SUMMIT MATH

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ALGEBRA 2

second edition

Books 1-8 REVIEW

CONTENTS

INTRODUCTION TO FUNCTIONS

1. What is the ordered pair represented by the statement $f(-4)=7$?

2. Use the graph to find the value of each expression listed below. Estimate if necessary.

$f(x)$

a. $f(4)$

b. x when $f(x) = 1$

c. $f(-8)$

d. x when $f(x) = -4$

3. Given: $h(x)=5x$ and $g(x)=\sqrt{x}$.

    a. Find $h(-3)$.

    b. What is $h\left[g(64)\right]$?

4. Three functions are shown. Use the functions to find the value of each expression listed below.

$$f(x)=\frac{3}{5}x-2 \qquad\qquad g(x)=-4x \qquad\qquad h(x)=x^2-1$$

a. $f(15)$

b. $g(-4)$

c. $h(-3)+g\left(\frac{1}{4}\right)$

5. Three functions are shown. Use the functions to find the value of each expression listed below.

$$f(v)=7-\frac{1}{5}v \qquad\qquad g(t)=6t \qquad\qquad h(x)=x^2+x-2$$

a. $f(-5)\cdot h(3)$

b. $h\left[f(50)\right]$
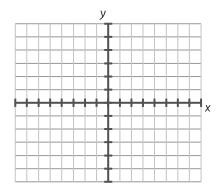
c. $g(y-2)$

6. $G(x)$ is a function. If $G(-10)=0$, does this represent the function's x- intercept or its G-intercept? How do you know?

7. The domain of a function is $-4\leq x\leq 6$. What does this domain tell you about the graph of the function?

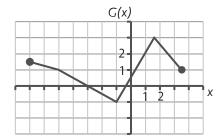8. What is the difference between the domain and the range of a function?

9. Briefly sketch a function that has the domain and range listed below.
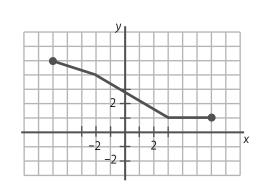
Domain: $-4 \leq x \leq 6$

Range: $-2 \leq y \leq 5$

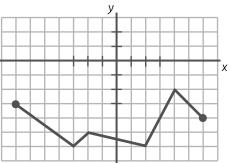10. Use the graph for the following questions.

a. Explain in words how you would find $G(-1)$ using the graph.

b. Explain in words how you would find $G(x)=2$ using the graph.

c. What is the range of this function?

d. What is the domain of this function?

11. Identify the interval on which the following function is decreasing. Show the interval using an inequality like ____ < x < ____ .
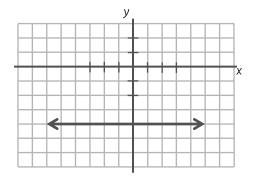
12. The previous function is not decreasing on the interval $3<x<6$ (the points that have x-values between 3 and 6). In this interval, the function is considered to be <u>constant</u>. Identify the interval on which the following functions are constant. If possible, write the interval as an inequality.
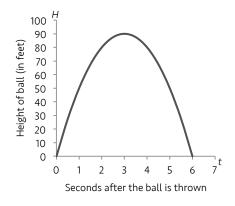
a.

b.

13. Identify the interval on which the graph in the next scenario is increasing.

14. Consider the graph. It shows how the height of a ball changes as it travels through the air after it is thrown.

   a. Estimate the value of $H(1)$.

   b. When does $H(t)=80$?

15. Identify the domain of the graph in the previous scenario.

16. In the previous scenario, which quantity is the dependent quantity? How do you determine which quantity is dependent?

17. A tank is filled with water, but it has a small leak. Water drips out of the tank at a constant rate. A bucket is placed under the leak to see how much water the tank is losing. When the bucket is checked at 11:00am, there are 60 milliliters of water in the bucket. At 11:20am, there are 164 milliliters of water in the bucket.

    a. How much water is leaking out of the tank every minute?

    b. How many liters of water does the tank lose in a day?

18. Find the slope of the line, given two points on that line.

    a. $(-1, 4)$ and $(8, -2)$ b. $(2, 6)$ and $(2, -3)$

19. Find the slope of the line, given two points on that line.

    a. $(11, -7)$ and $(-1, -7)$ b. (x_1, y_1) and (x_2, y_2)

20. What is the slope of a line that is parallel to $-5y = 15x - 10$?

21. What is the slope of a line that runs perpendicular to $y = -2x + \dfrac{2}{3}$?

22. What is the Slope-Intercept Form for the equation of a line?

23. Using Slope-Intercept Form, write the equation of the line, given the following information.

    a. one point on the line: (6, 2)

       slope: $-\dfrac{1}{3}$

    b. one point on the line: (−3, 4)
       y−intercept: (0, −11)

24. Convert each equation to Slope-Intercept Form.

    a. $5x + 7y = -21$ b. $y - 4 = -\dfrac{1}{2}\left(x + 12\right)$

25. What is the Standard Form for the equation of a line?

26. Circle the equations that are in Standard Form, where A, B, and C are integers.

a. $-11x + y = 17$

b. $0.5x + 2.1y = 10.4$

c. $-3x + 8y = 20$

d. $4x - \dfrac{1}{3}y = 2$

e. $y = 2x - 5$

f. $y - 4 = -\dfrac{1}{2}(x + 12)$

27. What is the Point-Slope Form for the equation of a line?
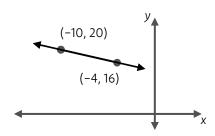
28. Write an equation, in Point-Slope Form, for the line described by the given information.

a. one point on the line: $(-2, 6)$

slope: $\dfrac{5}{2}$

b. two points on the line: $(-8, 5)$ and $(4, -1)$
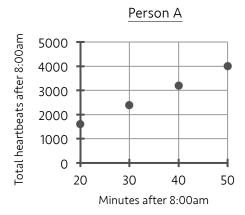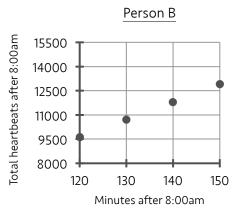
29. Write an equation, in Point-Slope Form, for the line shown in the graph.

$(-10, 20)$

$(-4, 16)$
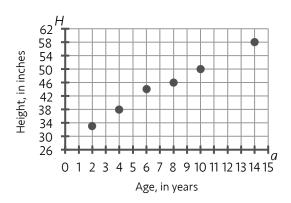
30. Identify the coordinates of the x- and y-intercepts of the line in the previous scenario.

