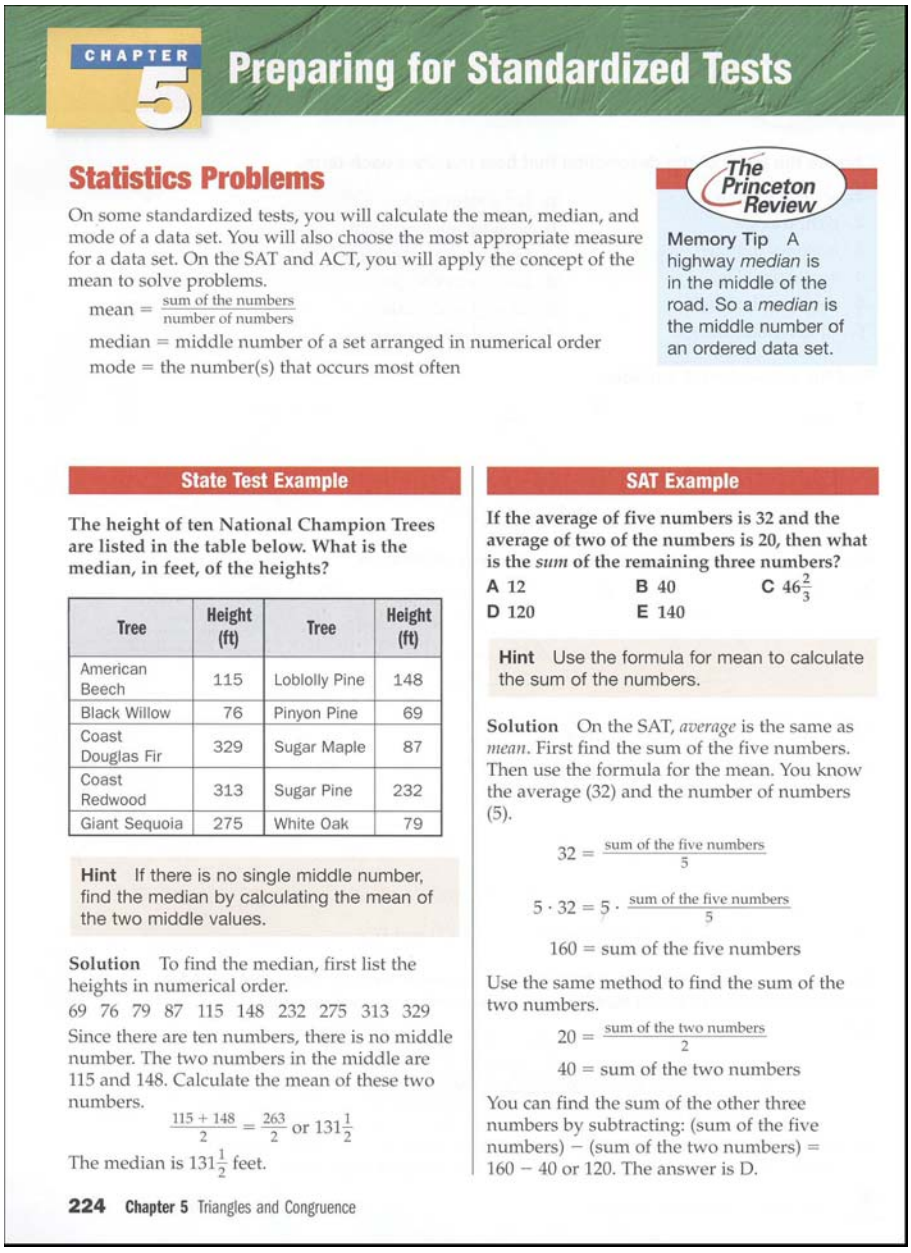
A 20% **B** 25% **C** $33\frac{1}{3}\%$
D 40% **E** 50%

Hint Don't mix units, like *hours* and *minutes*. In this case, use hours.

Solution The total time Sara drove is 3 hours (from 1:00 until 4:00). She drove 40 miles per hour or faster from 2:30 to 4:00, or $1\frac{1}{2}$ hours. The fraction of the time she drove 40 mph or faster is $\frac{1\frac{1}{2}}{3}$ or $\frac{1}{2}$. The equivalent percent is 50%. So, the answer is E.

Probability/Statistics	
Relationships	
OBJECTIVES	**PAGE REFERENCES**
MA-H-3.3.1 Students will understand how outliers affect measures of central tendency.	SE: **Sample Demonstrator: 224** 22, 418, 665 *Preparing for Standardized Tests* 224-225, 307
MA-H-3.3.2 Students will describe how sampling techniques can influence results.	See *Algebra: Concepts and Applications.*
MA-H-3.3.3 Students will understand and reason about the use and misuse of statistics and statistical representations such as type of graph and choice of scale.	SE: 7, 133, 219, 267. 347, 473 *Preparing for Standardized Tests* 184-185, 225, 347, 715
MA-H-3.3.4 Students will use data and curve of best fit to make and defend predictions.	See *Algebra: Concepts and Applications.*

Sample Demonstrator
Probability/Statistics: Relationships
MA-H-3.3.1 to MA-H-3.3.4



CHAPTER 5

Preparing for Standardized Tests

Statistics Problems

On some standardized tests, you will calculate the mean, median, and mode of a data set. You will also choose the most appropriate measure for a data set. On the SAT and ACT, you will apply the concept of the mean to solve problems.

mean = $\frac{\text{sum of the numbers}}{\text{number of numbers}}$

median = middle number of a set arranged in numerical order

mode = the number(s) that occurs most often

The Princeton Review

Memory Tip A highway *median* is in the middle of the road. So a *median* is the middle number of an ordered data set.

State Test Example

The height of ten National Champion Trees are listed in the table below. What is the median, in feet, of the heights?

Tree	Height (ft)	Tree	Height (ft)
American Beech	115	Loblolly Pine	148
Black Willow	76	Pinyon Pine	69
Coast Douglas Fir	329	Sugar Maple	87
Coast Redwood	313	Sugar Pine	232
Giant Sequoia	275	White Oak	79

Hint If there is no single middle number, find the median by calculating the mean of the two middle values.

Solution To find the median, first list the heights in numerical order.

69 76 79 87 115 148 232 275 313 329

Since there are ten numbers, there is no middle number. The two numbers in the middle are 115 and 148. Calculate the mean of these two numbers.

$$\frac{115 + 148}{2} = \frac{263}{2} \text{ or } 131\frac{1}{2}$$

The median is $131\frac{1}{2}$ feet.

