American Book Company's

PASSING THE TENNESSEE ALGEBRA I END-OF-COURSE ASSESSMENT

ERICA DAY

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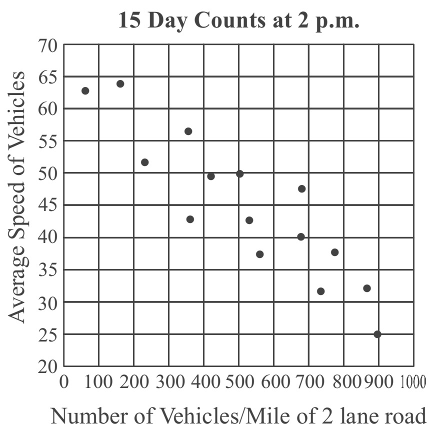
Contents

Diagnostic Test

1. Which equation could be the line of best fit for this scatter plot?



A $y = \frac{5}{9}x + 8$

B $y = \frac{1}{19}x + 74$

C $y = -\frac{5}{9}x + 8$

D $y = -\frac{1}{19}x + 74$

5.4

2. Simplify $\sqrt{45} \times \sqrt{27}$

F $3\sqrt{15}$

G $9\sqrt{15}$

H $\sqrt{72}$

J $\sqrt{121}$

2.1

3. Which of the following is equivalent to $\frac{\sqrt{8}}{2}$?

A $2\sqrt{2}$

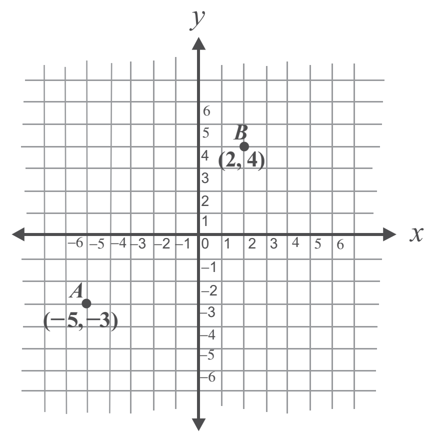
B $\sqrt{2}$

C 4

D $\frac{\sqrt{2}}{2}$

2.1

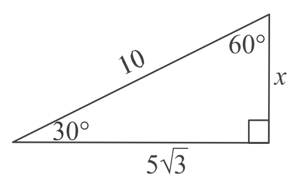
4. What is the distance between point A and point B?



F $7\sqrt{2}$
G $\sqrt{106}$
H $\sqrt{10}$
J 7

4.3

5. Find the value of x.



A 5

B $\frac{5\sqrt{3}}{2}$

C 10

D 15

4.2

6. What is the domain of the function $y = 4x + 2$?

F all real numbers
G all real numbers greater than zero
H all real numbers greater than two
J all real numbers less than zero

3.7

Evaluation Chart for the Diagnostic Mathematics Test

Directions: On the following chart, circle the question numbers that you answered incorrectly. Then turn to the appropriate topics (listed by chapters), read the explanations, and complete the exercises. Review the other chapters as needed. Finally, complete ***Passing the Tennessee Algebra I End-of-Course Assessment*** Practice Tests for further review.

		Questions	Pages
Chapter 1:	Exponents and Scientific Notation	33, 58, 63	14–26
Chapter 2:	Roots	2, 3, 11, 42	27–33
Chapter 3:	Rational and Irrational Numbers	65	34–41
Chapter 4:	Introduction to Algebra	28, 37, 39	42–54
Chapter 5:	Solving Multi-Step Equations and Inequalities	37, 53, 54, 57, 64	55–74
Chapter 6:	Algebra Word Problems	25	75–89
Chapter 7:	Polynomials	17, 31, 50, 56	90–111
Chapter 8:	Factoring	43, 45, 48, 49, 51, 52	112–133
Chapter 9:	Solving Quadratic Functions	46, 47, 59, 60	134–146
Chapter 10:	Graphing and Writing Equations and Inequalities	27, 40	147–164
Chapter 11:	Applications of Graphs	16, 20, 22, 34, 35, 36, 38	165–177
Chapter 12:	Systems of Equations and Systems of Inequalities	26	178–189
Chapter 13:	Relations and Functions	6, 12, 44	190–213
Chapter 14:	Patterns	7, 8, 15, 23	214–223
Chapter 15:	Geometry	4, 5, 9, 13, 14, 19, 21, 30	224–241
Chapter 16:	Statistics	1, 18, 41, 55, 62	242–256
Chapter 17:	Data Analysis	61	257–269
Chapter 18:	Probability	10, 24, 29, 32	270–281

1.10 Scientific Notation Word Problems

Solve the following word problems.

1. An analysis was done on one quart of pond water from the local park to see if it was safe for swimming. Dr. Andropolis counted 1.3×10^6 bacteria in the one quart. Express this in standard notation.

2. Using the scientific notation number in problem one, write the same number times $1,000$ in scientific notation.

3. Jeff Greenly is an asparagus farmer. In one year, Mr. Greenly harvested $82,300$ pounds of asparagus. Express this number in scientific notation.

4. Using the pounds of asparagus harvested in problem number three, express in scientific notation how many pounds would be harvested in ten years, if Mr. Greenly harvested about the same number of pounds each year.

5. The thickness of one pixie wing is 4.5×10^{-2} inches. Express this as a conventional number.

6. Planet Zorton is $68,820,000$ miles from planet Aerbon. Express this distance in scientific notation.

7. For one bottle of perfume, the perfume manufacturer needs $7,350$ pounds of flower blossoms. Express this amount in scientific notation.

8. If the same manufacturer of perfume in problem seven made $10,000$ bottles of perfume, how many pounds of flowers blossoms would be required? Express your answer in scientific notation.

9. The thickness of one grain of pepper is 2.3×10^{-2} inches. Express the thickness of one grain of pepper as a conventional number.

10. It takes $210,000$ seedlings a year to replace the trees harvested by the Perfect Papermill Company. Express this number in scientific notation.

11. The Earth moves around the sun at 6.7×10^4 miles per hour. How many miles does the Earth travel after 2.4×10^3 hours (or 100 days)?