31. If a line has an *x*-intercept of 5, the ordered pair representing the *x*-intercept is _____.

32. If a line has a *y*-intercept of −3, the ordered pair representing the *y*-intercept is _____.

33. When a person exercises, their heartbeat increases. The heartbeats for two people are shown below during a time period when they were exercising. These people have the same heartbeat rates when they are resting. Which person exercised more intensely during the time period shown? How do you know this?

Person A

Person B

34. The chart to the right shows a person's height at various ages throughout their childhood.

a. Draw an approximate trend line through the scatter plot shown.

b. Find the equation of your trend line to show the relationship between *H*, the height, and *a*, the age.

c. What was the average rate of change of the height over the time period shown?

35. In the previous scenario, <u>estimate</u> the height of the person when they were born.
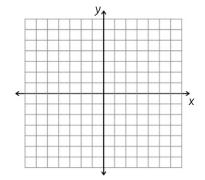
36. The following inequalities are written in Standard Form. Rearrange them to write them in Slope-Intercept Form.

      a. $14x - 7y < 7$ b. $11x - 22y \geq 66$
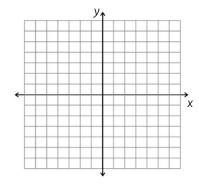
37. Did you forget to switch the direction of the inequality in the previous scenario? When you rearrange an inequality, when do you need to reverse the direction of the inequality symbol?

38. Graph each inequality.

      a. $y < \dfrac{1}{3}x + 5$ b. $-2y < 2x + 6$
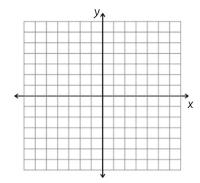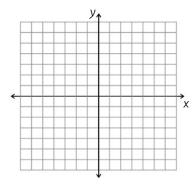
39. Graph each inequality.

      a. $-3y + 6x < 15$ b. $x \geq -4$

40. When you graph an inequality and you use a dashed line or a solid line for the boundary, what is the reason for choosing either a dashed or a solid line?

41. When you multiply a number by itself, the result is 25. What was the number?

42. What number equals 16 after it is squared?

When you learn about quadratic functions, you find out that there can be two numbers that make an equation true. This shows up in the previous scenario and in other scenarios you have seen as well.

43. Two quadratic equations are shown below. Solve each equation.

    a. $x^2 = 100$

    b. $x^2 = -4$

44. Solve each equation.

    a. $(x-2)^2 = 9$

    b. $-2(x+1)^2 = 10$

45. Fill in the blanks below to make each pair of expression equivalent.

    a. $(x+1)^2 = x^2 + 2x + \underline{\quad}$

    b. $(x-4)^2 = x^2 + \underline{\quad}x + \underline{\quad}$

46. Write in a third term to make each expression a perfect square trinomial.

    a. $x^2 - 10x$ _____

    b. $x^2 - 3x$ _____

47. Factor each trinomial above to confirm that it is a perfect square trinomial.

48. Write the Quadratic Formula.

49. Solve each quadratic equation by factoring.

    a. $x^2 - 10x + 25 = 0$

    b. $3x^2 + 7x = 6$

50. Solve each quadratic equation by Completing the Square.

    a. $x^2 - 10x + 2 = 0$

    b. $3x^2 - x = 6$
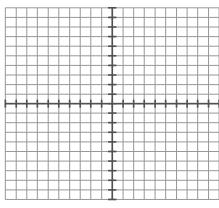
51. Solve each quadratic equation by using the Quadratic Formula.

    a. $x^2 - 10x + 2 = 0$ b. $3x^2 - x = 6$
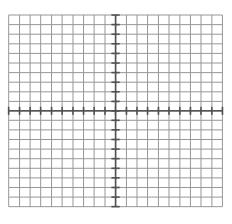
52. What is the shape of the graph of $y = mx + b$?

53. What is the shape of the graph of $y = ax^2 + bx + c$?

54. How can you use a parabola's equation to determine if a parabola will open upward or downward?

55. Graph the function below. You must include the vertex, the x-intercepts, and the y-intercept in your plotted points. Plot <u>at least 7 points</u>.

    $y = -x^2 + 6x$

56. Graph the function below. You must include the vertex, the x-intercepts, and the y-intercept in your plotted points. Plot at least 7 points.

$$f(x)=-\frac{1}{2}x^2+6$$

57. A basketball player attempts a shot. The equation for the height, h, of the ball (in feet) as a function of time, t, (in seconds) is given by $h(t)=-16t^2+32t+6$.

a. What is the maximum height of the ball during its trajectory?

b. The ball misses the basket and hits the floor below the net. For how many seconds was the ball in the air before it landed on the floor?

58. Fill in the blank. When you find the maximum height of a ball as it flies through the air, you're really just finding the location of the _____ of a parabola.

59. Fill in the blank. When you calculate how long a ball is in the air before it hits the ground, you're really just looking for the _____ of a parabola.

60. Determine the x-intercepts of the function $y = x^2 - 8x - 5$.

61. Simplify each of the following fractions.

a. $\dfrac{3x(x+4)}{5x(x+4)}$

b. $\dfrac{(x+1)(x+3)}{(x+1)(x+7)}$

c. $\dfrac{6x+6}{7x+7}$

62. In the previous scenario, the last fraction can only be simplified after you factor the expressions in the numerator and denominator. After you factor, it becomes clear that there are identical factors in the numerator and denominator. Use this strategy to simplify the following fractions.

a. $\dfrac{x^2-2x}{x^2-7x+10}$

b. $\dfrac{6x^2-7x-5}{3x^2+4x-15}$

63. When you simplify a fraction, you remove a disguised form of 1. Write the disguised form of 1 that you removed in each fraction in the previous scenario.

64. What is the simplified form of each fraction shown below?

a. $\dfrac{x+3}{3+x}$

b. $\dfrac{3y-8}{8-3y}$

c. $\dfrac{4-y}{5(y-4)}$

d. $\dfrac{(y-9)(y-1)}{(1-y)}$

65. Write the disguised form(s) of 1 in each expression below. Do not multiply the fractions.

a. $\dfrac{x}{8} \cdot \dfrac{12}{6x}$

b. $\dfrac{x(x-3)}{21} \cdot \dfrac{14}{(x-3)}$

c. $\dfrac{(x-7)^2}{5x+20} \cdot \dfrac{x+4}{(x-7)(x-7)}$

66. Simplify as much as you can.

a. $\dfrac{x^2-6x}{x+4} \cdot \dfrac{2x^2+8x}{x-6}$

b. $\dfrac{x^2-49}{x^2+6x-7} \cdot \dfrac{5x^2-4x-1}{7-x}$

When you divide expressions, it is useful to rewrite the division as a multiplication scenario. In other words, think of "divide" as "multiply by the reciprocal" and then carry on with the familiar process of multiplying fractions and simplifying the result.