SAT Example

If the average of five numbers is 32 and the average of two of the numbers is 20, then what is the *sum* of the remaining three numbers?

A 12 **B** 40 **C** $46\frac{2}{3}$
D 120 **E** 140

Hint Use the formula for mean to calculate the sum of the numbers.

Solution On the SAT, *average* is the same as *mean*. First find the sum of the five numbers. Then use the formula for the mean. You know the average (32) and the number of numbers (5).

$$32 = \frac{\text{sum of the five numbers}}{5}$$

$$5 \cdot 32 = 5 \cdot \frac{\text{sum of the five numbers}}{5}$$

160 = sum of the five numbers

Use the same method to find the sum of the two numbers.

$$20 = \frac{\text{sum of the two numbers}}{2}$$

40 = sum of the two numbers

You can find the sum of the other three numbers by subtracting: (sum of the five numbers) − (sum of the two numbers) = 160 − 40 or 120. The answer is D.

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Algebraic Ideas	
Concepts	
OBJECTIVES	**PAGE REFERENCES**
MA-M-4.1.1 Students will understand the concept of a function and roles of independent and dependent variables.	SE: *Preparing for Standardized Tests* 492-493 Also see *Algebra: Concepts and Applications.*
MA-H-4.1.2 Students will describe, give examples of, and recognize differences among expressions, equations, and inequalities.	SE: 718, 719, 722, 725 Also see *Algebra: Concepts and Applications.*
MA-H-4.1.3 Students will understand systems of linear equations (2 equations in 2 variables) and representations of linear systems.	SE: **Sample Demonstrator: 676** 676-680, 681-686, 710, 711, 756 TWE: MC 687
MA-H-4.1.4 Students will identify linear, quadratic, absolute value, and exponential functions from graphs and equations.	See *Algebra: Concepts and Applications.*
MA-H-4.1.5 Students will apply direct and inverse variation to both real-world and mathematical problems.	See *Algebra: Concepts and Applications.*
MA-H-4.1.6 Students will recognize, give examples of, and apply the laws of exponents.	SE: *Preparing for Standardized Tests* 272-273 Also see *Algebra: Concepts and Applications.*

Sample Demonstrator
Algebraic Ideas: Concepts
MA-H-4.1.1 to MA-H-4.1.6

16–1 Solving Systems of Equations by Graphing

What You'll Learn
You'll learn to solve systems of equations by graphing.

Why It's Important
Business Business analysts can find the break-even point in producing and selling a product by solving systems of equations. *See Exercise 25.*

A set of two or more equations is called a **system of equations**. The solution of a system of equations is the intersection point of the graphs of these equations. The ordered pair for this point satisfies all equations in the system.

To solve a system of equations, first graph each equation in the system. To graph the equations, you can find ordered pairs, use the slope and y-intercept, or use a graphing calculator. *Choose the method that is easiest for you to use. The results will be the same for all methods.*

When solving a system of two linear equations in two variables, there are three possibilities.

- The lines intersect, so the point of intersection is the solution.
- The lines are parallel, so there is no point of intersection and, therefore, no solution.
- The lines coincide (both graphs are the same), so there is an infinite number of solutions.

Example 1 **Solve the system of equations by graphing.**

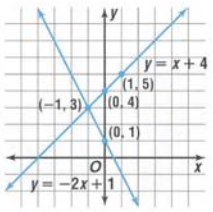
$y = x + 4$
$y = -2x + 1$

In this example, we find ordered pairs by choosing values for x and finding the corresponding values of y.

$y = x + 4$			
x	$x + 4$	y	(x, y)
0	4	4	(0, 4)
1	5	5	(1, 5)

$y = -2x + 1$			
x	$-2x + 1$	y	(x, y)
−1	3	3	(−1, 3)
0	1	1	(0, 1)

Graph the ordered pairs and draw the graphs of the equations. The graphs intersect at the point whose coordinates are $(-1, 3)$. Therefore, the solution of the system of equations is $(-1, 3)$.



Your Turn
a. $y = -x + 1$
$y = x - 5$

Algebraic Ideas	
Skills	
OBJECTIVES	**PAGE REFERENCES**
MA-H-4.2.1 Students will solve linear equations and linear inequalities.	SE: 312-315, 318-321, 470-473, 649, 652, 722, 723, 724, 725 *Algebra Link* 57, 64, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357-358, 369, 371, 375-376, 383-384, 389, 456, 471, 475, 588, 589, 593, 612, 614 TWE: IE 57, 64, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357, 369, 371, 375, 383, 389, 456, 471, 475, 588, 589, 593, 612, 614
MA-H-4.2.2 Students will graph the equation of a line.	SE: 70-73, 83, 174-179, 182, 729, 733 *Preparing for Standardized Tests* 492 TWE: MC 76
MA-H-4.2.3 Students will solve systems of linear equations (2 equations in 2 variables) including systems that arise from real-world problems.	SE: **Sample Demonstrator: 681** 676-680, 681-686, 710, 711, 756 TWE: MC 687
MA-H-4.2.4 Students will create tables of numerical values of functions including linear, quadratic, absolute value, exponential, and simple piecewise such as some long distance phone rates.	SE: 174-179, 182, 733 TWE: MC 76 Also see *Algebra: Concepts and Applications.*
MA-H-4.2.5 Students will determine the domain and range of a function, the slope and intercepts of a linear function, and the maximum/minimum and intercepts of a quadratic function.	SE: 168-173, 174-179, 182, 733 TWE: AP 140c Also see *Algebra: Concepts and Applications.*

OBJECTIVES	PAGE REFERENCES
MA-H-4.2.6 Students will determine approximate solutions to quadratic equations.	See *Algebra: Concepts and Applications.*
MA-H-4.2.7 Students will add, subtract, and multiply polynomial expressions, and students will factor polynomial expressions using the greatest common monomial factor.	See *Algebra: Concepts and Applications.*
MA-H-4.2.8 Students will use direct and inverse variation to solve real-world problems.	See *Algebra: Concepts and Applications.*

Sample Demonstrator
Algebraic Ideas: Skills
MA-H-4.2.1 to MA-H-4.2.8

16–2 Solving Systems of Equations by Using Algebra

What You'll Learn
You'll learn to solve systems of equations by using the substitution or elimination method.

Why It's Important
Consumer Choices
You can use systems of equations to compare phone rates. *See Exercise 30.*

In the previous lesson, you learned to solve systems of equations by graphing. You can also solve systems of equations by using algebra. One algebraic method is **substitution**. The substitution method for solving a system of equations is illustrated in Example 1.

