



Lemont High School

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Lemont High School Students and Parents/Guardians,

Because of the sequential nature of mathematics, Lemont High School's Mathematics Department annually makes supplemental practice available to students in the summer. The concepts included are from prior years of school, and this resource is a tool for students to strengthen readiness for the next school year.

The completion of this packet is not required work for the upcoming school year. However, we believe it is important for students to maintain their skills over the summer. This never has been more important.

The packet includes a review of basic mathematics, mathematical concepts, and applications of these concepts. Students should use external resources if they are not familiar with some of the concepts included in this packet. Many of the answers for this packet will be available on the school's website by June.

Please contact me at bzettergren@lhs210.net with any questions. The Mathematics Department wants to continue to provide tools to practice and strengthen the mastery of mathematics.

Sincerely,

Brittany Zettergren

Mathematics Department Chair

Math II Summer Packet Skills List (Honors)

- a. Identifying components of terms: Constant, Coefficient, Base, Exponents, etc.
- b. Exponent Rules
- c. Perfect Squares
- d. Operations with rational numbers
- e. Distributive Property: expressions and equations
- f. Determining Factors a number
- g. Graphing Linear and Exponential Functions from a table or given $f(x)$ with key features
- h. Comparing rate of change between functions
- i. Determine function values
- j. Transformation of linear and exponential functions using functions notation
- k. Linear Regression
- l. Solving systems algebraically and graphically
- m. Solving systems inequalities algebraically and graphically
- n. Describing elements of a two-way table
- o. Interpreting two-way tables
- p. Pythagorean Theorem
- q. Triangles: Congruence, Properties
- r. Parallel Properties and Perpendicularity
- s. Finding measures of angles
- t. Transformations: Translations, Rotations, Reflections
- u. Perimeter and Area of Triangles, Circles, Parallelograms
- v. Volume of Cylinders and Prisms
- w. *(H) – Exponential Regression*
- x. *(H) – Simple Probability*
- y. *(H) – Problem Solving*

1. Identify the terms, coefficients, constants, and factors of $10x^2 - 2x + 4x^2 + 3x - 12$.

2. Explain why the expression $2 \cdot 3^x$ is not equivalent to the expression 6^x .

3. The sum of 4, a , and b is represented by the expression $4 + a + b$. If the sum is negative, which of the following statements must be true?

- a. $a + b$ is greater than 0.
- b. $a + b$ must equal 0.
- c. $a + b$ is less than negative 4.
- d. $a + b$ is greater than 4.

4. Determine whether each expression is a monomial. Write yes or no. Explain your reasoning.

a. 10 : _____

b. $5x + 3$: _____

c. $\frac{7}{x^2}$: _____

d. $6x^2 - x + 9$: _____

e. $24xy^2$: _____

f. j : _____

5. What value can be placed in each box to create a true statement?

a. $(b^{\square})^5 = b^{15}$

b. $g^{\square} \cdot g^6 = g^{11}$

c. $(a^2 \cdot a^{\square})^3 = a^{18}$

6. Given the area of a circle is πr^2 , express the area of the circle with radius $2xy^2$ as a monomial.

7. Express the area of a square with sides of length $3xy^2$ as a monomial.

8. The set of natural numbers are $\{0,1,2,3,\dots\}$. Which of these radicals have natural number solutions?

a. $\sqrt{50}$

b. $\sqrt{25}$

c. $\sqrt{9} + \sqrt{4}$

d. $\sqrt{6}$

9. What must be true about a for the statement $\sqrt{7a} \cdot \sqrt{36} = 7 \cdot 6 = 42$ to be true?

#10 – 15 should be done without a calculator.

10. Which fraction is larger?

$$\frac{2}{3} \quad \text{or} \quad \frac{7}{18}$$

11. Circle any values that are equivalent:

$$\frac{2}{5}, \frac{6}{8}, \frac{6}{15}, \frac{9}{30}, \frac{14}{35}, \frac{20}{50}$$

12. Evaluate: $\frac{1}{3} \cdot \frac{3}{7} \cdot \frac{8}{2}$

13. Evaluate: $\frac{2}{5} + \frac{4}{5}$

14. Evaluate: $\frac{2}{3} - \frac{7}{4}$

15. Convert to an improper fraction: $6\frac{3}{4}$

16. Rebecca, Anna, and Jenna tried to solve the equation $40 - 4(x + 3) = 7x - 5$. They got three different results. Who has the correct result? What mistakes did each of the others make?