12. There are 3.949×10^6 miles of roads in the United States, If, on average, 1.2×10^2 cars went over each mile of road per day, how many miles would be driven each day in the United States?

2.5 Multiplying Roots

You can also multiply square roots. To multiply square roots, you just multiply the numbers under the square root sign and then simplify. Look at the examples below.

Example 12: $\sqrt{2} \times \sqrt{6}$

Step 1: $\sqrt{2} \times \sqrt{6} = \sqrt{2 \times 6} = \sqrt{12}$ Multiply the numbers under the square root sign.

Step 2: $\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$ Simplify

Example 13: $3\sqrt{3} \times 5\sqrt{6}$

Step 1: $(3 \times 5)\sqrt{3 \times 6} = 15\sqrt{18}$ Multiply the numbers in front of the square root, and multiply the numbers under the square root sign.

Step 2: $15\sqrt{18} = 15\sqrt{2 \times 9}$
$15 \times 3\sqrt{2} = 45\sqrt{2}$ Simplify.

Example 14: $\sqrt{14} \times \sqrt{42}$ For this more complicated multiplication problem, use the rule of roots that you learned on page 28, $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$.

Step 1: $\sqrt{14} = \sqrt{7} \times \sqrt{2}$ and
$\sqrt{42} = \sqrt{2} \times \sqrt{3} \times \sqrt{7}$ Instead of multiplying 14 by 42, divide these numbers into their roots.

$$\sqrt{14} \times \sqrt{42} = \sqrt{7} \times \sqrt{2} \times \sqrt{2} \times \sqrt{3} \times \sqrt{7}$$

Step 2: Since you know that $\sqrt{7} \times \sqrt{7} = 7$ and $\sqrt{2} \times \sqrt{2} = 2$, the problem simplifies to $(7 \times 2)\sqrt{3} = 14\sqrt{3}$

Simplify the following multiplication problems.

1. $\sqrt{5} \times \sqrt{7}$
2. $\sqrt{32} \times \sqrt{2}$
3. $\sqrt{10} \times \sqrt{14}$
4. $2\sqrt{3} \times 3\sqrt{6}$
5. $4\sqrt{2} \times 2\sqrt{10}$
6. $\sqrt{5} \times 3\sqrt{15}$
7. $\sqrt{45} \times \sqrt{27}$
8. $5\sqrt{21} \times \sqrt{7}$
9. $\sqrt{42} \times \sqrt{21}$
10. $4\sqrt{3} \times 2\sqrt{12}$
11. $\sqrt{56} \times \sqrt{24}$
12. $\sqrt{11} \times 2\sqrt{33}$
13. $\sqrt{13} \times \sqrt{26}$
14. $2\sqrt{2} \times 5\sqrt{5}$
15. $\sqrt{6} \times \sqrt{12}$

3.3 Ordering Rational and Irrational Numbers

Example 3: Order these numbers from least to greatest: $1.1, \frac{9}{7}, 1.01, \sqrt{2}$

Step 1: Determine if all of your numbers are fractions. If so, you can use the special technique for fractions given in example 2. In either case, you can use the following steps.

Step 2: Convert all of the rational numbers into decimals. In this example, $\frac{9}{7} \approx 1.286$ (using long division)

Step 3: Arrange rational numbers with decimal points directly under each other.

1.1
1.286
1.01

Step 4: Fill in with 0's so they all have the same number of places after the decimal point. Read the numbers as if the decimal point wasn't there.

1.100
$1.286 \longleftarrow$ Greatest rational number
$1.010 \longleftarrow$ Least rational number

Step 5: Square and compare the rational and irrational numbers as given in "Comparing Rational and Irrational Numbers."

$$\left(\frac{9}{7}\right)^2 = \frac{81}{49}$$

$$\left(\sqrt{2}\right)^2 = 2$$

Step 6: Compare using the lowest common denominator.

$$2 = \frac{2}{1} \times \frac{49}{49} = \frac{98}{49}$$

$\frac{81}{49} < \frac{98}{49}$ which means that $\frac{9}{7} < \sqrt{2}$

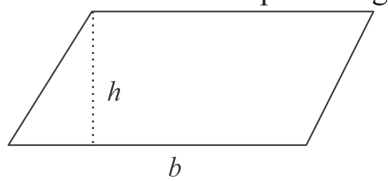
Step 7: Place the irrational number in its proper place among the rational numbers.

1.100
1.286
$1.010 \longleftarrow$ Least real number
$\sqrt{2} \longleftarrow$ Greatest real number

Answer: $1.010, 1.1, \frac{9}{7}, \sqrt{2}$

4.7 Substituting Numbers in Formulas

Example 6: Area of a parallelogram: $A = b \times h$
Find the area of the parallelogram if $b = 20$ cm and $h = 10$ cm.



Step 1: Copy the formula with the numbers given in place of the letter in the formula.
$A = 20 \times 10$

Step 2: Solve the problem. $A = 20 \times 10 = 200$. Therefore, $A = 200$ cm^2.

Solve the following problems using the formulas given.

1. The volume of a rectangular pyramid is determined by using the following formula:
$V = \dfrac{lwh}{3}$
Find the volume of the pyramid if $l = 6$ in, $w = 6$ in, and $h = 11$ in.

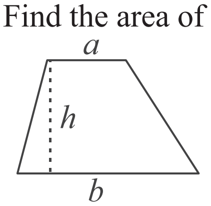
2. Find the approximate volume of a cone with a radius of 30 inches and a height of 60 inches using the formula:
$V = \frac{1}{3}\pi r^2 h \qquad \pi \approx 3.14$

3. Lumber is measured by the following formula:
Number of board feet = $\dfrac{LWT}{12}$
Find the number of board feet if $L = 14$ feet, $W = 8$ feet, and $T = 6$ feet.