1 Example

Use substitution to solve the system of equations.

$2x + y = 5$
$3x - 2y = 4$

Step 1 Solve the first equation for y since the coefficient of y is 1.

$$\begin{aligned} 2x + y &= 5 \\ 2x + y - 2x &= 5 - 2x \quad \textit{Subtract } 2x \textit{ from each side.} \\ y &= 5 - 2x \end{aligned}$$

Step 2 In the solution of the system, y must have the same value in both equations. So, substitute $5 - 2x$ for y in the second equation. Then solve for x.

$$\begin{aligned} 3x - 2y &= 4 \\ 3x - 2(5 - 2x) &= 4 \quad \textit{Replace } y \textit{ with } 5 - 2x. \\ 3x - 10 + 4x &= 4 \quad \textit{Distributive property} \\ 7x - 10 &= 4 \quad \textit{Add like terms.} \\ 7x - 10 + 10 &= 4 + 10 \quad \textit{Add 10 to each side.} \\ 7x &= 14 \\ \frac{7x}{7} &= \frac{14}{7} \quad \textit{Divide each side by 7.} \\ x &= 2 \end{aligned}$$

Step 3 Substitute 2 for x in the first equation and solve for y.

$$\begin{aligned} 2x + y &= 5 \\ 2(2) + y &= 5 \quad \textit{Replace } x \textit{ with } 2. \\ 4 + y &= 5 \\ 4 + y - 4 &= 5 - 4 \quad \textit{Subtract 4 from each side.} \\ y &= 1 \end{aligned}$$

Check your solution by substituting in both equations or by graphing.

The solution to this system of equations is (2, 1).

Your Turn **Use substitution to solve each system of equations.**

a. $x = y + 1$
$x + y = 8$

b. $3x + y = -6$
$-2x + 3y = 4$

Algebraic Ideas	
Relationships	
OBJECTIVES	**PAGE REFERENCES**
MA-H-4.3.1 Students will write and solve linear equations describing real-world situations.	SE: *Algebra Link* 57, 64, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357-358, 369, 371, 375-376, 383-384, 389, 456, 471, 475, 588, 589, 593, 612, 614 *Preparing for Standardized Tests* 306-307 TWE: IE 57, 64, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357, 369, 371, 375, 383, 389, 456, 471, 475, 588, 589, 593, 612, 614
MA-H-4.3.2 Students will understand how formulas, tables, graphs, and equations of functions relate to each other.	SE: **Sample Demonstrator: 174** 174-179, 182, 733 *Algebra Link* 57, 64, 70, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357-358, 369, 371, 375-376, 383-384, 389, 456, 471, 475, 588, 589, 593, 612, 614 TWE: IE 57, 64, 105, 118, 151, 158, 190, 195, 205, 229, 241, 248, 284, 313, 357, 369, 371, 375, 383, 389, 456, 471, 475, 588, 589, 593, 612, 614
MA-H-4.3.3 Students will demonstrate how slope shows rate of change in linear functions arising from real-world situations.	SE: 168-173, 182, 733 TWE: MC 174

OBJECTIVES	PAGE REFERENCES
MA-H-4.3.4 Students will show how changes in parameters affect graphs of functions [e.g., compare the graphs $y = x^2$, $y = 2x^2$, $y = (x - 4)^2$, and $y = x^2 + 3$].	See *Algebra: Concepts and Applications.*
MA-H-4.3.5 Students will show how equations and graphs are models of the relationship between two real-world quantities (e.g., the relationship between degrees Celsius and degrees Fahrenheit).	SE: **Sample Demonstrator: 174** 174, 178-179, 677, 680, 683, 685-686, 712 TWE: AP 140c EM 179

Sample Demonstrator
Algebraic Ideas: Relationships
MA-H-4.3.1 to MA-H-4.1.5

4–6 Equations of Lines

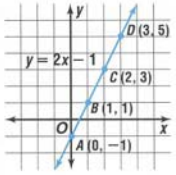
What You'll Learn
You'll learn to write and graph equations of lines.

Why It's Important
Communication
Telephone company representatives can use linear equations to determine the cost of telephone calls. *See Exercise 35.*

The equation $y = 2x - 1$ is called a **linear equation** because its graph is a straight line. We can substitute different values for x in the equation to find corresponding values for y, as shown in the table at the right.

x	$2x - 1$	y	(x, y)
0	$2(0) - 1$	-1	$(0, -1)$
1	$2(1) - 1$	1	$(1, 1)$
2	$2(2) - 1$	3	$(2, 3)$
3	$2(3) - 1$	5	$(3, 5)$

We can then graph the ordered pairs (x, y). Notice that there is one line that contains all four points. There are many more points whose ordered pairs are solutions of $y = 2x - 1$. These points also lie on the line.



To find the slope of this line, choose any two points on the line, such as $B(1, 1)$ and $C(2, 3)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \textit{Definition of slope}$$

$$= \frac{3 - 1}{2 - 1} \quad \textit{Replace } y_2 \textit{ with 3, and } y_1 \textit{ with 1. Replace } x_2 \textit{ with 2, and x1 with 1.}$$

$$= \frac{2}{1} \text{ or } 2$$

Now look at the graph of $y = 2x - 1$. The y-value of the point where the line crosses the y-axis is -1. This value is called the **y-intercept** of the line.

$$y = 2x - 1$$
slope — 2; y-intercept — -1

Most linear equations can be written in the form $y = mx + b$. This form is called the **slope-intercept form**.

Slope-Intercept Form	An equation of the line having slope m and y-intercept b is $y = mx + b$.

Codes Used for TWE Pages

A	Assess
AP	Applications
EM	Enrichment Masters
HG	Hands-On Geometry
IE	In-Class Examples
MC	5-Minute Check
MM	Manipulatives/Modeling
RA	Reteaching Activity
TM	Technology/Multimedia
T	Teach

LESSON PLAN CORRELATIONS

Chapter 1 Reasoning in Geometry	
LESSON	**KENTUCKY OBJECTIVES**
1-1 Patterns and Inductive Reasoning	MA-H-1.1.2, MA-H-3.2.1, MA-H-3.2.3, MA-H-3.3.3
1-2 Points, Lines, and Planes	Supports Kentucky and National Math Standards and Objectives
1-3 Postulates	MA-H-2.2.2
1-4 Conditional Statements and Their Converses	MA-H-3.3.1
1-5 Tools of the Trade	Supports Kentucky and National Math Standards and Objectives
1-6 A Plan for Problem Solving	MA-H-2.3.1