<p>Rebecca</p> $40 - 4(x + 3) = 7x - 5$ $40 - 4x + 12 = 7x - 5$ $52 - 4x = 7x - 5$ $52 - 4x + 5 = 7x - 5 + 5$ $57 - 4x = 7x$ $57 - 4x + 4x = 7x + 4x$ $57 = 11x$ $\frac{57}{11} = x$	<p>Anna</p> $40 - 4(x + 3) = 7x - 5$ $40 - 4x + 3 = 7x - 5$ $43 - 4x = 7x - 5$ $39x = 7x - 5$ $39x - 7x = 7x - 5 - 7x$ $32x = -5$ $x = -\frac{5}{32}$
<p>Jenna</p> $40 - 4(x + 3) = 7x - 5$ $40 - 4x - 12 = 7x - 5$ $28 - 4x = 7x - 5$ $28 - 4x + 4x = 7x - 5 + 4x$ $28 = 11x - 5$ $28 + 5 = 11x - 5 + 5$ $33 = 11x$ $3 = x$	

17. Simplify the following expressions:

a. $11(a + 5b - 3c)$

b. $7 - 5(y - 11)$

c. $2(3z + 1) - (z - 6)$

18. The factors of $1176 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 7 \cdot 7 = 2^3 \cdot 3 \cdot 7^2$. Find the factors of the following:

a. 98

b. 810

c. 72

19. Since $64 = 2^6 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$, paired factors of the number 64 are as follows:

$$1 \cdot 64 = 2^6$$

$$2 \cdot 32 = 2^1 \cdot 2^5$$

$$4 \cdot 16 = 2^2 \cdot 2^4$$

$$8 \cdot 8 = 2^3 \cdot 2^3$$

Find the paired factors of the following numbers that meet the criteria given.

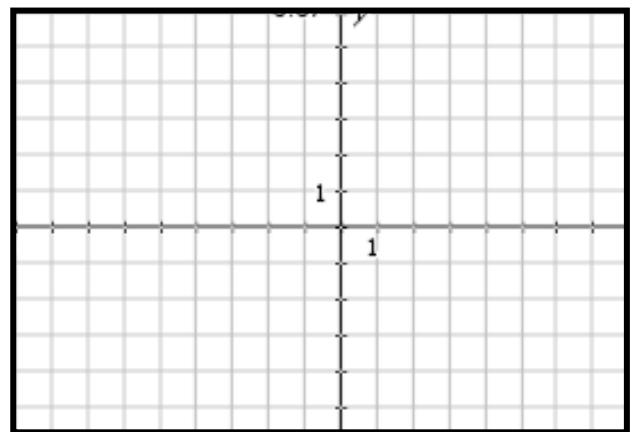
- Two numbers that multiply to 36 whose sum is 15.
- Two numbers that multiply to -21 whose sum is -4 .
- Two numbers that multiply to 60 whose sum is -17 .

20. On the axes to the right, graph each of the following:

$f(x)$ is exponential with an asymptote at $y = 5$

$g(x)$ is linear with a negative slope

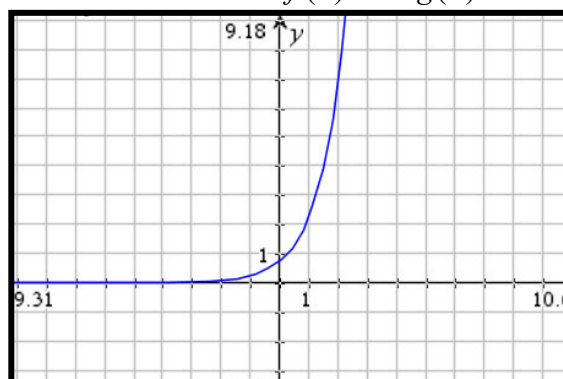
$f(x) = g(x)$ at an x -value of $x = 1$



21. Which of the following statements is true about the functions $f(x)$ and $g(x)$?

$$f(x) = 3(2)^x$$

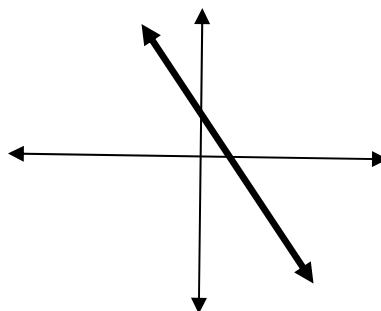
$$g(x) =$$



- The y -intercept of function $f(x)$ is less than the y -intercept of the function $g(x)$.
- The y -intercept of function $f(x)$ is greater than the y -intercept of the function $g(x)$.
- The y -intercept of function $f(x)$ is equal to the y -intercept of the function $g(x)$.
- The y -intercepts cannot be determined.