4. The perimeter of a square is figured by the formula $P = 4s$.
Find the perimeter if $s = 6$.

5. What is the approximate circumference of a circle with a diameter of 8 cm?
$C = \pi d \qquad \pi \approx 3.14$

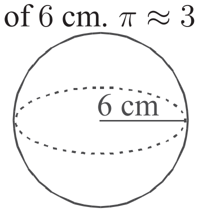
6. Find the area of the trapezoid



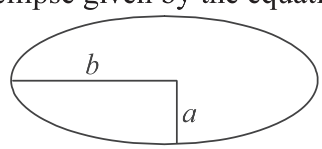
$A = \frac{1}{2}h\,(a + b)$
$a = 11$ in
$b = 23$ in
$h = 18$ in

7. Find the approximate volume of a sphere with a radius of 6 cm. $\pi \approx 3.14$

$V = \frac{4}{3}\pi r^3$



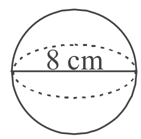
8. Find the approximate area of the following ellipse given by the equation: $A = \pi ab$



$\pi \approx 3.14$
$a = 2$ cm
$b = 4$ cm

9. The formula for changing from degrees Fahrenheit to degrees Celsius is:
$$\mathrm{C} = \frac{5\,(\mathrm{F} - 32)}{9}$$
If it is 68°F outside, how many degrees Celsius is it?

10. Find the approximate volume.



$V = \frac{4}{3}\pi r^3 \quad \pi \approx 3.14$

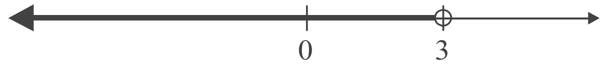
11. Louise has a cone-shaped mold to make candles. The diameter of the base is 10 cm, and it is 13 cm tall. About how many cubic centimeters of liquid wax will it hold?
$\pi \approx 3.14$
$V = \frac{1}{3}\pi r^2 h$

5.9 Graphing Inequalities on a Number Line

An inequality is a sentence that contains a $\neq$, $<$, $>$, $\leq$, or $\geq$ sign. Look at the following graphs of inequalities on a number line.

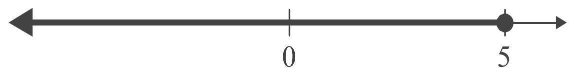
NUMBER LINE

$x < 3$ is read "x is less than 3."



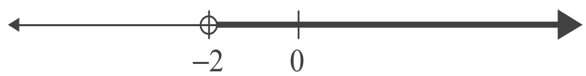
There is no line under the $<$ sign, so the graph uses an **open** endpoint to show x is less than 3 but does not include 3. All the numbers less than 3 are shaded.

$x \leq 5$ is read "x is less than or equal to 5."

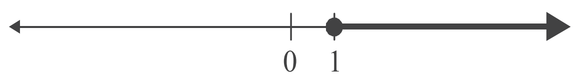


If you see a line under $<$ or $>$ ($\leq$ or $\geq$), the endpoint is filled in. The graph uses a **closed** circle because the number 5 is included in the graph.

$x > -2$ is read "x is greater than -2."

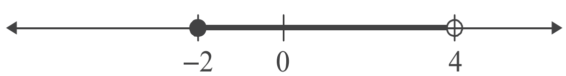


$x \geq 1$ is read "x is greater than or equal to 1."



There can be more than one inequality sign. This is called a **compound inequality**. For example:

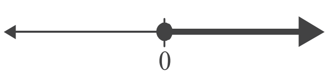
$-2 \leq x < 4$ is read "-2 is less than or equal to x and x is less than 4."



Graph the solution sets of the following inequalities.

1. $x > 8$ 
2. $x \leq 5$ 
3. $-5 < x < 1$ 
4. $x > 7$ 
5. $1 \leq x < 4$ 
6. $x \geq 10$ 

Give the inequality represented by each of the following number lines.

7. 

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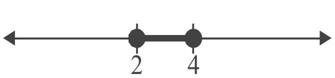
8. 

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9. 

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10. 

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11. 

____

12. 

____

6.7 Consecutive Integer Problems

	Examples:	Algebraic notation:
Consecutive integers follow each other in order	$1, 2, 3, 4$ $-3, -4, -5, -6$	$n, n+1, n+2, n+3$
Consecutive **even** integers:	$2, 4, 6, 8, 10$ $-12, -14, -16, -18$	$n, n+2, n+4, n+6$
Consecutive **odd** integers:	$3, 5, 7, 9$ $-5, -7, -9, -11$	$n, n+2, n+4, n+6$

Example 12: The sum of three consecutive odd integers is 63. Find the integers.

Step 1: Represent the three odd integers:
Let n = the first odd integer
$n + 2$ = the second odd integer
$n + 4$ = the third odd integer

Step 2: The sum of the integers is 63, so the algebraic equation is
$n + n + 2 + n + 4 = 63$. Solve for n.
$n = 19$

Solution: the first odd integer = 19
the second odd integer = 21
the third odd integer = 23

Check: Does $19 + 21 + 23 = 63$? Yes, it does.

Example 13: Find three consecutive odd integers such that the sum of the first and second is three less than the third.

Step 1: Represent the three odd integers just like above:
Let n = the first odd integer
$n + 2$ = the second odd integer
$n + 4$ = the third odd integer

Step 2: In this problem, the sum of the first and second integers is three less than the third integer, so the algebraic equation is written as follows:
$n + n + 2 = n + 4 - 3$
$n = -1$

Solution: the first odd integer = -1
the second odd integer = 1
the third odd integer = 3

Check: Is the sum of -1 and 1 three less than 3?
$-1 + 1 = 3 - 3$ or $0 = 0$ Yes, it is.

7.12 Multiplying Two Binomials

When you multiply two binomials such as $(x+6)(x-7)$, you must multiply each term in the first binomial by each term in the second binomial. The easiest way is to use the **FOIL** method. If you can remember the word **FOIL**, it can help you keep order when you multiply. The "**F**" stands for **first**, "**O**" stands for **outside**, "**I**" stands for **inside**, and "**L**" stands for **last**.

F		**O**		**I**		**L**
FIRST		**OUTSIDE**		**INSIDE**		**LAST**
Multiply the **first** terms in each binomial		Next, multiply the **outside** terms.		Then, multiply the **inside** terms.		Last, multiply the **last** terms.
$(x+6)(x-7)$		$(x+6)(x-7)$		$(x+6)(x-7)$		$(x+6)(x-7)$
$x \times x = x^2$		$x \times -7 = -7x$		$6 \times x = 6x$		$6 \times -7 = -42$
x^2	$+$	$-7x$	$+$	$6x$	$+$	-42

Now just combine like terms, $6x - 7x = -x$, and write your answer.