Chapter 2 Segment Measure and Coordinate Graphing	
LESSON	**KENTUCKY OBJECTIVES**
2-1 Real Numbers and Number Lines	MA-H-1.1.1, MA-H-1.2.1, MA-H-1.2.2, MA-H-1.3.1, MA-H-4.3.1
2-2 Segments and Properties of Real Numbers	MA-H-1.1.1, MA-H-1.2.1, MA-H-1.2.2, MA-H-1.3.1, MA-H-4.3.1
2-3 Congruent Segments	MA-H-2.2.7, MA-H-2.3.1
2-4 The Coordinate Plane	Supports Kentucky and National Math Standards and Objectives
2-5 Midpoints	MA-H-2.2.7

Chapter 3 Angles	
LESSON	**KENTUCKY OBJECTIVES**
3-1 Angles	Supports Kentucky and National Math Standards and Objectives
3-2 Angle Measures	MA-H-2.1.3
3-3 The Angle Addition Postulate	MA-H-2.3.1
3-4 Adjacent Angles and Linear Pairs of Angles	MA-H-2.1.3
3-5 Complementary and Supplementary Angles	MA-H-2.1.3, MA-H-2.3.1, MA-H-4.3.1
3-6 Congruent Angles	MA-H-2.1.3
3-7 Perpendicular Lines	MA-H-2.1.3, MA-H-3.2.1, MA-H-3.2.3, MA-H-3.3.3

Chapter 4 Parallels	
LESSON	**KENTUCKY OBJECTIVES**
4-1 Parallel Lines and Planes	MA-H-2.1.2
4-2 Parallel Lines and Transversals	MA-H-2.1.2, MA-H-2.1.3
4-3 Transversal and Corresponding Angles	MA-H-2.1.2, MA-H-2.1.3, MA-H-2.3.1, MA-H-4.3.1, MA-H-4.3.2
4-4 Proving Lines Parallel	MA-H- 2.1.2
4-5 Slope	MA-H-2.1.4, MA-H-2.2.7, MA-H-2.3.2, MA-H-4.2.5, MA-H-4.3.3
4-6 Equations of Lines	MA-H-2.3.2, MA-H-4.2.2, MA-H-4.2.5, MA-H-4.3.5

Chapter 5 Triangles and Congruence	
LESSON	**KENTUCKY OBJECTIVES**
5-1 Classifying Triangles	MA-H-2.3.1, MA-H-4.3.1
5-2 Angles of a Triangle	MA-H-2.3.2, MA-H-4.3.1
5-3 Geometry in Motion	MA-H-2.1.1, MA-H-2.2.2, MA-H-2.3.1
5-4 Congruent Triangles	MA-H-4.3.1, MA-H-4.3.2, MA-H-2.3.1
5-5 SSS and SAS	MA-H-2.2.5
5-6 ASA and AAS	MA-H-3.3.3, MA-H-3.2.1, MA-H-3.2.3

Chapter 6 More about Triangles	
LESSON	**KENTUCKY OBJECTIVES**
6-1 Medians	MA-H-2.3.1, MA-H-4.3.1
6-2 Altitudes and Perpendicular Bisectors	MA-H-2.1.2
6-3 Angle Bisectors of Triangles	MA-H-2.3.1, MA-H-4.3.1
6-4 Isosceles Triangles	MA-H-2.3.1
6-5 Right Triangles	MA-H-2.2.2, MA-H-2.2.3
6-6 The Pythagorean Theorem	MA-H-2.2.4
6-**7** Distance on the Coordinate Plane	MA-H-2.2.4, MA-H-2.2.7

Chapter 7 Triangle Inequalities	
LESSON	**KENTUCKY OBJECTIVES**
7-1 Segments, Angles, and Inequalities	MA-H-2.3.1
7-2 Exterior Angle Theorem	MA-H-4.3.1
7-3 Inequalities Within a Triangle	MA-H-2.2.2
7-4 Triangle Inequality Theorem	MA-H-2.2.2

Chapter 8 Quadrilaterals	
LESSON	**KENTUCKY OBJECTIVES**
8-1 Quadrilaterals	MA-H- 2.2.2, MA-H-2.3.1, MA-H-4.2.1, MA-H-4.3.1
8-2 Parallelograms	MA-H- 2.2.2, MA-H-4.2.1
8-3 Tests for Parallelograms	MA-H-2.2.2
8-4 Rectangles, Rhombi, and Squares	MA-H-2.2.2
8-5 Trapezoids	MA-H-2.2.2

Chapter 9 Proportions and Similarity	
LESSON	**KENTUCKY OBJECTIVES**
9-1 Using Ratios and Proportions	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5
9-2 Similar Polygons	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5, MA-H-2.3.1, MA-H-4.3.1
9-3 Similar Triangles	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5
9-4 Proportional Parts and Triangles	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5, MA-H-4.3.1
9-5 Triangles and Parallel Lines	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5, MA-H-4.3.1
9-6 Proportional Parts and Parallel Lines	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5, MA-H-2.3.1, MA-H-4.3.1
9-7 Perimeters and Similarity	MA-H-1.3.4, MA-H-2.1.4, MA-H-2.2.5, MA-H-4.3.1

Chapter 10 Polygons and Area	
LESSON	**KENTUCKY OBJECTIVES**
10-1 Naming Polygons	MA-H-2.2.2
10-2 Diagonals and Angle Measures	MA-H-2.2.2
10-3 Areas of Polygons	MA-H-2.3.1
10-4 Areas of Triangles and Trapezoids	MA-H-2.3.4, MA-H-3.3.1
10-5 Areas of Regular Polygons	MA-H-2.3.1
10-6 Symmetry	MA-H-3.1.5, MA-H-3.2.4, MA-H-3.2.6
10-7 Tessellations	MA-H-2.1.1, MA-H-2.2.1

Chapter 11 Circles	
LESSON	**KENTUCKY OBJECTIVES**
11-1 Parts of a Circle	MA-H-2.3.1, MA-H-4.2.1, MA-H-4.3.1, MA-H-4.3.2
11-2 Arcs and Central Angles	MA-H-2.3.1
11-3 Arcs and Chords	MA-H-4.3.1, MA-H-4.3.2
11-4 Inscribed Polygons	MA-H-4.2.1, MA-H-4.3.1, MA-H-4.3.2
11-5 Circumference of a Circle	MA-H-1.1.1, MA-H-2.3.1
11-6 Area of a Circle	MA-H-1.1.1, MA-H-3.1.5, MA-H-3.2.4, MA-H-3.2.5, MA-H-3.2.6