67. Simplify as much as you can.

a. $\dfrac{-7x+35}{x^3+5x^2} \div \dfrac{25-x^2}{x^3+10x^2+25x}$

b. $\dfrac{4y^2-1}{4y^2+12y} \div \dfrac{2y^2-15y-8}{y^2-5y-24}$

When you compare multiplying and dividing fractions, division is related to multiplication. When a scenario requires dividing by a fraction, you can change the division to multiplying by the reciprocal. Similarly, when you compare adding and subtracting fractions, subtraction is related to addition.

68. Simplify as much as you can.

a. $\dfrac{5+x}{2x}+\dfrac{3-4x}{x}$

b. $\dfrac{5-x}{x-2}-\dfrac{2x-1}{x-2}$

69. Add the fractions. Simplify as much as you can.

a. $\dfrac{p+2}{p+5}+\dfrac{p-5}{p^2+10p+25}$

b. $\dfrac{8}{t-3}+\dfrac{5}{t}$

70. Subtract the fractions. Simplify as much as you can.

a. $\dfrac{5}{y-1}-\dfrac{3}{y+2}$

b. $\dfrac{4}{x^2-25}-\dfrac{x+2}{x^2+x-20}$

71. Solve the equation.

$$\frac{x}{4} + \frac{x+7}{3} = 7$$

72. You can make the previous equation easier to solve by eliminating the fractions. To do this, multiply both sides of the equation by 12 (the least common multiple of 3 and 4). You can practice clearing the fractions in each equation shown below. Do <u>not</u> solve each equation. Instead, write the expression that will clear the fractions if you multiply both sides of the equation by that expression.

a. $\dfrac{6}{3x} + \dfrac{-2}{2} = \dfrac{11}{3}$

b. $x - \dfrac{4}{x} = \dfrac{1}{2}$

c. $\dfrac{3}{x+1} + \dfrac{x-4}{2} = \dfrac{1}{x+1}$

73. Clear the fractions in each equation in the previous scenario. Do <u>not</u> solve the equation.

74. Solve each equation.

a. $\dfrac{10}{y} + \dfrac{2}{5} = \dfrac{6}{y}$

b. $\dfrac{-2}{x+3} - \dfrac{6}{x} = 1$

75. Check your solution for each of the previous equations to confirm that your solution makes the original equation true.

76. Solve the equation.

$$\frac{2}{x^2+4x-5} - \frac{10}{x+5} = \frac{6}{x-1}$$

RATES: MOTION, WORK & INTEREST

77. Two brothers apply for a job at a bakery. The job involves baking cookies, so the bakery owner asks them to come in and bake cookies on separate days. Their results are shown in the table. If they both baked good-tasting cookies, which brother was hired for the job?

Name	Time spent at the bakery	Cookies baked
Adnan	45 minutes	216 cookies
Omer	1.2 hours	360 cookies

78. Suppose Omer and Adnan are both hired to work at the bakery. The bakery sets a goal to make 3,000 cookies per day. How many hours do they need to spend at the bakery every day to reach the bakery's goal? The brothers work together and maintain the same baking rates from the previous scenario.

79. Solve the equation.

$$\frac{1}{8}t + \frac{1}{5}t = 1$$

80. Kylie's team can build a house in 8 days. Dan's team can build a house in 5 days. If they work together, how long will it take them to build a house?

81. Bill and Gus are co-owners of an apple orchard. Bill can harvest all of the apples in 12 days. Gus can harvest all of the apples in 10 days. How long does it take hem to harvest all of the apples when they work together?

82. Joyce walks 4.08 miles in four-fifths of an hour. Dale walks 3.75 miles in 45 minutes. Which person walks farther in an hour? How much farther does that person walk, measured in feet?

83. You find two ways to travel between two cities. You can take a train or a plane. The train maintains an average speed of 60 miles per hour. The plane flies at an average speed of 310 miles per hour and it will get you to your destination in 2 hours less than the train. What is the distance between the two cities you want to travel between?
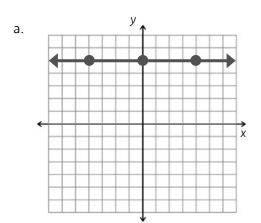
84. You drive 10 miles in 20 minutes. You then increase your speed and drive 20 more miles in 20 minutes. Finally, you drive 32 more miles in 20 minutes. What was your average speed for the entire trip?

85. If you walk a distance of 1 mile for 10 minutes and then run at a speed of 12 miles per hour for 20 minutes. What was your average speed?

86. You put $500 in account that earns 4% interest every year. You also put some money in a second account that each 3% interest every year. After one year, you earned a total of $41 in interest.

    a. Which account has a higher value of one year?

    b. How much did you invest in the account that earns 3% interest?
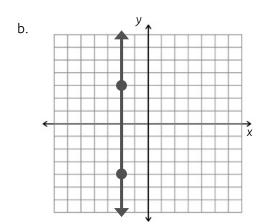
87. You have saved $4,000, but you don't need to spend it yet so you look for ways to earn interest on this money. Since you have heard that it is a good idea to diversify your investments, you pick two separate accounts. One account earns 2% interest. Another account does not have a fixed interest rate. Instead, it has a variable interest rate that depends on how the stock market performs that year. You divide your money evenly between the two accounts. At the end of one year, you earned $100 in interest. By what percent did the value of the variable interest rate account increase after that year?

88. A group of people who are members of their city council are looking for ways to save up for future projects that will improve their city. They agree to invest a total of $1,000,000 in two types of funds. After one year, the two funds increased in value by 4.5% and 6%, respectively and their initial investment is worth $1,056,250. How much did they invest in each account?

LINEAR & NONLINEAR SYSTEMS OF EQUATIONS

89. Determine the equation of each line shown.

a.

b.

90. In the previous scenario, if you graph the two lines on the same grid, at what ordered pair would the two lines intersect?

91. Use the Substitution Method to find the intersection point of each pair of lines below.

a.
$$y = -4x - 10$$
$$5x - \frac{1}{2}y = 3$$
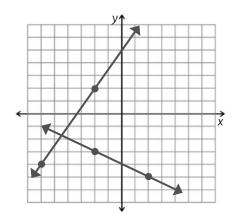
b.
$$9x - 4y = 11$$
$$-4x + 2y = 6$$
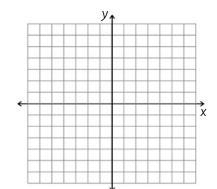
92. Where do the two lines intersect?