$(x+6)(x-7) = x^2 - x - 42.$

Note: It is customary for mathematicians to write polynomials in descending order. That means that the term with the highest-number exponent comes first in a polynomial. The next highest exponent is second and so on.

Multiply the following binomials.

1. $(y-8)(y+3)$
2. $(4x+5)(x+20)$
3. $(5b-3)(3b-5)$
4. $(6g+4)(g-20)$
5. $(8k-7)(-5k-3)$
6. $(9v-4)(3v+5)$
7. $(20p+4)(5p+3)$
8. $(3h-20)(-4h-7)$
9. $(w-5)(w-8)$
10. $(6x+2)(x-4)$
11. $(7t+3)(4t-2)$
12. $(5y-20)(5y+20)$
13. $(a+6)(3a+7)$
14. $(3z-9)(z-5)$
15. $(7c+4)(6c+7)$

8.13 Multiplying Rational Expressions

Multiplying rational expressions is similar to multiplying fractions because a rational expression is a fraction.

Example 18: Multiply: $\frac{x^4 - x^3}{y^3} \times \frac{y^4}{x^2}$

Step 1: When you multiply a rational expression, you must multiply the numerators together and multiply the denominators together.

$$\frac{x^4 - x^3}{y^3} \times \frac{y^4}{x^2} = \frac{(x^4 - x^3) \times y^4}{y^3 \times x^2} = \frac{x^4y^4 - x^3y^4}{x^2y^3}$$

Step 2: Simplify the resulting rational expression. You can factor x^3y^4 out of the numerator.

$$\frac{x^4y^4 - x^3y^4}{x^2y^3} = \frac{x^3y^4(x-1)}{x^2y^3}$$

Step 3: You can also cancel x^2y^3 because it is a factor in both the numerator and denominator of the expression.

$$\frac{x^3y^4(x-1)}{x^2y^3} = \frac{xy(x-1)}{1} = xy(x-1)$$

Therefore, $\frac{x^4 - x^3}{y^3} \times \frac{y^4}{x^2} = xy(x-1)$.

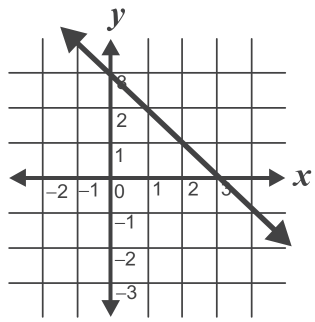
Multiply the following rational expressions.

1. $\frac{-b}{2a} \times \frac{-a}{3b}$
2. $\frac{4x}{y} \times \frac{1}{2y}$
3. $\frac{5a}{3b} \times \frac{4c}{3b}$
4. $\frac{a+b}{a-b} \times \frac{c+b}{c-b}$
5. $\frac{c}{a^2} \times \frac{c-a}{b-c}$
6. $\frac{y^5}{x^3} \times \frac{y^2+2y+1}{x^2-y}$
7. $\frac{x^2-2x-3}{x^2-5x-14} \times \frac{x^2-2x-35}{x^2+6x-27}$
8. $\frac{9}{x} \times \frac{x^5}{y}$
9. $\frac{a^2-b}{a-b^2} \times \frac{7c}{b}$
10. $\frac{5}{x^2y} \times \frac{4}{xy^2}$
11. $\frac{5x^3}{2} \times \frac{2x^3}{5}$
12. $\frac{x+7}{x-1} \times \frac{x-3}{x+5}$
13. $\frac{3c}{a^2} \times \frac{2ba}{c}$
14. $\frac{a^5-a^2}{b^3} \times \frac{c^4}{a^2}$
15. $\frac{b-17}{c^2+2} \times \frac{a^3}{b^3} \times \frac{c^3}{b-17}$
16. $\frac{hk}{47} \times \frac{16}{m}$

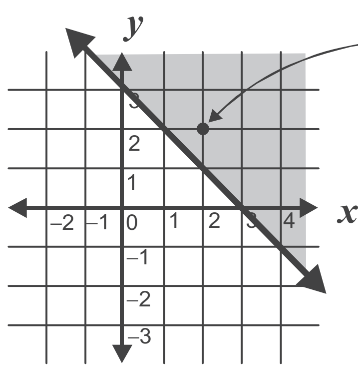
Example 16: Graph $x + y \geq 3$.

Step 1: First, we graph $x + y \geq 3$ by changing the inequality to an equality. Think of ordered pairs that will satisfy the equation $x + y = 3$. Then, plot the points, and draw the line. As shown below, this line divides the Cartesian plane into 2 half-planes, $x + y \geq 3$ and $x + y \leq 3$. One half-plane is above the line, and the other is below the line.

x	y
2	1
0	3
3	0
4	–1



Step 2: To determine which side of the line to shade, first choose a test point. If the point you choose makes the inequality true, then the point is on the side you shade. If the point you choose does not make the inequality true, then shade the side that does not contain the test point.



For our test point, let's choose $(2, 2)$. Substitute $(2, 2)$ into the inequality.

$x + y \geq 3$
$2 + 2 \geq 3$

$4 \geq 3$ is true, so shade the side that includes this point.

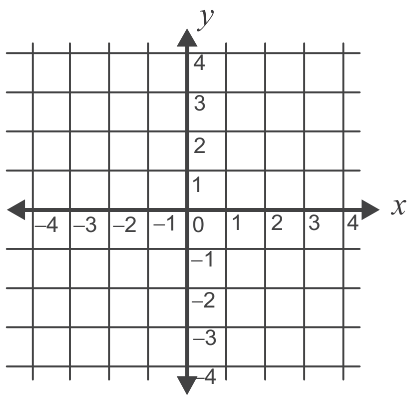
Use a solid line because of the $\geq$ sign.

Graph the following inequalities on your own graph paper.