Chapter 12 Surface Area and Volume	
LESSON	**KENTUCKY OBJECTIVES**
12-1 Solid Figures	MA-H-2.2.2
12-2 Surface Areas of Prisms and Cylinders	MA-H-2.2.6
12-3 Volumes of Prisms and Cylinders	MA-H-2.2.6
12-4 Surface Areas of Pyramids and Cones	MA-H-2.2.6
12-5 Volumes of Pyramids and Cones	MA-H-2.2.6, MA-H-2.3.4
12-6 Spheres	MA-H-2.2.6
12-7 Similarity of Solid Figures	MA-H-2.3.4

Chapter 13 Right Triangles and Trigonometry	
LESSON	**KENTUCKY OBJECTIVES**
13-1 Simplifying Square Roots	MA-H-1.1.1, MA-H-1.2.2
13-2 45°-45°-90° Triangles	MA-H-2.2.4
13-3 30°-60°-90° Triangles	MA-H-2.2.4
13-4 Tangent Ratio	MA-H-2.1.5, MA-H-2.2.3
13-5 Sine and Cosine Ratios	MA-H-2.1.5, MA-H-2.2.3

Chapter 14 Circle Relationships	
LESSON	**KENTUCKY OBJECTIVES**
14-1 Inscribed Angles	MA-H-2.3.1, MA-H-4.2.1, MA-H-4.3.1, MA-H-4.3.2
14-2 Tangents to a Circle	MA-H-2.3.1, MA-H-4.2.1, MA-H-4.3.1, MA-H-4.3.2
14-3 Secant Angles	MA-H-2.3.1
14-4 Secant-Tangent Angles	MA-H-2.3.1
14-5 Segment Measures	MA-H-2.3.1, MA-H-4.2.1, MA-H-4.3.1, MA-H-4.3.2
14-6 Equations of Circles	MA-H-2.3.2

Chapter 15 Formalizing Proof	
LESSON	**KENTUCKY OBJECTIVES**
15-1 Logic and Truth Tables	Supports Kentucky and National Math Standards and Objectives
15-2 Deductive Reasoning	MA-H-2.1.2, MA-H-2.2.2
15-3 Paragraph Proofs	MA-H-2.1.3, MA-H-2.2.5, MA-H-2.2.2
15-4 Preparing for Two-Column Proofs	MA-H-2.1.3, MA-H-4.2.1
15-5 Two-Column Proofs	MA-H-2.2.5
15-6 Coordinate Proofs	MA-H-2.3.2, MA-H-3.3.1

Chapter 16 More Coordinate Graphing and Transformations	
LESSON	**KENTUCKY OBJECTIVES**
16-1 Solving Systems of Equations by Graphing	MA-H-4.1.3, MA-H-4.2.3
16-2 Solving Systems of Equations by Using Algebra	MA-H-4.1.3, MA-H-4.2.3
16-3 Translations	MA-H-2.1.1, MA-H-2.2.1, MA-H-2.3.3
16-4 Reflections	MA-H-2.1.1, MA-H-2.2.1, MA-H-2.3.3
16-5 Rotations	MA-H-2.1.1, MA-H-2.2.1, MA-H-2.3.3
16-6 Dilations	MA-H-2.1.1, MA-H-2.2.1, MA-H-2.3.3

STANDARDS FOR MATHEMATICS
EVALUATION INSTRUMENT

Content/Process	Comments
1. Material is comprehensive and includes content emphasized in Kentucky's Learning Goals and Academic Expectations and supported by the Core Content for Assessment, Program of Studies, and relevant National Standards.	Content emphasized in Kentucky's Learning Goals and Academic Expectations is covered in Core Content statements MA-H-2.1.1, MA-H-2.1.2, MA-H-2.1.3, MA-H-2.1.5, MA-H-2.2.2, MA-H-2.2.3, MA-H-2.2.4, MA-H-2.2.5, MA-H-2.2.6, MA-H-2.2.7, MA-H-2.3.1, MA-H-2.3.2, MA-H-2.3.3 and MA-H-2.3.4. A correlation of the material in *Glencoe Geometry: Concepts and Applications* is aligned to the NCTM Standards for School Mathematics can be found on pages T15-T17 in the Teacher's Wraparound Edition.

Content/Process	Comments
2. Content appears to be free from factual errors.	*Glencoe Geometry: Concepts and Applications* is the product of ongoing classroom-oriented research that involves students, teachers, curriculum supervisors, administrators, parents, and college-level mathematics educators. Prior to publication of any Glencoe program, typical research activities include a review of educational research and recommendations made by groups such as NCTM; mail surveys of mathematics educators, discussion groups involving mathematics teachers, department heads, and supervisors; focus groups involving mathematics educators; face-to-face interviews with mathematics educators; telephone surveys of mathematics educators; in-depth analysis of manuscript by a wide range of reviewers and consultants; and field tests in which students and teachers use pre-publication manuscript in the classroom.
3. Content makes connections to other content areas across the curriculum.	There is an emphasis on integrating algebra, geometry, measurement, proportional reasoning, statistics, probability, technology, and problem solving. Applications give students frequent opportunities to apply concepts to both real-life and mathematical situations.
4. Concepts and application of skills to real-life situations are introduced when appropriate.	Relevant, real-life applications are a part of every lesson. Practical problem solving is linked to students' real-life interests. Applications give students frequent opportunities to apply concepts to both real-life and mathematical situations.

Content/Process	Comments
5. Content appears to be free of social, ethnic, racial, religious, gender, and geographical bias.	*Glencoe Geometry: Concepts and Applications* is the product of ongoing classroom-oriented research that involves students, teachers, curriculum supervisors, administrators, parents, and college-level mathematics educators. Prior to publication of any Glencoe program, typical research activities include a review of educational research and recommendations made by groups such as NCTM; mail surveys of mathematics educators, discussion groups involving mathematics teachers, department heads, and supervisors; focus groups involving mathematics educators; face-to-face interviews with mathematics educators; telephone surveys of mathematics educators; in-depth analysis of manuscript by a wide range of reviewers and consultants; and field tests in which students and teachers use pre-publication manuscript in the classroom.
6. Material is flexible and accommodates various learning styles, interest/ability levels, and intelligences, including adaptations and accommodations for students with special needs.	*Glencoe Geometry: Concepts and Applications* introduces new concepts in a variety of ways to meet the needs of all learners. In addition to more traditional instructional experiences, *Glencoe Geometry: Concepts and Applications* encourages students to **do** mathematics. See page T8 in the Teacher's Wraparound Edition (TWE) for a description of the opportunities provided in the Student's Edition that accommodate students with diverse learning styles.
7. Reading level is appropriate for interest and ability level of intended student group; level remains consistent throughout.	The readability level is 7.9 Dale Chall.