22. Which of the following could be the equation of the line graphed? Circle all that apply.

- a. $f(x) = \frac{1}{2}x + 3$
- b. $f(x) = -400x + 520$
- c. $f(x) = \frac{4}{7}x - 15$
- d. $23x + 16y = 200$
- e. $47y - 27x = 110$
- f. $60x + 81y = -90$



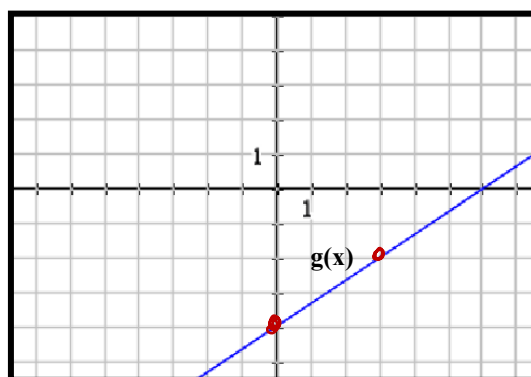
23. If the given table represents a linear function, which of the following is true? Circle all that apply.

- a. The y-intercept of the graph is negative.
- b. The function is decreasing.
- c. The graph of the function has an asymptote at $y = -13$.
- d. $f(2) = -1$

x	$f(x)$
-6	-13
-4	-10
2	-1
4	2

24. Given the table and the graph below, which of the following statements is true about the linear functions $f(x)$ and $g(x)$?

x	$f(x)$
-9	-10
-6	-6
-3	-2
0	2



- a. The function $f(x)$ has a greater rate of change than the function $g(x)$.
- b. The function $g(x)$ has a greater rate of change than the function $f(x)$.
- c. The rates of change for both $g(x)$ and $f(x)$ are equal.
- d. The rates of change cannot be determined.

25. Given that $f(x)$ is linear, and $g(x)$ is exponential, which has a greater rate of change in the domain $[1,5]$?

$$g(x) = 2(3)^x$$

x	1	2	3	4	5
$f(x)$	7	12	17	22	27

26. Nicholas and Jacob were having an argument about who could run more miles in one week. On the first day, they both ran one mile. Every day thereafter, Nicholas will run 7 miles per day, and Jacob will double the amount of miles he runs from one day to the next.

a. Create functions for each of these scenarios

b. Which function increases faster for the first few days?

c. Which function has a greater rate of change over this week long time period?

d. If the men planned on running for 1 week, who would run more miles?

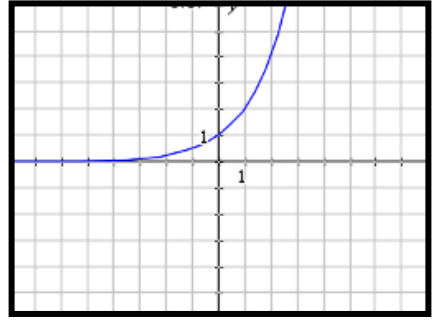
27. What is the rate of change for the function $f(x) = 2(3)^{\frac{x}{7}}$ over the interval $[14,35]$?

28. If $f(x) = -3x + 2$ and the domain of f is $\{3,4,5\}$, what is the range of $f(x)$?

29. Answer the following questions for the graph of $f(x)$ and $g(x)$ to the below:

a. What is the values of $f(2)$, $g(3)$, and $g(-6)$?

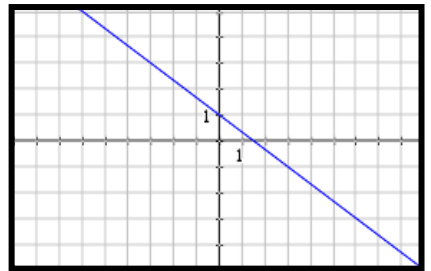
$f(x) =$



b. What does the point $(0,1)$ represent?

c. Create a scenario for both $f(x)$ and $g(x)$.

$g(x) =$

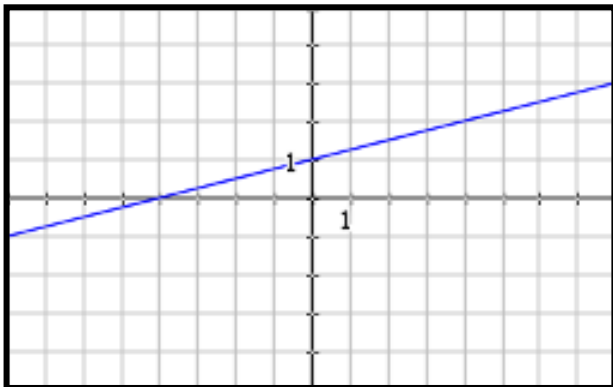


d. Create a function that has a greater rate of change than $g(x)$. Create a scenario for this new function.