93. Without graphing, determine the intersection point of each pair of lines. Use any method. Graph the two equations to confirm that your answer is accurate.
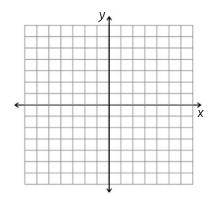
a.
$$-x+2y=14$$
$$3x-6y=-36$$
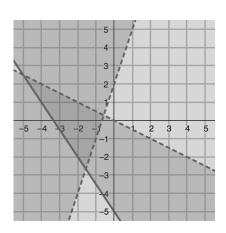
b.
$$-3x-y=2$$
$$6x=-4-2y$$

94. The school's photographer took pictures of students at graduation. She charged $3.25 for wallet-size pictures and $10.50 for portrait-size pictures. Crystal bought a total of 10 pictures for $61.50. How many pictures of each type did she purchase?

95. Write a system of inequalities that would have the solution region shown.

96. Solve the system shown below and verify your results by using a graphing application.

$$\begin{cases} 3x - y = -2 \\ 2x^2 - y = 0 \end{cases}$$

97. Solve the system, using any combination of elimination or substitution.

$$\begin{cases} 2x + y - z = 5 \\ x + 4y + 2z = 16 \\ 15x + 6y - 2z = 12 \end{cases}$$

Consider the table below.

x	2	3	4	5	6
y	−7	−5	−1	5	

a. Find the missing term.

b. The ordered pairs are points from a parabola. Find the equation of this parabola.

99. If you multiply 200 by *A*, it will make 200 become 27% larger. What is the value of *A*?

100. If you multiply 200 by *B*, it will make 200 become 35% smaller. What is the value of *B*?

101. The temperature of a glass of water is modeled by the function $T = 80(0.8)^h$, where *T* is the temperature of the water, in °F, after it has been sitting in a freezer for *h* hours.

   a. Is temperature of the water increasing or decreasing every hour? By what percent?

   b. How long as the water been sitting in the freezer at the moment it freezes, if the water freezes at 32°F? Find the approximate time, rounded to the nearest hour.

   c. According to this model, when does the temperature of the water reach 0° F?

102. A mold sample is analyzed and the initial measurement reveals that there are 2 square centimeters of mold in the sample. The mold increases in area by 25% every day.

   a. Write an exponential function that models the area of the mold, *A*, after the mold has been growing for *d* days after the first measurement.

b. How many days does it take for the mold sample to become 12 square centimeters?

103. If the mold sample is shaped like a perfect circle, and its area is 12 square centimeters, what is the diameter of the sample?

104. Each table displays data from an exponential function. Fill in the missing cells.

a.

x	y
−1	
0	24
1	43.2
2	77.76
3	

b.

x	y
−1	
0	500
1	450
2	405
5	

c.

x	y
−1	
2	128
3	256
4	512
6	

105. Write the exponential function for each table shown above.
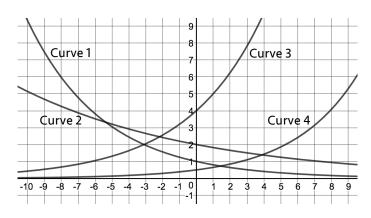
106. Match each graph with its corresponding function.

a. $y = 2(0.91)^x$ b. $y = 0.5(1.3)^x$ c. $y = (0.8)^x$ d. $y = 4(1.25)^x$

Curve 1
Curve 2
Curve 3
Curve 4
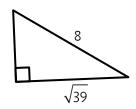
107. In 1950, the average family income in the United States was $3,300 per year. In 2014, the average family income had risen to $51,017 per year. If this growth has followed an exponential pattern, by what percent has the average family income in the United States increased every year?
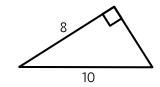
THE PYTHAGOREAN THEOREM & SPECIAL RIGHT TRIANGLES

108. Determine the missing side length for each triangle shown.

a.

8

$\sqrt{39}$

b.

8

10
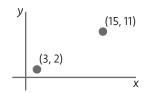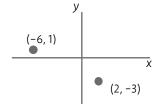
109. What is the distance between the two points shown in the graph?

a.

y

(15, 11)

(3, 2)

x

b.

y

(−6, 1)

x

(2, −3)
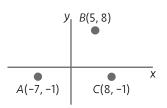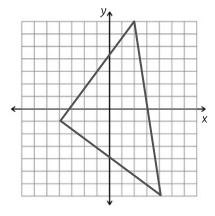
110. What is the slope of the line that passes through each pair of points in the previous scenario?

111. Notice point *B* and point *C*. Which point is closer to *A*? (4 points)

y B(5, 8)

x

A(−7, −1)   C(8, −1)

112. Consider the figure shown. What is the figure's perimeter?

y

x

113. Find the length of each unmarked side. Write lengths in exact, unrounded values only.

a.

45°
9

b.

60°   20
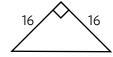
114. Find the length of each unmarked side. Write lengths in exact, unrounded values only.

a.

16   16

b.

60°

27
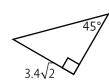
115. Find the length of each unmarked side. Write lengths in exact, unrounded values only.

a.

45°

3.4√2

b.

14

45°
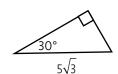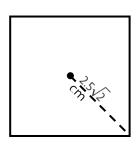
116. Find the length of each unmarked side. Write lengths in exact, unrounded values only.

a.

30°

5√3

b.

5
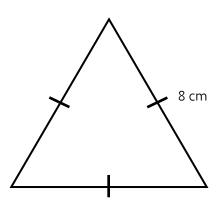
117. Two shapes are shown: a square and a triangle. Which shape has the larger area, and by how many square centimeters?