Content/Process	Comments
8. Content reflects research-based practices (e.g., hands-on activities, technology, problem-solving situations).	**Geometry Activities** give students hands-on experience, with a partner or group, in discovering mathematical concepts for themselves and taking responsibility for their own learning. Practical problem solving is linked to students' real-life interests. **Internet Projects** enable students to become more deeply engaged in a problem situation using technology. Additional opportunities to utilize the world of technology in studying and exploring mathematics are given in the **Graphing Calculator Tutorial**. **Online Study Tools** referenced on the Student Edition (SE) pages are keyed specifically to *Glencoe Geometry: Concepts and Applications*.

Content/Process	Comments
9. Concepts are explored in depth and reinforced throughout.	*Glencoe Geometry: Concepts and Applications* presents all of the fundamental concepts of Geometry and covers all of the Kentucky Core Content Standards for Geometry. The content addresses the basic terms of geometry, reasoning, angles, parallels, triangles and congruence, triangle inequalities, quadrilaterals, proportion and similarity, polygons, circles, area, surface area, volume, basic trigonometry, coordinate graphing, transformations, and proof with an emphasis on informal proof. The program is designed to meet the needs of students who may have experienced difficulties in previous mathematics courses. Most lessons focus on one objective, and prerequisite skills are addressed at the point where they are needed. Online support provides additional practice for each lesson. With its easy-to-read format and emphasis on visuals and hands-on activities, *Glencoe Geometry: Concepts and Applications* helps motivate students to learn geometry.

Assessment	Comments
1. Student assessment is aligned with the instructional program. Assessment activities are similar to learning activities.	*Glencoe Geometry: Concepts and Applications* includes a variety of assessment instruments to support instruction. The Student Edition has two **quizzes** in each chapter as well as a **Study Guide and Assessment** that includes **vocabulary review, review exercises** for each objective, and **applications** and **problem solving**. Also included for each chapter are a **Chapter Test** and a 2-page Preparing for **Standardized Tests** assessment. The Teacher's Wraparound Edition includes a 5-Minute Check and **Open-Ended Assessment** in every lesson. The Assessment and Evaluation Matters include multiple-choice tests, free-response tests, an open-ended assessment, a mid-chapter test, quizzes, cumulative review, and standardized test practice. The **TestCheck** and **Worksheet Builder CD-ROM**, correlated to the Kentucky Core Content Standards for Geometry, allows teachers to crate customized tests and quizzes with any combination of free-response, multiple-choice, short0answer, and open-ended items. The **Test Check** and **Worksheet Builder** also contains special banks of questions for **SAT, ACT,** and **TIMSS**. Preparing for **CATS Practice** and **Sample Test Workbook** gives students practice by objective and sample tests representative of **CATS**. *Glencoe Geometry: Concepts and Applications* provides integrated and ongoing test preparation throughout the year to help reduce student anxiety and improve student performance.

Assessment	Comments
2. Assessment activities examine the extent to which students have internalized and made sense of mathematical concepts and whether they can use mathematics to communicate their ideas.	Every chapter has a **Study Guide and Review** and **Practice Test** that includes Vocabulary, Understanding and Using Vocabulary, Examples and Review Exercises for each objective, Applications and Problem Solving. Practice **Quizzes**, **Practice Tests**, **Study Guide and Review**, and **Standardized Test Practice** in the SE provide ongoing self-assessment opportunities before students take actual tests.

Assessment	Comments
3. Assessment activities provide opportunities for students to demonstrate knowledge and skills in real-life situations and interdisciplinary applications.	*Glencoe Geometry: Concepts and Applications* includes a variety of assessment instruments to support instruction. The Student Edition has two **quizzes** in each chapter as well as a **Study Guide and Assessment** that includes **vocabulary review, review exercises** for each objective, and **applications** and **problem solving**. Also included for each chapter are a **Chapter Test** and a 2-page Preparing for **Standardized Tests** assessment. The Teacher's Wraparound Edition includes a 5-Minute Check and **Open-Ended Assessment** in every lesson. The Assessment and Evaluation Matters include multiple-choice tests, free-response tests, an open-ended assessment, a mid-chapter test, quizzes, cumulative review, and standardized test practice. The **TestCheck** and **Worksheet Builder CD-ROM**, correlated to the Kentucky Core Content Standards for Geometry, allows teachers to crate customized tests and quizzes with any combination of free-response, multiple-choice, short0answer, and open-ended items. The **Test Check** and **Worksheet Builder** also contains special banks of questions for **SAT, ACT,** and **TIMSS**. Preparing for **CATS Practice** and **Sample Test Workbook** gives students practice by objective and sample tests representative of **CATS**. *Glencoe Geometry: Concepts and Applications* provides integrated and ongoing test preparation throughout the year to help reduce student anxiety and improve student performance.

Assessment	Comments
4. A variety of assessments (e.g., diagnostic, formative, summative, open response, multiple choice, individual, small group, oral, demonstrations, presentations, self and peer, performance, portfolio prompts) is included.	*Glencoe Geometry: Concepts and Applications* includes a variety of assessment instruments to support instruction. The Student Edition has two **quizzes** in each chapter as well as a **Study Guide and Assessment** that includes **vocabulary review, review exercises** for each objective, and **applications** and **problem solving**. Also included for each chapter are a **Chapter Test** and a 2-page Preparing for **Standardized Tests** assessment. The Teacher's Wraparound Edition includes a 5-Minute Check and **Open-Ended Assessment** in every lesson. The Assessment and Evaluation Matters include multiple-choice tests, free-response tests, an open-ended assessment, a mid-chapter test, quizzes, cumulative review, and standardized test practice. The **TestCheck** and **Worksheet Builder CD-ROM**, correlated to the Kentucky Core Content Standards for Geometry, allows teachers to crate customized tests and quizzes with any combination of free-response, multiple-choice, short-answer, and open-ended items. The **Test Check** and **Worksheet Builder** also contains special banks of questions for **SAT, ACT,** and **TIMSS**. Preparing for **CATS Practice** and **Sample Test Workbook** gives students practice by objective and sample tests representative of **CATS**. *Glencoe Geometry: Concepts and Applications* provides integrated and ongoing test preparation throughout the year to help reduce student anxiety and improve student performance. The **Standardized Test Preparation CD-ROM** contains blocks of test items from state tests, the SAT, the ACT, TIMSS, and NAEP.