1. $x + y \leq 4$
2. $x + y \geq 3$
3. $x \geq 5 - y$
4. $x \leq 1 + y$
5. $x - y \geq -2$
6. $x < y + 4$
7. $x + y < -1$
8. $x - y \leq 0$
9. $x \geq y + 2$
10. $x < -y + 1$
11. $-x + y > 1$
12. $-x - y < -2$

Chapter 11 Review

1. Graph the equation $y = -\frac{1}{2}x^2 + 1$.



2. What is the name of the graph described by the equation $y = 2x^2 - 1$?

3. If you change the slope of the line $2x - y = 4$ to -1, how will the graph of the line be affected?

4. Paulo turns on the oven to preheat it. After one minute, the oven temperature is 200°. After 2 minutes, the oven temperature is 325°.

Oven Temperature

Minutes	Temperature
1	200°
2	325°

Assuming the oven temperature rises at a constant rate, write an equation that fits the data.

5. Write an equation that fits the data given below. Assume the data is linear.

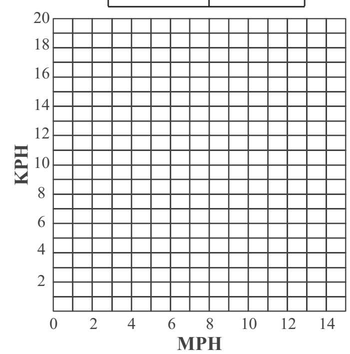
Plumber Charges per Hour

Hour	Charge
1	\$170
2	\$220

6. The data given below show conversions between miles per hour and kilometers per hour. Based on this data, graph a conversion line on the Cartesian plane below.

Speed

MPH	KPH
5	8
10	16



7. What would be the approximate conversion of 9 mph to kph?

8. What would be the approximate conversion of 13 kph to mph?

9. A bicyclist travels 12 mph downhill. About how many kph is the bicyclist traveling?

10. Use the data given below to graph the interest rate versus the interest rate on \$80.00 in one year.

\$80.00 Principal

Interest Rate	Interest-1 year
5%	\$4.00
10%	\$8.00

11. About how much interest would accrue in one year at an 8% interest rate?

12. What is the slope of the line describing interest versus interest rate?

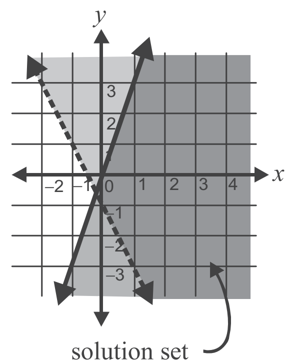
13. What information does the slope give in problem 12?

12.5 Graphing Systems of Inequalities

Systems of inequalities are best solved graphically. Look at the following examples.

Example 6: Sketch the solution set of the following system of inequalities:

$y > -2x - 1$ and $y \leq 3x$



Step 1: Graph both inequalities on a Cartesian plane. Study the chapter on graphing inequalities if you need to review.

Step 2: Shade the portion of the graph that represents the solution set to each inequality just as you did in the chapter on graphing inequalities.

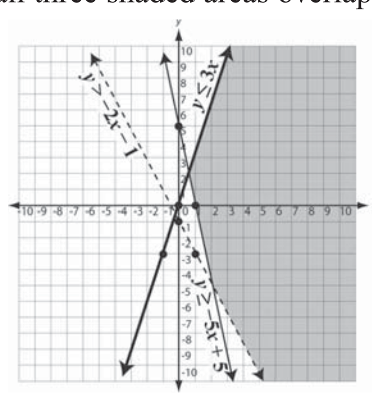
Step 3: Any shaded region that overlaps is the solution set of both inequalities.

Example 7: Sketch the solution set of the following systems of inequalities:
$y > -2x - 1$, $y \leq 3x$, and $y \geq -5x + 5$

Step 1: Graph all three inequalities on a Cartesian plane. Study the section on graphing inequalities if you need to review.

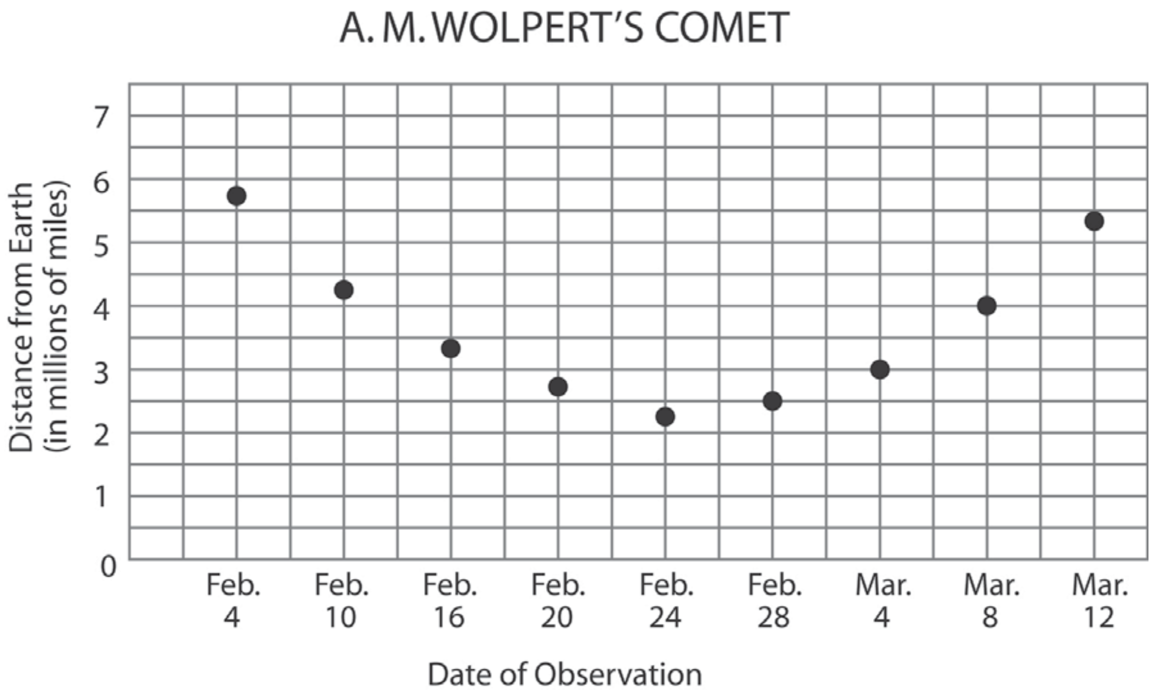
Step 2: Shade the portion of each graph that represents the solution set to each inequality.