25√2 cm

8 cm
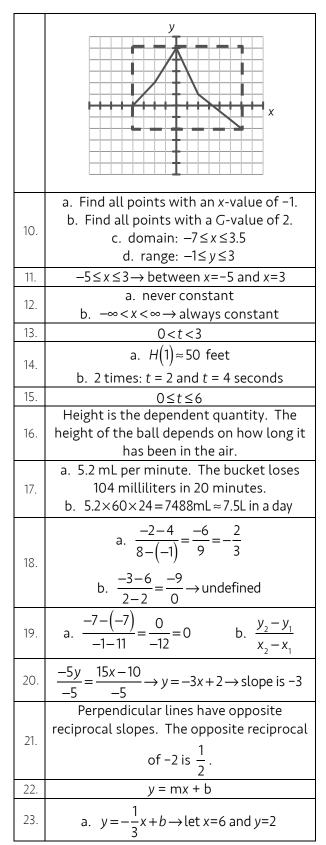
118. If you forget the relationship between the sides of a 30-60-90 triangle, what shape can you use to remember the $x:x\sqrt{3}:2x$ ratio?
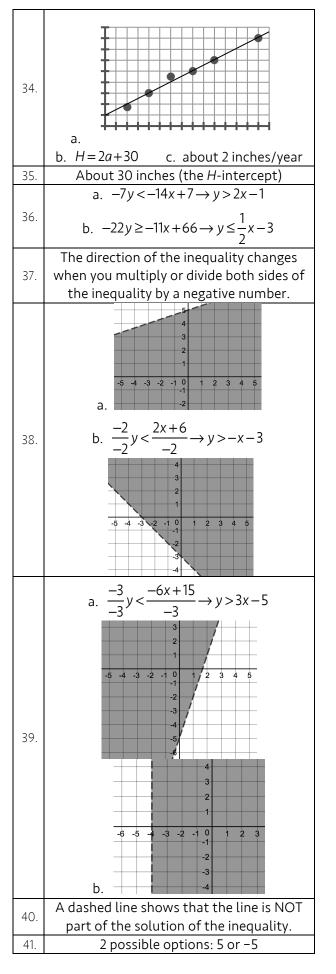
119. If you forget the relationship between the sides of a 45-45-90 triangle, what shape can you use to remember the $x:x:x\sqrt{2}$ ratio?

ANSWER KEY

1.	$(-4, 7)$
2.	a. -4.5 b. $x = -6, -2, 2$ c. 5 d. $x = 3$
3.	a. $5(-3) \rightarrow -15$ b. First, find $g(64)$. $g(64) = 8$. Then, find $h(8)$. $h(8) = 40$. Thus, $h[g(64)] = 40$.
4.	a. $\dfrac{3}{5}(15) - 2 \rightarrow 9 - 2 \rightarrow 7$ b. $-4(-4) \rightarrow 16$ c. $(-3)^2 - 1 + \ -4\left(\dfrac{1}{4}\right) \rightarrow 8 + -1 \rightarrow 7$
5.	a. $f(-5) = 7 - \dfrac{1}{5}(-5) \rightarrow 7 + 1 \rightarrow 7$ $h(3) = (3)^2 + (3) - 2 \rightarrow 9 + 3 - 2 \rightarrow 10$ $f(-5) \cdot h(3) = 7 \cdot 10 = 70$ b. First, find $f(50) \rightarrow 7 - 10 \rightarrow -3$. Then, find $h(-3) \rightarrow (-3)^2 + (-3) - 2 \rightarrow 4$. Thus, $h[f(50)] = 4$. c. $6(y - 2) \rightarrow 6y - 12$
6.	$G(-10) = 0$ represents the point $(-10, 0)$. Since G is 0, the point is on the x-axis, which makes it an x-intercept.
7.	All of the points that are part of the function have x-values greater than or equal to -4 and less than or equal to 6.
8.	The domain is all of the x-values that are part of the function. The range is all of the function's y-values.
9.	Answers will vary, but the function must be inside the dashed rectangle shown below. Its highest and lowest x- and y- values must touch rectangle's edges.

10.	a. Find all points with an x-value of -1. b. Find all points with a G-value of 2. c. domain: $-7 \le x \le 3.5$ d. range: $-1 \le y \le 3$
11.	$-5 \le x \le 3 \rightarrow$ between $x = -5$ and $x = 3$
12.	a. never constant b. $-\infty < x < \infty \rightarrow$ always constant
13.	$0 < t < 3$
14.	a. $H(1) \approx 50$ feet b. 2 times: $t = 2$ and $t = 4$ seconds
15.	$0 \le t \le 6$
16.	Height is the dependent quantity. The height of the ball depends on how long it has been in the air.
17.	a. 5.2 mL per minute. The bucket loses 104 milliliters in 20 minutes. b. $5.2 \times 60 \times 24 = 7488 \text{mL} \approx 7.5 \text{L}$ in a day
18.	a. $\dfrac{-2 - 4}{8 - (-1)} = \dfrac{-6}{9} = -\dfrac{2}{3}$ b. $\dfrac{-3 - 6}{2 - 2} = \dfrac{-9}{0} \rightarrow$ undefined
19.	a. $\dfrac{-7 - (-7)}{-1 - 11} = \dfrac{0}{-12} = 0$ b. $\dfrac{y_2 - y_1}{x_2 - x_1}$
20.	$\dfrac{-5y}{-5} = \dfrac{15x - 10}{-5} \rightarrow y = -3x + 2 \rightarrow$ slope is -3
21.	Perpendicular lines have opposite reciprocal slopes. The opposite reciprocal of -2 is $\dfrac{1}{2}$.
22.	$y = mx + b$
23.	a. $y = -\dfrac{1}{3}x + b \rightarrow$ let $x = 6$ and $y = 2$

	$2=-\dfrac{1}{3}(6)+b \rightarrow 2=-2+b \rightarrow b=4$ $y=-\dfrac{1}{3}x+4$ b. $y=mx-11 \rightarrow$ let $x=-3$ and $y=4$ $4=m(-3)-11 \rightarrow 15=-3m \rightarrow m=-5$ $y=-5x-11$
24.	a. $7y=-5x-21 \rightarrow y=-\dfrac{5}{7}x-3$ b. $y-4=-\dfrac{1}{2}x-6 \rightarrow y=-\dfrac{1}{2}x-2$
25.	$Ax+By=C$
26.	Circle a. and c.
27.	$y-y_1=m(x-x_1)$
28.	a. $y-6=\dfrac{5}{2}(x+2)$ b. Find the slope: $\dfrac{-1-5}{4-(-8)}=\dfrac{-6}{12}=-\dfrac{1}{2}$ Use either point to write the equation: $y-5=-\dfrac{1}{2}(x+8)$ or $y+1=-\dfrac{1}{2}(x-4)$
29.	Find the slope: $\dfrac{16-20}{-4-(-10)}=\dfrac{-4}{6}=-\dfrac{2}{3}$ Use either point to write the equation: $y-16=-\dfrac{2}{3}(x+4)$ or $y-20=-\dfrac{2}{3}(x+10)$
30.	$y-16=-\dfrac{2}{3}(x+4) \rightarrow y-16=-\dfrac{2}{3}x-\dfrac{8}{3}$ $y=-\dfrac{2}{3}x-\dfrac{8}{3}+\dfrac{48}{3} \rightarrow y=-\dfrac{2}{3}x+\dfrac{40}{3}$ y-intercept: $\left(0, \dfrac{40}{3}\right)$ or $\left(0, 13\dfrac{1}{3}\right)$ To find the x-intercept, let $y=0$. $0=-\dfrac{2}{3}x+\dfrac{40}{3} \rightarrow \dfrac{2}{3}x=\dfrac{40}{3} \rightarrow x=\dfrac{40}{3}\cdot\dfrac{3}{2}$ x-intercept: $(20, 0)$
31.	$(5, 0)$
32.	$(0, -3)$
33.	Person B exercised more intensely. Person A had a total heartbeat increase of around 2500 beats in 30 minutes (≈ 80 beats/min). Person B had a total heartbeat increase of around 3000 beats in 30 minutes (≈ 100 beats/min).