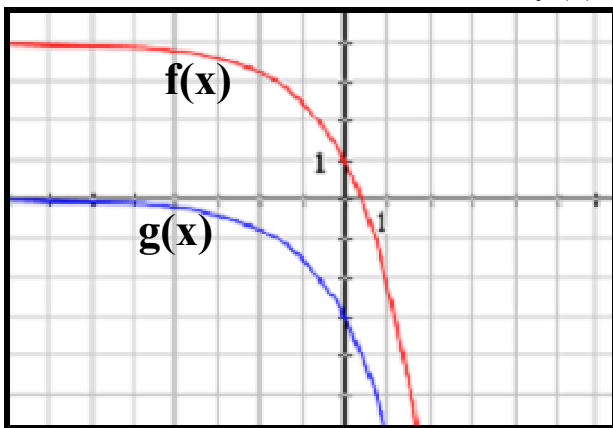
e. True or False: $f(-1) > g(3)$

f. True or False: $f(-2)$ is positive.

30. Given the graph of $f(x)$, create $g(x) = f(x) + 3$.



31. Describe the transformation that occurs from $f(x)$ to $g(x)$ in function notation.



32. The table below shows the study times and test scores for a number of students.

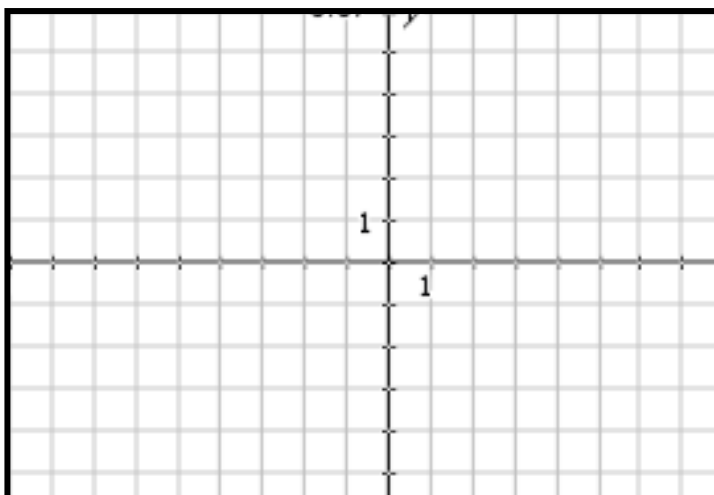
Study Time in minutes	27	22	38	24	12	42	15	34
Test Score	70	65	77	70	58	73	64	71

- Find the line of best fit. _____
- Write a sentence describing the slope. _____
- Find the correlation coefficient. _____ What does this value show about the data?
- If a student studies for an hour, what should her score be? _____
- If a student doesn't study at all, what should his score be? _____

33. Using a graph, find the solution(s) to the following system of equations:

$$y = 3^{x-1}$$

$$y = 2x + 4$$



34. Jeff and his friends are planning a trip to a paintball park. Find the cost of lunch and the cost of each paintball. What would be the cost for 400 paintballs and lunch?

Paintball in the park:

- \$25 for 500 paintballs
- \$16 for 200 paintballs
- Lunch is included!

35. A total of \$25,000 is invested in two funds paying 8% and 8.5% simple interest. If the yearly interest earned is \$2060, how much of the \$25,000 is invested at the 8% rate?

36. You find that you have a clogged drain and need to have a plumber come out to fix it. You check with two different companies and find that Perfect Plumbing charges \$50 for a visit, plus \$10 per hour. Drain Demons charges \$25 for a visit, plus \$20 per hour.

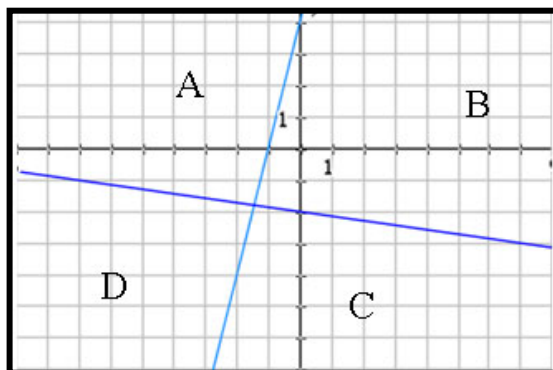
- After how many hours would it not matter which company you chose?
- If you estimate that it will take 2 hours to fix, which company should you go with?