Step 3: The area where all three shaded areas overlap is the solution set for all three inequalities.



****Note**: Be careful! It is possible for the shaded areas of the three inequalities to not overlap. If there is no area where all three overlap, then there is no solution set for the three inequalities. You might want to shade the solutions of each inequality with a different color so that the overlap is easier to determine.

A. M. Wolpert, a famous astronomer, drew a scatter plot of the distance of a particular comet from the Earth. Her scatter plot is graphed below.



3. According to the graph, what was the closest that the comet came to Earth?

A 2 miles
B 2 million miles
C 2.25 million miles
D 2.5 million miles

4. What would a y value of 0 mean on this graph?

F The comet is remaining the same distance from the Earth.
G The astronomer forgot to record a value.
H The comet is so distant it can no longer be observed.
J The comet would strike the Earth.

Find the pattern, the next number, and the 20th number for each of the sequences below.

	Sequence	Pattern	Next Number in Sequence	20th number in the Sequence
1.	$-1, 0, 1, 2, 3$	________	____________	______________
2.	$6, 7, 8, 9, 10$	________	____________	______________
3.	$7, 15, 23, 31, 39$	________	____________	______________
4.	$-6, -12, -18, -24, -30$	________	____________	______________
5.	$5, 9, 13, 17, 21$	________	____________	______________
6.	$4, 8, 12, 16, 20$	________	____________	______________
7.	$8, 32, 72, 128, 200$	________	____________	______________
8.	$-1, -2, -3, -4, -5$	________	____________	______________
9.	$5, 10, 15, 20, 25$	________	____________	______________
10.	$3, 5, 7, 9, 11$	________	____________	______________

14.2 Making Pattern Predictions

Use what you know about number patterns to answer the following questions.

Corn plants grow as tall as they will get in about 20 weeks. Study the chart of the rate of corn plant growth below, and answer the questions that follow.

Corn Growth

Beginning Week	Height (inches)
2	9
7	39
11	63
16	??

1. If the growth pattern continues, how high will the corn plant be beginning week 16?
2. If the growth pattern was constant (at the same rate from week to week), how high was the corn in the beginning of the 9th week?

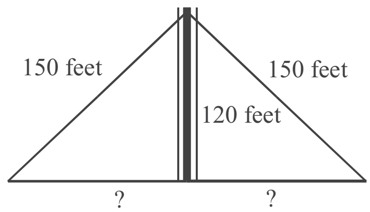
Peter Nichols is staining furniture for a furniture manufacturer. He stains large pieces of furniture in the beginning of the day that take longer to dry and smaller pieces of furniture as the day progresses.

Time	# Pieces Completed per Hour
Hour 1	3
Hour 3	5
Hour 6	8

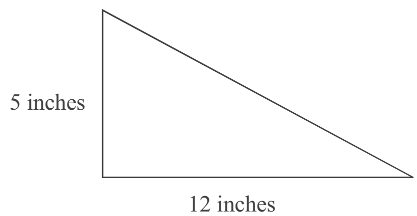
3. How many pieces of furniture did Peter stain during his fifth hour of work?
4. How many pieces of furniture will Peter have stained by the end of two 8 hour days?

Solve the following problems.

1. In order for a 120 foot cell phone tower to stand up to the wind, there must be cables attached to the top of the tower and the ground. How far away must the cable be attached to the ground from the base of the tower if the cable is 150 feet long?



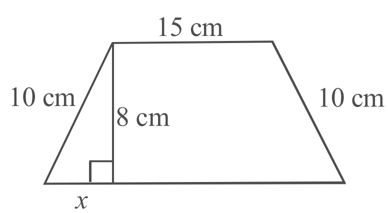
2. Tiffany wants to attach a ribbon around the outside of her triangular flag, which is 5 inches tall and 12 inches long. How many inches of ribbon will she need?



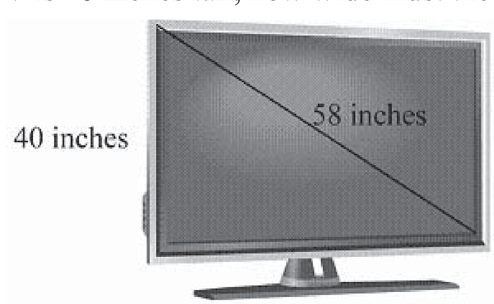
3. Frank walks along a park in order to go to school – 100 yards south and 350 yards east. But then he realizes that he forgot his math book and cuts diagonally across the park to run home. How far did Frank go on his travels?

4. The foot of a ladder is placed 10 feet from a wall. If the top of the ladder rests 15 feet above the ground on the wall, about how long is the ladder?

5. Find the perimeter of the trapezoid.



6. Michael just bought the biggest TV he could find, measuring 58 inches, which is the diagonal measurement. If the TV is 40 inches tall, how wide must the stand be to hold the new TV?



16.8 The Line of Best Fit

At this point, you now understand how to plot points on a Cartesian plane. You also understand how to find the data trend on a Cartesian plane. These skills are necessary to accomplish the next task, determining the line of best fit.

In order to find the line of best fit, you must first draw a scatter plot of all data points. Once this is accomplished, draw an oval around all of the points plotted. Draw a line through the points in such a way that the line separates half the points from one another. You may now use this line to answer questions.

Interpolate - to find/estimate a value on the line of best fit

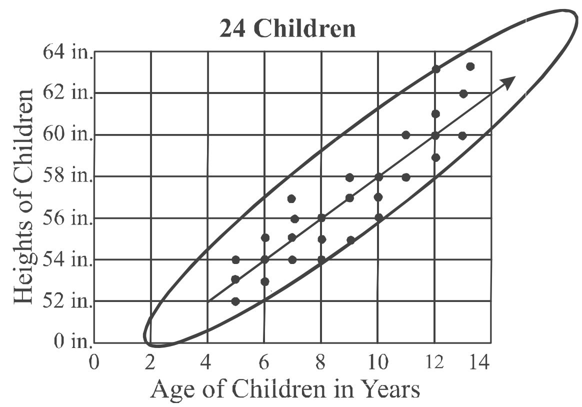
Extrapolate - to find/estimate a value that could be in the data set, but is outside the line of best fit

Example 8: The following data set contains the heights of children between 5 and 13 years old. Make a scatter plot and draw the line of best fit to represent the trend. Using the graph, determine the height for a 14-year old child.