34.	 a. b. $H=2a+30$ c. about 2 inches/year
35.	About 30 inches (the H-intercept)
36.	a. $-7y<-14x+7 \rightarrow y>2x-1$ b. $-22y \geq -11x+66 \rightarrow y \leq \dfrac{1}{2}x-3$
37.	The direction of the inequality changes when you multiply or divide both sides of the inequality by a negative number.
38.	a. b. $\dfrac{-2}{-2}y<\dfrac{2x+6}{-2} \rightarrow y>-x-3$
39.	a. $\dfrac{-3}{-3}y<\dfrac{-6x+15}{-3} \rightarrow y>3x-5$ b.
40.	A dashed line shows that the line is NOT part of the solution of the inequality.
41.	2 possible options: 5 or −5
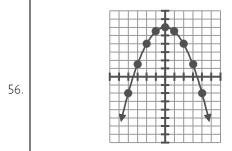
42.	2 possible options: 4 or –4
43.	a. 10 or –10 b. $2i$ or $-2i$
44.	a. $x-2=\pm\sqrt{9}\rightarrow x=2\pm3\rightarrow x=5$ or -1 b. $(x+1)^2=-5\rightarrow x+1=\pm\sqrt{-5}$ $x=-1\pm i\sqrt{5}$
45.	a. $(x+1)^2=x^2+2x+\underline{\ 1\ }$ b. $(x-4)^2=x^2+\underline{\ -8\ }x+\underline{\ 16\ }$
46.	a. $\left(\dfrac{-10}{2}\right)^2=(-5)^2=25$ b. $\left(\dfrac{-3}{2}\right)^2=\dfrac{9}{4}$
47.	a. $\left(x-\dfrac{3}{2}\right)^2$ b. $\left(x+\dfrac{2}{5}\right)^2$
48.	$x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$
49.	a. $(x-5)(x-5)=0\rightarrow x=5$ b. $3x^2+7x-6=0\rightarrow(3x-2)(x+3)$ $x=\dfrac{2}{3}$ or -3
50.	a. $x^2-10x=-2\rightarrow x^2-10x+25=-2+25$ $(x-5)^2=23\rightarrow x-5=\pm\sqrt{23}\rightarrow x=5\pm\sqrt{23}$ b. $\dfrac{3x^2-x}{3}=\dfrac{6}{3}\rightarrow x^2-\dfrac{1}{3}x=2$ $\rightarrow x^2-\dfrac{1}{3}x+\dfrac{1}{36}=2+\dfrac{1}{36}$ $\rightarrow x^2-\dfrac{1}{3}x+\dfrac{1}{36}=\dfrac{73}{36}\rightarrow\left(x-\dfrac{1}{6}\right)^2=\dfrac{73}{36}$ $\rightarrow x-\dfrac{1}{6}=\pm\sqrt{\dfrac{73}{36}}\rightarrow x=\dfrac{1}{6}\pm\dfrac{\sqrt{73}}{6}$
51.	a. $x=\dfrac{-(-10)\pm\sqrt{(-10)^2-4(1)(2)}}{2(1)}$ $x=\dfrac{10\pm\sqrt{92}}{2}\rightarrow x=\dfrac{10\pm2\sqrt{23}}{2}$ $\rightarrow x=5\pm\sqrt{23}$ a. change equation to $3x^2-x-6=0$ $x=\dfrac{1\pm\sqrt{(-1)^2-4(3)(-6)}}{2(3)}\rightarrow x=\dfrac{1\pm\sqrt{73}}{6}$
52.	a line
53.	a parabola
54.	In the equation $y=ax^2+bx+c$, if "a" is positive, the parabola opens upward, like

	a smile. If a<0, the parabola opens downward, like a frown.
55.	
56.	 x–intercepts: $\pm\sqrt{12}$ or $\pm\approx3.5$
57.	a. Find the t-value of the vertex: $t=-\dfrac{b}{2a}=-\dfrac{32}{2(-16)}=1$ second Plug in $t=1$ to find the maximum height. $h(1)=-16(1)^2+32(1)+6\rightarrow h=22$ feet b. Let $H=0$ and solve for t. $0=-16t^2+32t+6\rightarrow0=-2(8t^2-16t-3)$ $x=\dfrac{-(-16)\pm\sqrt{(-16)^2-4(8)(-3)}}{2(8)}$ $\rightarrow x=2.2$ or $-0.2\rightarrow2.2$ seconds
58.	vertex
59.	x-intercepts
60.	To find x-intercepts, let $y=0$. $x^2-8x-5=0$ This equation cannot be solve by factoring, so you can use Completing the Square or the Quadratic Formula. $x^2-8x\underline{\ \ \ \ }=5\rightarrow x^2-8x\underline{\ +16\ }=5\underline{\ +16\ }$ $(x-4)^2=21\rightarrow x-4=\pm\sqrt{21}\rightarrow x=4\pm\sqrt{21}$ x-intercepts: $(4+\sqrt{21},0)$ and $(4-\sqrt{21},0)$
61.	a. $\dfrac{3}{5}$ b. $\dfrac{x+3}{x+7}$ c. $\dfrac{6(x+1)}{7(x+1)}\rightarrow\dfrac{6}{7}$