37. Given the inequality $y > -2x + 1$ and $y \leq x + 3$, the point $(-2, 1)$ is _____. Explain your answer.

- A solution to both inequalities, _____
- A solution to $y > -2x + 1$ only, _____
- A solution to $y \leq x + 3$ only, _____
- Not a solution of either inequalities, _____

38. Which region (A, B, C, or D) would be shaded to represent the correct solution to the system of linear inequalities

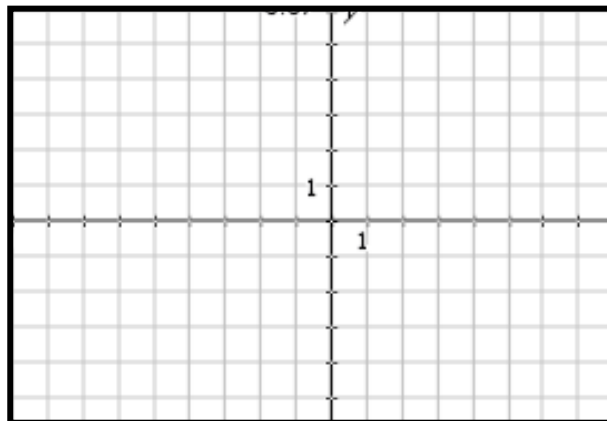
$$\begin{cases} 7y + x \leq -14 \\ 4x - y \leq -4 \end{cases}$$



39. To apply for a scholarship, you must have a minimum of 20 hours of community service and a grade-point average of at least 3.75. Another scholarship requires at least 40 hours of community service and a minimum grade-point average of 3.0.

- a. Write a system of inequalities to represent the credentials you must have to apply for both scholarships.

- b. Graph the system of inequalities.



- c. If you are eligible for both scholarships, give one possible solution.

40. Angela asked 100 adults which type of music they enjoyed. They could choose Jazz, Rock, Classical or Folk music. The two-way table shows some information about their answers.

	Jazz	Rock	Classical	Folk	Total
Men	12		19	4	52
Women		23			
Total	21			11	100

- a. Complete the two-way table.
- b. How many did not choose Classical music?

41. A soda company conducted a taste test for three different kinds of soda that it makes. It surveyed 200 people in each age group about their favorite flavor and the results are shown in the table below.

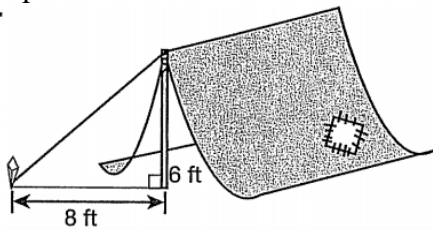
Age	Soda A	Soda B	Soda C
Under 20	30	44	126
20 to 39	67	75	58
40 to 59	88	78	34
60 and over	141	49	10

- a. How many people in all were surveyed for the taste test?
- b. How many participants chose Soda A?
- c. How many participants chose Soda C who were also 20 years or older?

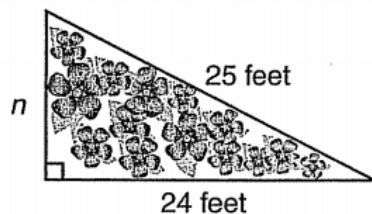
42. An airline wants to determine if passengers not checking luggage is related to people being on business trips. Data for 1000 random passengers at an airport was collected and summarized in the table below.

	Checked Baggage	No Checked Baggage
Traveling for business	103	387
Not traveling for business	216	294

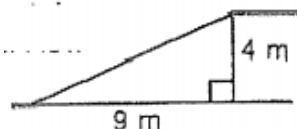
- How many passengers travelled for business?
 - How many passengers traveling did not check baggage?
 - Of the passengers traveling for business, how many did not check baggage?
43. If a right triangle has legs of 4in and 5in, use the Pythagorean Theorem to find the length of the hypotenuse.
44. A tent is supported by a guy rope tied to a stake, as shown in the diagram. What is the length of the rope?



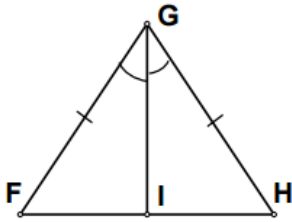
45. Julie is planning a right triangular garden. She marked two sides that measure 24feet and 25feet. What is the length of side labelled n ?