Age 5: 4’6", 4’4", 4’5"	Age 8: 4’8", 4’6", 4’7"	Age 11: 5’0", 4’10"
Age 6: 4’7", 4’5", 4’6"	Age 9: 4’9", 4’7", 4’10"	Age 12: 5’1", 4’11", 5’0", 5’3"
Age 7: 4’9", 4’7", 4’6", 4’8"	Age 10: 4’9", 4’8", 4’ 10"	Age 13: 5’3", 5’2", 5’0", 5’1"

In this example, the data points lay in a positive sloping direction. To determine the line of best fit, all data points were circled, then a line of best fit was drawn. Half of the points lay below, half above the line of best fit drawn bisecting the narrow length of the oval.

To find the height of a 14-year old, simply continue the line of best fit forward. In this case, the height is 62 inches.



Plot the data sets below, then draw the line of best fit. Next, use the line to estimate the value of the next measurement.

1. Selected values of the Sleekster Brand Light Compact Vehicles: New Vehicle: $13,000.
   1 year old: $12,000, $11,000, $12,500   3 year old: $8,500, $8,000, $9,000
   2 year old: $9,000, $10,500, $9,500   4 year old: $7,500, $6,500, $6,000
   5 year old: ?

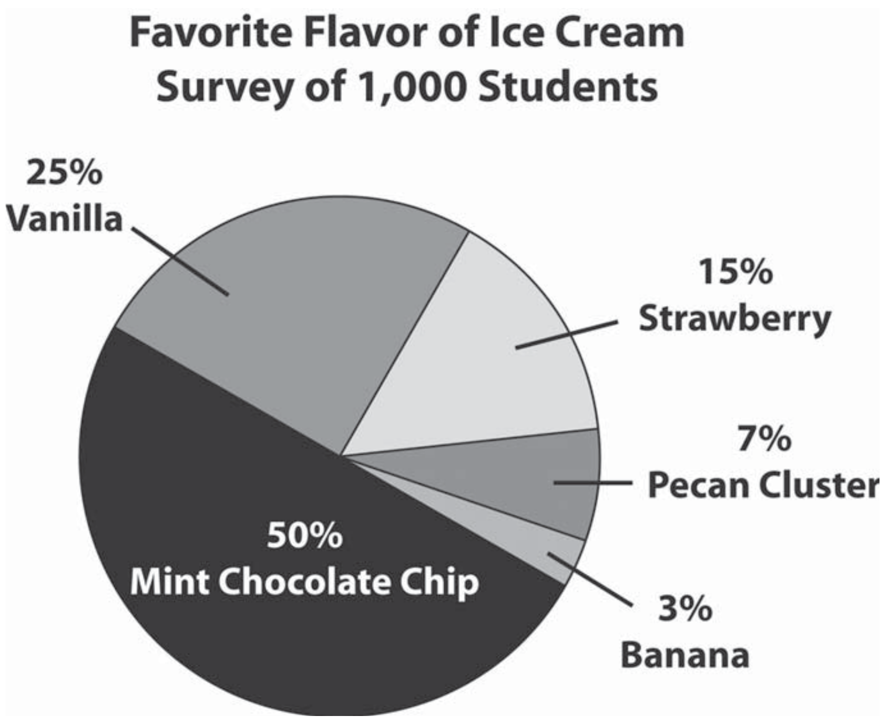
2. The relationship between string length and kite height for the following kites:
   (L = 500 ft, H = 400 ft) (L = 250 ft, H = 150ft) (L = 100 ft, H = 75 ft) (L = 500 ft, H = 350 ft) (L = 250 ft, H = 200 ft) (L = 100 ft, H = 50 ft) (L = 600 ft, H = ?)

3. Relationship between Household Incomes(HI) and Household Property Values (HPV):
   (HI = $30,000, HPV = $100,000) (HI = $45,000, HPV = $120,000) (HI = $60,000, HPV = $135,000) (HI = $50,000, HPV = 115,000) (HI = $35,000, HPV = 105,000) (HI = 65,000, HPV = 155,000) (HI = $90,000, HPV = ?)

17.5 Circle Graphs

Circle graphs represent data expressed in percentages of a total. The parts in a circle graph always add up to 100%. Circle graphs are sometimes called **pie graphs** or **pie charts**. A few examples of circle graphs are: percentage of kids who prefer a peanut butter and jelly sandwich; or the least favorite color among red, yellow, and purple.

Example 5: A survey of $1,000$ students was taken to see which flavor of ice cream should be added to the list of flavors in the school cafeteria: mint chocolate chip, strawberry, vanilla, banana, or pecan cluster. How many students voted for strawberry?



Step 1: Locate the category "Strawberry" on the circle graph. 15% of students choose strawberry.

Step 2: Multiply the percentage of students who chose strawberry to the total number of students. $0.15 \times 1,000 = 150$. Of the $1,000$ students surveyed, 150 of them voted for strawberry as their favorite flavor of ice cream.

Find the probability of the following problems. Express the answer as a percent.

1. A computer chooses a random number between 1 and 200. What is the probability that you will guess the same number that the computer chose in 1 try?

2. There are 18 candy-coated chocolate pieces in a bag. Three have defects in the coating that can be seen only with close inspection. What is the probability of pulling out a defective piece without looking?

3. Seven brothers have to choose which day each will wash the dishes. They put equal-sized pieces of paper in a hat, each labeled with a day of the week. What is the probability that the first brother who draws will choose a weekend day?

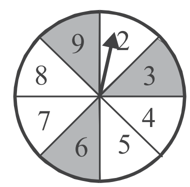
4. For his garden, Clay has a mixture of 23 white corn seeds, 13 yellow corn seeds, and 18 bicolor corn seeds. If he reaches for a seed without looking, what is the probability that Clay will plant a bicolor corn seed first?

5. Mom just got a new home improvement store credit card in the mail. What is the probability that the last digit is an even number?