Assessment	Comments
5. Assessment activities provide opportunities for student integration of technology in the assessment process.	The **GeomPASS: Concepts and Applications CD-ROM** reviews and reinforces important concepts through a unique Pretest-Tutorial-Guided Practice-Posttest format. Self-paced and easy-to-use, it is an excellent tool for standardized test preparation.

Organization and Structure	Comments
1. Organization is logical and allows for spiraling of content.	*Glencoe Geometry: Concepts and Applications* is composed of 16 chapters, each having 4 to 7 lessons. Each lesson follows a straightforward format. The lesson begins with *What You'll Learn* and *Why It's Important*, which provide the objective of the lesson and the benefit of learning the concept. In the lesson narrative, in **important terms are highlighted yellow**, and definitions, rules, and properties are displayed in **concept boxes**. Completely worked-out examples with clear explanations parallel the exercises in the **Guided Practice** and Practice sections. **Check for Understanding** exercises are designed to be completed in class. In the **Communicating Mathematics** exercises, students define, describe, and explain mathematical concepts. Keyed to the examples, the **Guided Practice** exercises present a representative sample of the exercises in the Practice exercises. The Practice exercises are separated into A, B, and C sections, indicated only in the Teacher's Wraparound Edition. The **Applications and Problem Solving** exercises apply geometric concepts to both real-life and mathematical problem situations. Each lesson contains a **Critical Thinking** exercise in which students explain, justify, and prove mathematical relationships. The **Mixed Review** exercises are spiraled and cumulative. Each **Mixed Review** section contains a **Standardized Test Practice** question, some of which are open-ended. The **Student Handbook** in the back of the Student Edition contains **Algebra Review** and **Extra Practice** for each lesson as well as a **Graphing Calculator Tutorial**, **Glossary**, **Selected Answers**, and **Index**.

Organization and Structure	Comments
2. Language is clear and concise with correct grammar and sentence structure.	*Glencoe Geometry: Concepts and Applications* is the product of ongoing classroom-oriented research that involves students, teachers, curriculum supervisors, administrators, parents, and college-level mathematics educators. Prior to publication of any Glencoe program, typical research activities include a review of educational research and recommendations made by groups such as NCTM; mail surveys of mathematics educators, discussion groups involving mathematics teachers, department heads, and supervisors; focus groups involving mathematics educators; face-to-face interviews with mathematics educators; telephone surveys of mathematics educators; in-depth analysis of manuscript by a wide range of reviewers and consultants; and field tests in which students and teachers use pre-publication manuscript in the classroom.

Organization and Structure	Comments
3. Vocabulary and key terms are clearly defined and easily accessible within each lesson.	In the lesson narrative, **important terms** are **highlighted in yellow**, and definitions, rules, and properties are displayed in **concept boxes**.
4. Visual illustrations (e.g., graphs, charts, models) and examples are clearly presented and content-related.	Graphs, charts, and models are used throughout the book to illustrate concepts. Completely worked-out examples with clear explanations parallel the exercises in the **Guided Practice** and **Practice** sections.
5. Illustrations and language reflect diversity (e.g., racial, ethnic, culture, age, gender, disabilities).	*Glencoe Geometry: Concepts and Applications* is the product of ongoing classroom-oriented research that involves students, teachers, curriculum supervisors, administrators, parents, and college-level mathematics educators. Prior to publication of any Glencoe program, typical research activities include a review of educational research and recommendations made by groups such as NCTM; mail surveys of mathematics educators, discussion groups involving mathematics teachers, department heads, and supervisors; focus groups involving mathematics educators; face-to-face interviews with mathematics educators; telephone surveys of mathematics educators; in-depth analysis of manuscript by a wide range of reviewers and consultants; and field tests in which students and teachers use pre-publication manuscript in the classroom.
6. Legible type, length of lines, spacing, page layout, and width of margins contribute to overall appearance and use.	Prior to publication of any Glencoe program, an in-depth analysis of manuscript by a wide range of reviewers and consultants is conducted. Field tests in which students and teachers use pre-publication manuscript in the classroom also helps ensure accuracy.

Organization and Structure	Comments
7. Student materials seem durable and conducive to daily student use (e.g., size, weight).	The very best materials are used in all Glencoe products. The materials are easy for students to use, both in school and at home.
8. Textbook includes appropriate and sufficient glossary, index, and appendices.	The **Student Handbook** can be found on pp. 717-833. It contains sections on **Algebra Review**, **Extra Practice**, **TI-92 Tutorial, Postulates and Theorems, Glossary**, **Selected Answers**, and **Index**. **Formulas** and **Symbols** are listed inside the back cover.

Organization and Structure	Comments
9. Materials are organized into units of study (or similar structures) with daily lessons that include worthwhile, real-world tasks.	*Glencoe Geometry: Concepts and Applications* is composed of 16 chapters, each having 4 to 7 lessons. Each lesson follows a straightforward format. The lesson begins with *What You'll Learn* and *Why It's Important*, which provide the objective of the lesson and the benefit of learning the concept. In the lesson narrative, in **important terms are highlighted yellow**, and definitions, rules, and properties are displayed in **concept boxes**. Completely worked-out examples with clear explanations parallel the exercises in the **Guided Practice** and Practice sections. **Check for Understanding** exercises are designed to be completed in class. In the **Communicating Mathematics** exercises, students define, describe, and explain mathematical concepts. Keyed to the examples, the **Guided Practice** exercises present a representative sample of the exercises in the Practice exercises. The Practice exercises are separated into A, B, and C sections, indicated only in the Teacher's Wraparound Edition. The **Applications and Problem Solving** exercises apply geometric concepts to both real-life and mathematical problem situations. Each lesson contains a **Critical Thinking** exercise in which students explain, justify, and prove mathematical relationships. The **Mixed Review** exercises are spiraled and cumulative. Each **Mixed Review** section contains a **Standardized Test Practice** question, some of which are open-ended. The **Student Handbook** in the back of the Student Edition contains **Algebra Review** and **Extra Practice** for each lesson as well as a **Graphing Calculator Tutorial**, **Glossary**, **Selected Answers**, and **Index**.

Organization and Structure	Comments
10. Materials can be easily understood by students and parents.	The reading level of *Glencoe Geometry: Concepts and Applications* is on target at 7.9 Dale Chall. In addition, the material presented is interesting and related to students' lives. The Glencoe Math Website helps parents get involved with their child's learning through Involving Parents and Community in the Mathematics Classroom.