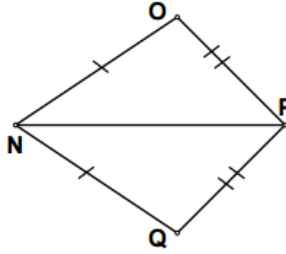
46. An inclined ramp rises 4 meters over a horizontal distance of 9 meeters. How long is the ramp?



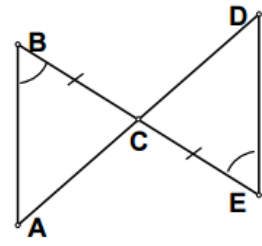
47. In each of the figures below, write a congruence statement for the figures AND the postulate that proves that the triangles are congruent.



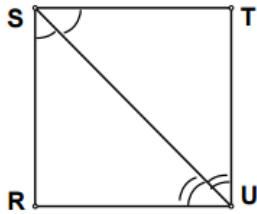
a.



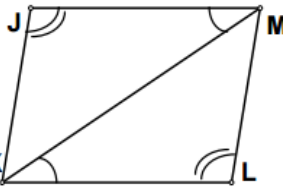
b.



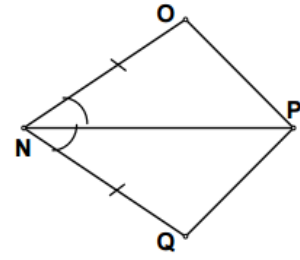
c.



d.

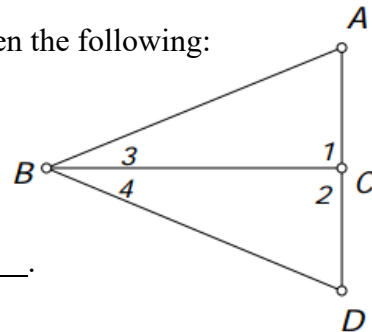


e.



f.

48. Use the following diagram to make conjectures when given the following:

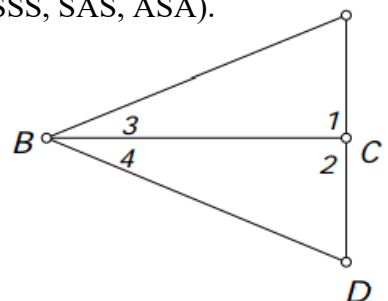


a. If $BC \perp AD$, then _____.

b. If \overline{BC} bisects $\angle ABD$, then _____.

c. If C is the midpoint of \overline{AD} , then _____.

49. Given the information stated in each exercise, you are to prove $\triangle ABC \cong \triangle DBC$. Without doing the proof, state the method you would use to prove them congruent. (SSS, SAS, ASA).



a. Given: $AB = BD$; $AC = CD$ _____

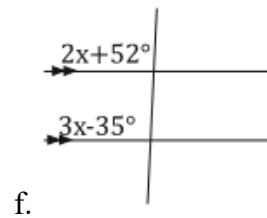
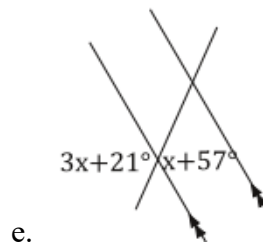
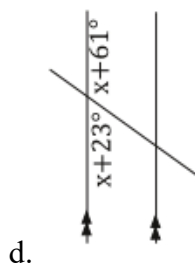
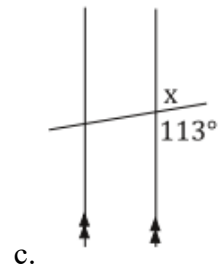
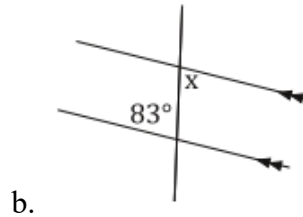
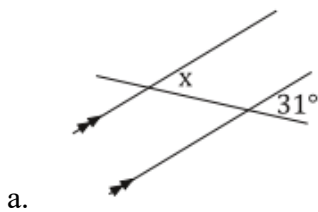
b. Given: $\angle ABC \cong \angle DBC$; $AB = BD$ _____

c. Given: $\angle 1$ & $\angle 2$ are right angles; $\angle 3 \cong \angle 4$ _____

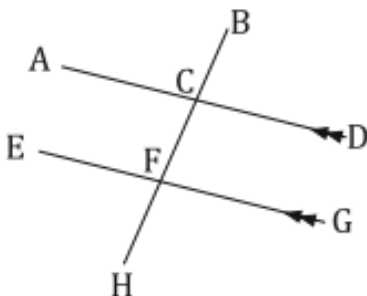
50. In a triangle, one angle measures 46° while another measures 108° . What is the measure of the remaining angle?