62.	a. $\dfrac{x(x-2)}{(x-7)(x-2)} \to \dfrac{x}{x-7}$ b. $\dfrac{(3x-5)(2x+1)}{(3x-5)(x+3)} \to \dfrac{2x+1}{x+3}$
63.	a. $\dfrac{x-2}{x-2}$ b. $\dfrac{3x-5}{3x-5}$
64.	a. 1 b. –1 c. $-\dfrac{1}{5}$ d. $-(y-9)$ or $9-y$
65.	a. $\dfrac{12x}{12x}$ b. $\dfrac{7(x-3)}{7(x-3)}$ c. $\dfrac{(x+4)(x-7)^2}{(x+4)(x-7)^2}$
66.	a. $\dfrac{x(x-6)}{x+4} \cdot \dfrac{2x(x+4)}{x-6} \to 2x^2$ b. $\dfrac{(x+7)(x-7)}{(x+7)(x-1)} \cdot \dfrac{(5x+1)(x-1)}{7-x} \to -(5x+1)$
67.	a. $\dfrac{-7(x-5)}{x^2(x+5)} \cdot \dfrac{x(x+5)^2}{(5-x)(5+x)} \to \dfrac{7}{x}$ b. $\dfrac{(2y+1)(2y-1)}{4y(y+3)} \cdot \dfrac{(y-8)(y+3)}{(2y+1)(y-8)} \to \dfrac{2y-1}{4y}$
68.	a. $\dfrac{5+x}{2x} + \dfrac{2(3-4x)}{2(x)} \to \dfrac{11-7x}{2x}$ b. $\dfrac{5-x-(2x-1)}{x-2} \to \dfrac{-3x+6}{x-2}$ $\to \dfrac{-3(x-2)}{x-2} \to -3$
69.	a. $\dfrac{(p+2)(p+5)}{(p+5)(p+5)} + \dfrac{p-5}{(p+5)^2}$ $\to \dfrac{p^2+7p+10+p-5}{(p+5)^2} \to \dfrac{p^2+8p+5}{(p+5)^2}$ b. $\dfrac{8t}{t(t-3)} + \dfrac{5(t-3)}{t(t-3)} \to \dfrac{13t-15}{t(t-3)}$
70.	a. $\dfrac{5(y+2)}{(y-1)(y+2)} - \dfrac{3(y-1)}{(y+2)(y-1)}$ $\to \dfrac{5y+10}{D} - \dfrac{3y-3}{D} \to \dfrac{2y+13}{(y-1)(y+2)}$ b. $\dfrac{4}{(x+5)(x-5)} - \dfrac{x+2}{(x+5)(x-4)}$

	$\dfrac{4(x-4)}{(x+5)(x-5)(x-4)} - \dfrac{(x+2)(x-5)}{(x+5)(x-4)(x-5)}$ $\dfrac{4x-16}{D} - \dfrac{x^2-3x-10}{D} \to \dfrac{-x^2+7x-6}{D}$ $\to \dfrac{-(x^2-7x+6)}{D} \to \dfrac{-(x-6)(x-1)}{(x+5)(x-5)(x-4)}$
71.	$12\cdot\left(\dfrac{x}{4}+\dfrac{x+7}{3}\right)=7\cdot 12 \to 3x+4x+28=84$ $\to 7x=56 \to x=8$
72.	a. $6x$ b. $2x$ c. $2(x+1)$
73.	a. $6x\cdot\left(\dfrac{6}{3x}+\dfrac{-2}{2}\right)=\left(\dfrac{11}{3}\right)\cdot 6x \to 12-6x=22x$ b. $2x\cdot\left(x-\dfrac{4}{x}\right)=\left(\dfrac{1}{2}\right)\cdot 2x \to 2x^2-8=x$ c. $2(x+1)\cdot\left(\dfrac{3}{x+1}+\dfrac{x-4}{2}\right)=\left(\dfrac{1}{x+1}\right)\cdot 2(x+1)$ $\to 6+(x-4)(x+1)=2$
74.	a. $5y\cdot\left(\dfrac{10}{y}+\dfrac{2}{5}\right)=\left(\dfrac{6}{y}\right)\cdot 5y$ $50+2y=30 \to 2y=-20 \to y=-10$ b. $x(x+3)\left(\dfrac{-2}{x+3}-\dfrac{6}{x}\right)=1\cdot x(x+3)$ $-2x-6x-18=x^2+3x \to 0=x^2+11x+18$ $0=(x+2)(x+9) \to x=-2,-9$
75.	a. $\dfrac{10}{(-10)}+\dfrac{2}{5}=\dfrac{6}{(-10)} \to -1+\dfrac{2}{5}=-\dfrac{3}{5}$ b. $x=-2 \to \dfrac{-2}{-2+3}-\dfrac{6}{-2}=1 \to -2+3=1$ $x=-9 \to \dfrac{-2}{-9+3}-\dfrac{6}{-9}=1 \to \dfrac{1}{3}+\dfrac{2}{3}=1$
76.	$\dfrac{2}{(x+5)(x-1)}-\dfrac{10}{x+5}\cdot\dfrac{(x-1)}{(x-1)}=\dfrac{6}{(x-1)}\cdot\dfrac{(x+5)}{(x+5)}$ $\dfrac{2}{D}-\dfrac{10x-10}{D}=\dfrac{6x+30}{D} \to D=(x+5)(x-1)$ $D\cdot\left(\dfrac{2}{D}-\dfrac{10x-10}{D}\right)=\left(\dfrac{6x+30}{D}\right)\cdot D$ $2-(10x-10)=6x+30$ $-10x+12=6x+30 \to x=-\dfrac{9}{8}$
77.	Omer was hired because he baked cookies at a faster rate.

	Adnan: 288 cookies per hour Omer: 300 cookies per hour
78.	Together, the brothers can bake 588 cookies per hour. The brothers can bake 3,000 cookies in about 5.1 hours.
79.	$40\cdot\left(\dfrac{1}{8}t+\dfrac{1}{5}t\right)=1\cdot40\rightarrow 5t+8t=40$ $13t=40\rightarrow t=\dfrac{40}{13}$ or $3\dfrac{1}{13}$
80.	$3\dfrac{1}{13}$ days To answer this question, you can solve the equation in the previous scenario.
81.	Solve $\dfrac{1}{12}d+\dfrac{1}{10}d=1$. $60\cdot\left(\dfrac{1}{12}d+\dfrac{1}{10}d\right)=1\cdot60\rightarrow 5d+6d=60$ $11d=60\rightarrow t=\dfrac{60}{11}$ or $5\dfrac{6}{11}$ days
82.	$4.08\div\dfrac{4}{5}\rightarrow 4.08\div0.8\rightarrow 5.1$ miles/hour $3.75\div\dfrac{3}{4}\rightarrow 3.75\div0.75\rightarrow 5$ miles/hour Joyce walks one-tenth of a mile farther in 1 hour, or 528 ft. (One mile is 5,280 ft.)
83.	Use rate x time = distance Train: rate = 60; time = t Plane: rate = 310; time = t – 2 Use either option, the distance is the same, so you can set up an equation. $d_{train}=d_{plane}\rightarrow R_{train}T_{train}=R_{plane}T_{plane}$ $60t=310(t-2)\rightarrow t=2.48$ hours The distance between the cities is $60(2.48)$ or 148.8 miles.
84.	average speed = $\dfrac{\text{total distance}}{\text{total time}}$ total distance: 10 + 20 + 32 = 62 miles total time: 60 minutes = 1 hour average speed: 62 miles per hour
85.	average speed = $\dfrac{\text{total distance}}{\text{total time}}$ Note: If you run 12 mph for 20 minutes, you will run a distance of 4 miles. total distance: 1 + 4 = 5 miles total time: 30 minutes = 0.5 hour average speed: 10 miles per hour
86.	a. The $500 account increases by 4%, or