6. Alex has a paper bag of cookies that holds 8 chocolate chip, 5 peanut butter, 8 butterscotch chip, and 3 ginger. Without looking, his friend John reaches in the bag for a cookie. What is the probability that the cookie is ginger?

7. An umpire at a little league baseball game has 10 balls in his pockets. One is brand A, 5 are brand B, and 4 are brand C. What is the probability that the next ball he throws to the pitcher is a brand C ball?

8. What is the probability that the spinner's arrow will land on an odd number that is shaded?



9. The spinner in the problem above stopped on a shaded wedge on the first spin and stopped on the number 8 on the second spin. What is the probability that it will not stop on a shaded wedge or on the 8 on the third spin?

10. A company is offering 1 grand prize, 10 second place prizes, and 50 third place prizes based on a random drawing of contest entries. If your entry is one of the 500 total entries, what is the probability you will win a third place prize?

11. In the contest problem above, what is the probability that you will win the grand prize or a second place prize?

12. A box of a dozen doughnuts has 4 lemon cream-filled, 6 chocolate cream-filled, and 2 vanilla cream-filled. If the doughnuts look identical, what is the probability of picking a lemon cream-filled?

Practice Test 1

1. Find the distance between the points $(6, 5)$ and $(3, -4)$, using the distance formula.

A $\sqrt{10}$
B $9\sqrt{10}$
C $10\sqrt{3}$
D $3\sqrt{10}$

4.3

2. Simplify:

$(3x^2 - 5x + 6) - (x^2 + 4x - 7)$

F $4x^2 - x - 1$
G $4x^2 - x + 13$
H $2x^2 - 9x - 1$
J $2x^2 - 9x + 13$

1.3

3. Given the equation $y = 2x - 6$, how would the graph change if the equation became $y = 2x + 6$?

A the graph will shift left 6 units
B the graph will shift right 6 units
C the graph will shift up 12 units
D the graph will shift down 12 units

1.5

4. What is $\frac{\sqrt{2}}{\sqrt{6}}$ in simplest terms?

F $\frac{\sqrt{2} \times \sqrt{6}}{6}$

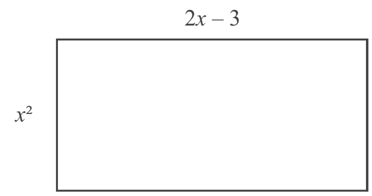
G $\frac{\sqrt{12}}{6}$

H $\frac{2\sqrt{3}}{6}$

J $\frac{\sqrt{3}}{3}$

2.1

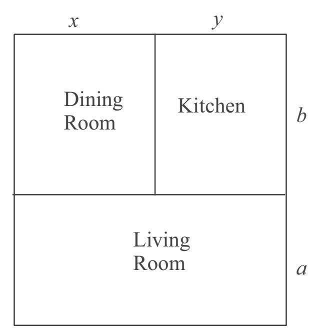
5. Find the perimeter of the rectangle below.



A $2x^2 + 4x - 6$
B $2x^2 - 4x + 6$
C $2x^2 + 4x$
D $2x^2 - 4x$

3.2

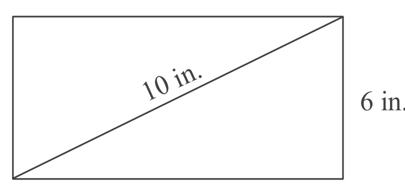
6. Which expression represents the total area of the 3 rooms shown below?



F $xy\,(a + b)$
G $ab\,(x + y)$
H $(a + b)\,(x + y)$
J $b\,(x + y) + ay$

3.2

7. Find the area of the rectangle below.

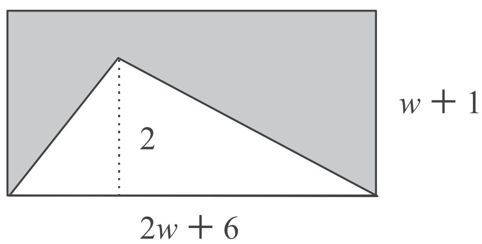


A 42 sq. in.
B 48 sq. in.
C 54 sq. in.
D 60 sq. in.

4.2

Practice Test 2

1. The triangle and rectangle have dimensions as shown. Which of the following expressions represents the area of the shaded region?



A $2w + 6$

B $3w + 6$

C $2w^2 + 6w$

D $3w^2 + 6w$

3.2

2. The Tennessee aquarium is 2.38×10^4 cubic meters in size. It also holds 6.3×10^6 gallons of water. If a tank is only 1 m^3 in size, how many gallons of water can the tank hold?

F 2.65×10^2 gallons

G 2.65×10^3 gallons

H 1.50×10^2 gallons

J 1.50×10^{11} gallons

2.2

3. If the value of y is positive, what is the sum of $8\sqrt{5y}$ and $\sqrt{5y}$?

A $8\sqrt{5y}$

B $8\sqrt{10y}$

C $9\sqrt{10y}$

D $9\sqrt{5y}$

2.1

4. Professor Harold has discovered a pollen that measures 0.00000071 grams per particle. What is the measure of 100 of these pollen particles in scientific notation?

F 71×10^{-6}
G 71×10^{-7}
H 7.1×10^{-6}
J 7.1×10^{-5}

2.2

5. Find the median of the list of numbers below.

77	67	27	77	54
64	53	77	48	58

How would the median change if 61 was added to the list?

A The number would reduce by 1.

B The number would increase by 1.

C The number would stay the same, 62.

D The number would stay the same, 61.

5.2

6. A laboratory technician was examining unknown particles under a microscope. One measured 4.1×10^{-8} m, another measured 9.2×10^{-7} m, and a third measured 3.2 $\times 10^{-9}$ m. Which of the following choices lists the measures of the three particles from least to greatest?

F 4.1×10^{-8} m, 9.2×10^{-7} m, 3.2×10^{-9} m
G 9.2×10^{-7} m, 4.1×10^{-8} m, 9.2×10^{-7} m
H 3.2×10^{-9} m, 4.1×10^{-8} m, 9.2×10^{-7} m
J 3.2×10^{-9} m, 9.2×10^{-7} m, 4.1×10^{-8} m

2.3