51. Is it possible for a triangle to have angle measures of 1° , 2° , and 177° ? Explain why or why not.

52. Solve for x in each figure below:

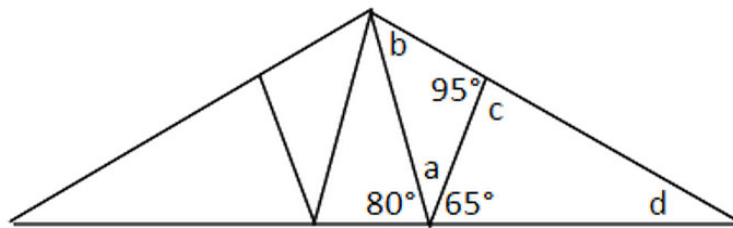


53. In the following diagram, $m\angle BCD = (x + 26)^\circ$ and $m\angle BFG = (2x + 24)^\circ$. Find $m\angle BFG$.

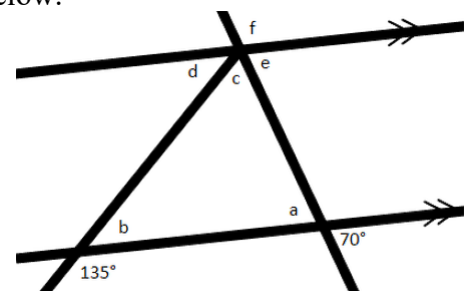


54. Find the equation of the linear function that is perpendicular to $f(x) = \frac{2}{3}x + 5$ and passing through the point $(3, 2)$.
55. Find the equation of the linear function that is parallel to $2x - 3y = 6$ and passing through the point $(0, 3)$.
56. Find the equation of the linear function that is perpendicular to $f(x) = -7$ and passing through the point $(-2, 5)$.
57. Find the equation of the perpendicular bisector through the segment with endpoints $(-10, -1)$ and $(5, 9)$.

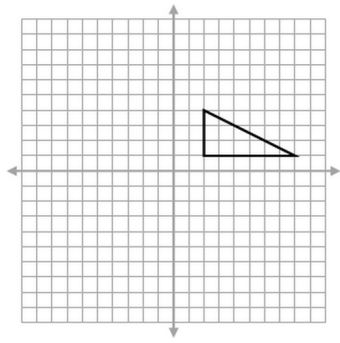
58. Use what know about the sum of the angles in a triangle together with the properties of supplementary angles to calculate the missing angles in the figure below.



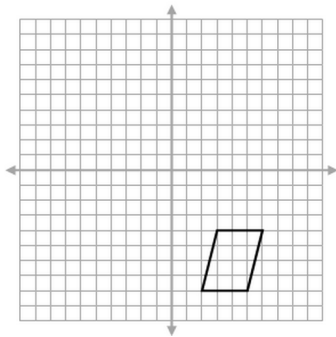
59. Use what know about the sum of the angles in a triangle together with the properties of supplementary angles to calculate the SUM of angles b, c, and e in the figures below.



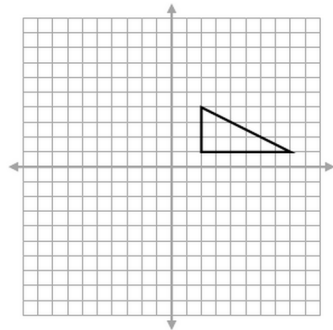
60. Draw a reflection of the figure shown over the x-axis.



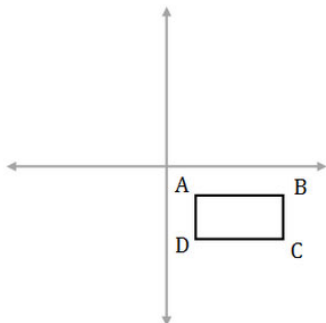
61. Draw a reflection of the figure shown over the y-axis.



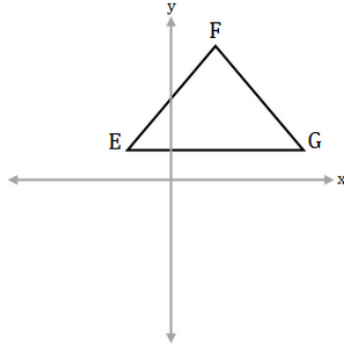
62. Draw a rotation of 90° clockwise about the origin of the figure shown.