	$20. The other account increases by $41 – $20, or $21. If the 3% account increases by more money ($21) that the 4% account ($20), but it has a lower interest rate, you must have put more money in the second account. b. If a 3% increase equals an increase of $21, you can solve an equation that asks, "3% of what number equals $21?" $\rightarrow 0.03x=21\rightarrow x=700$
87.	You put the same amount of money in the accounts, or $2,000 each. The 2% account increases by 2% of $2,000, or $40. The variable interest rate account increases by $60. You can solve the equation $2000x=60\rightarrow x=0.03$. The variable account increased by 3%.
88.	Create a system of equations. Equation 1: $A + B$ = 1,000,000 Equation 2: 1.045A + 1.06B = 1,056,250 A = $250,000 B = $750,000
89.	a. $y=5$ b. $x=-2$
90.	$\left(-2,5\right)$
91.	a. $5x-\dfrac{1}{2}(-4x-10)=3\rightarrow 5x+2x+5=5$ $7x=0\rightarrow x=0$ $\rightarrow y=-4(0)-10\rightarrow y=-10\rightarrow\left(0,-10\right)$ b. $2\cdot(-4x+2y)=(6)\cdot2\rightarrow -8x+4y=12$ $9x-4y=11$ $\underline{+\quad -8x+4y=12}$ $x\qquad\;\; =23$ $9(23)-4y=11\rightarrow y=49\rightarrow\left(23,49\right)$
92.	Equations: $y=\dfrac{3}{2}x+5$ and $y=-\dfrac{1}{2}x-4$ Solve: $\dfrac{3}{2}x+5=-\dfrac{1}{2}x-4\rightarrow x=-\dfrac{9}{4}$ $\left(-4.5,\;-1.75\right)$
93.	a. The lines do not intersect. They are parallel. b. The lines intersect infinitely many times. The 2 equations are the same line.
94.	$w+p=10\rightarrow$ number of pictures $3.25w+10.50p=61.50\rightarrow$ total cost Solve the system of equations. 6 wallet-size 4 portrait-size
95.	$y>3x+2,\; y<-\dfrac{1}{2}x,\; y\geq-\dfrac{3}{2}x-5$

96.	$y=3x+2 \rightarrow 2x^2-(3x+2)=0$ $\rightarrow 2x^2-3x-2=0 \rightarrow (2x+1)(x-2)=0$ $\rightarrow x=-\dfrac{1}{2}$ or $2 \rightarrow y=\dfrac{1}{2}$ or 8 intersection points: $\left(-\dfrac{1}{2},\dfrac{1}{2}\right)$ or $(2,8)$
97.	$(-2,6,-3)$
98.	a. 13 b. Use 3 points on the parabola to form 3 equations. $-7=4A+2B+C$ $-5=9A+3B+C$ $-1=16A+4B+C$ $A=1, B=-3, C=-5$ Equations: $y=x^2-3x-5$
99.	1.27
100.	0.65
101.	a. decreasing by 20% b. About 4 hours. After 4 hours, the water is 32.76°F. c. The water does not reach a temperature of 0°F. As more time passes, the temp. gets closer and closer to 0°F, but it does not actually get there.
102.	a. $A=2(1.25)^d$ b. About 8 days
103.	The area of a circle is $A=\pi r^2$. Solve for r. $\pi r^2=12 \rightarrow r^2 \approx 3.819 \rightarrow r \approx 1.95$ The sample's diameter is about 3.9 cm.
104.	a. $(-1, 13.\overline{3}), (3, 139.968)$ b. $(-1, 555.\overline{5}), (5, 295.245)$ c. $(-1, 16), (6, 2048)$
105.	a. $y=24(1.8)^x$ b. $y=500(0.9)^x$ c. $y=32(2)^x$
106.	a. Curve 2 b. Curve 4 c. Curve 1 d. Curve 3
107.	2 points: (1950, 3300) and (2014, 51017) Make 2 equations: $3300=A(B)^{1950}$ and $51017=A(B)^{2014}$ Solve the system to find the value of B.
	$B \approx 1.044 \rightarrow 4.4\%$ increase every year
108.	a. $a^2+\left(\sqrt{39}\right)^2=8^2 \rightarrow a^2+39=64$ $\rightarrow a^2=25 \rightarrow a=5$ b. $a^2+8^2=10^2 \rightarrow a^2+64=100$ $\rightarrow a^2=36 \rightarrow a=6$
109.	Option 1: Draw a right triangle and use the Pythagorean Theorem. a. $12^2+9^2=d^2 \rightarrow 225=d^2 \rightarrow d=15$ b. $8^2+4^2=d^2 \rightarrow 80=d^2 \rightarrow d=4\sqrt{5}$ Option 2: Use the distance formula. $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
110.	a. $\dfrac{9}{12} \rightarrow \dfrac{3}{4}$ b. $\dfrac{-4}{8} \rightarrow -\dfrac{1}{2}$
111.	Points B and C are both equidistant from point A. Points A and B are 15 units apart, while A and C are also 15 units apart.
112.	The shorter sides are 10 units. The longer side is $10\sqrt{2}$ units. The perimeter of the isosceles triangle is 20 + $10\sqrt{2}$ units.
113.	a. leg: 9 hypotenuse: $9\sqrt{2}$ b. shorter leg: 10 longer leg: $10\sqrt{3}$
114.	a. hypotenuse: $16\sqrt{2}$ b. shorter leg: $9\sqrt{3}$ hyp.: $18\sqrt{3}$
115.	a. leg: $3.4\sqrt{2}$ hyp.: $3.4\sqrt{2}\sqrt{2} \rightarrow 3.4\sqrt{4} \rightarrow 6.8$ b. legs: $\dfrac{14}{\sqrt{2}} \rightarrow \dfrac{14}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} \rightarrow \dfrac{14\sqrt{2}}{2} \rightarrow 7\sqrt{2}$
116.	a. shorter leg: $5\sqrt{3} \div 2 \rightarrow 2.5\sqrt{3}$ hyp.: $2.5\sqrt{3}\sqrt{3} \rightarrow 7.5$ b. not enough information
117.	The equilateral triangle's area is greater by 2.5 cm^2. 25 vs. 27.7
118.	Draw an equilateral triangle and split it in half to form two 30-60-90 triangles.
119.	Draw a square and connect opposite corners to form two 45-45-90 triangles.