Student Experiences	Comments
1. The program emphasizes students *doing* mathematics rather than *memorizing* mathematics.	*Glencoe Geometry: Concepts and Applications* is designed to help students of basic and average ability levels develop geometric skills and concepts. The concise lesson narrative, lower readability, and unique info-graphics and photo-graphics help students learn important concepts. **Hands-on Geometry** activities give students the opportunity to bridge the gap between the concrete and the abstract. **Getting Ready** features in the exercises allow students to review subskills needed for homework assignments. **Reading Geometry** features help students understand the terminology of geometry, which is necessary for concept development. Most examples are immediately followed by **Your Turn** problems, which give students the opportunity to practice the concepts they have just learned. **Check for Understanding** in every lesson allows students to gauge their own mastery of lesson concepts.
2. Both group and individual activities are included.	*Glencoe Geometry: Concepts and Applications* offers multiple opportunities for students to learn cooperatively as well as individually. In addition to more traditional instructional experiences, hands-on labs and activities, projects, and online activities and research give students hands-on experience, with a partner or group, in discovering mathematical concepts.
3. Materials and activities provide authentic applications that allow students to make meaningful connections across the curriculum, to real-world situations, and to interrelated mathematical concepts.	The **Your Turn** problems in each section in every lesson contains Applications that give students opportunities to apply concepts to both real-life and mathematical situations.

Student Experiences	Comments
4. Materials and activities encourage students to explore and investigate mathematical ideas through various problem-solving techniques.	*Glencoe Geometry: Concepts and Applications* is designed to help students of basic and average ability levels develop geometric skills and concepts. The concise lesson narrative, lower readability, and unique info-graphics and photo-graphics help students learn important concepts. **Hands-on Geometry** activities give students the opportunity to bridge the gap between the concrete and the abstract. **Getting Ready** features in the exercises allow students to review subskills needed for homework assignments. **Reading Geometry** features help students understand the terminology of geometry, which is necessary for concept development. Most examples are immediately followed by **Your Turn** problems, which give students the opportunity to practice the concepts they have just learned. **Check for Understanding** in every lesson allows students to gauge their own mastery of lesson concepts.

Student Experiences	Comments
5. Materials and activities ask students to read, write, and discuss mathematics.	*Glencoe Geometry: Concepts and Applications* is designed to help students of basic and average ability levels develop geometric skills and concepts. The concise lesson narrative, lower readability, and unique info-graphics and photo-graphics help students learn important concepts. **Hands-on Geometry** activities give students the opportunity to bridge the gap between the concrete and the abstract. **Reading Geometry** features help students understand the terminology of geometry, which is necessary for concept development. Each lesson contains a **Critical Thinking** exercise in which students explain, justify, and prove mathematical relationships. Students are shown how to organize information about each chapter by using a **Foldables Study Organizer.**

Student Experiences	Comments
6. Materials and activities ask students to reflect upon, clarify, justify, and generalize their mathematical ideas.	Throughout the *Glencoe Geometry: Concepts and Applications* program students are given the tools they need to organize their thinking, process new concepts, and connect them to concepts they already know. Students are shown how to organize information about each chapter by using a **Foldables Study Organizer.**

Technology	Comments
1. In order for students to focus on decision-making, reflection, reasoning, and problem solving, instructional activities incorporate the use of technology (e.g., calculators, probes, computers) and include instructions on how to use the technology tools.	Students are given multiple opportunities to utilize the world of technology in studying and exploring mathematics. **Online support** provides additional practice for each lesson. With its easy-to-read format and emphasis on visuals and hands-on activities *Glencoe Geometry: Concepts and Applications* helps students to learn geometry. The Student Handbook contains a **Graphing Calculator Tutorial**.
2. Various forms of media are included (e.g., CDs, videos, computer software)	The following items are included in the program: **Interactive Teacher Edition**, **KY TestCheck and Worksheet Builder CD-ROM**, **GeomPASS: Concepts and Applications Tutorial CD-ROM**, **KY Interactive Lesson Planner**, **KY CATS Prep CD-ROM**, **MindJogger Videoquizzes**, **Vocabulary Puzzlemaker**, Using the **Internet in the Math Classroom**, and **State Test Prep CD-ROM** High School.
3. Student materials are available online.	Free access to **Glencoe Math Website,** www.geomconcepts.com**,** is provided with the program.

Resource Materials	Comments
1. Teacher materials coordinate easily with student materials (e.g., additional resources included at point of need, student pages shown, manipulatives appropriate for indicated lesson, instructional technology indicated).	Each lesson in the Teacher's Wraparound Edition (TWE) begins with a **Resource Manager**, which includes instructional technology. A list of blackline masters and manipulatives for each lesson is included at the beginning of each chapter. Each student page is shown in the TWE on the same pages as related teacher's materials.
2. Activities are included that adapt to the various learning styles, intelligences, and interest/ability levels.	*Glencoe Geometry: Concepts and Applications* is designed to help students of basic and average ability levels develop geometric skills and concepts.
3. Extension activities including adaptations and accommodations for students with special needs.	*Glencoe Geometry: Concepts and Applications* is designed to help students of basic and average ability levels develop geometric skills and concepts.
4. Resources provide objectives, background information, common student errors, hints, advice for lesson implementation and real-world connections, connections within mathematics, and references (e.g., solutions manuals, study guides).	Additional resource materials include **Teacher's Classroom Resources**, **KY CATS Math Practice and Sample Test Workbook for Grade 11 Assessment TE**, **KY Guide to Daily Intervention**, **Teaching Trasparencies**, **5-Minute Check Transparencies**, **Answer Key Transparencies**, **Overhead Manipulative Resources**, **Teaching Math with Foldables** by Dinah Zike, **State Test Prep Answer Key**. **Spanish Study Guide and Assessment**, **Prerequistie Sills Workbook: A Review of Algebra**, **Practice Workbook**, **State Test Prep Workbook High School**, **KY CATS Math Practice and Sample Test Workbook for Grade 11 Assessment SE**.

Resource Materials	Comments
5. Suggestions are made for integration of themes and/or interdisciplinary instruction.	USA TODAY Education's Online site offers resources and interactive features connected to each day's newspaper. Log on to www.education.usatoday.com. Ancillary materials include **Science and Math Lab Manual** and **School-to-Career Masters**.
6. Suggestions are made for family and community involvement and school/home communication.	The **Glencoe Math Website,** www.geomconcepts.com**,** helps parents get involved with their child's learning through **Involving Parents and Community in the Mathematics Classroom**.
7. The included media are durable, easy to use, and have technical merit.	All included media are made to last and can be easily incorporated into lessons.
8. Teacher resources are available online.	Free access to **Glencoe Math Website,** www.geomconcepts.com**,** is provided with the program.

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