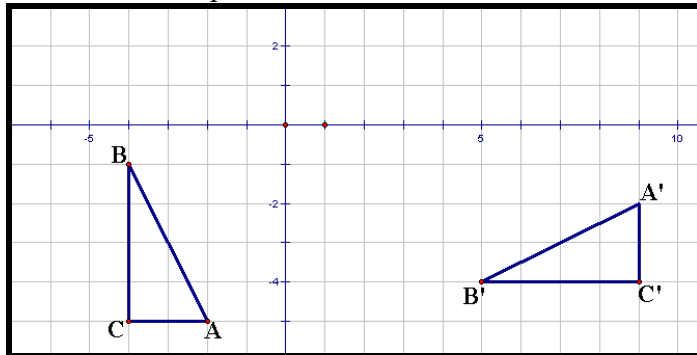
63. The coordinates of rectangle ABCD are $(2, -2)$ $(8, -2)$ $(8, -5)$ $(2, -5)$. What are the coordinates of rectangle A'B'C'D after a translation of $(-6, 7)$.



64. The coordinates of $\triangle EFG$ are $(-3, 2)$, $(3, 11)$, $(11, 2)$. What are the coordinates of $\triangle E'F'G'$ after a horizontal reflection?



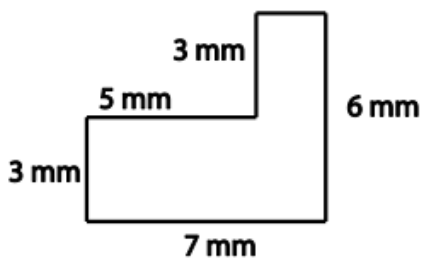
65. Describe the sequence of transformations from ABC to $A'B'C'$.



66. Find the perimeter of a square with each side measuring 9 meters.

67. Find the length of one side of a square whose perimeter is 52 feet.

68. Find the length of the missing side of the shape below.

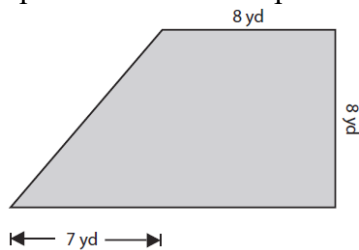


69. A yoga mat is rectangular and measures 72 inches by 24 inches. Find the area of the mat.

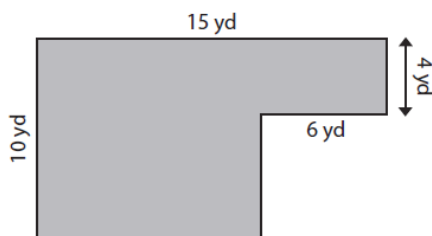
70. Maddison calculates the area of a rectangle to be 56 meters. What is wrong with her answer?

71. The perimeter of a rectangle is 66. The length is twice the width. Find the length and width of the rectangle.

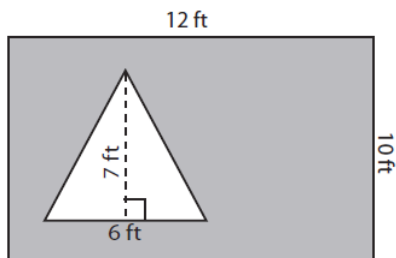
72. Find the perimeter of the shape shown below.



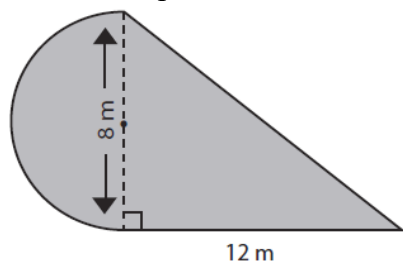
73. Find the perimeter of the shape shown below.



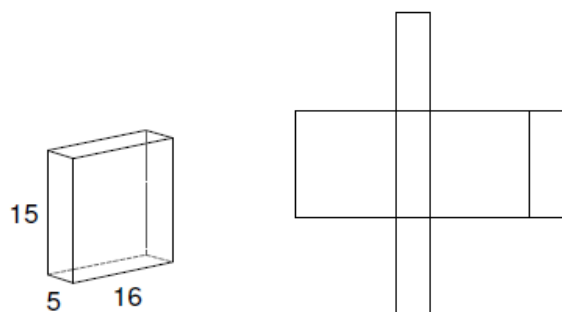
74. Find the area of the shaded region.



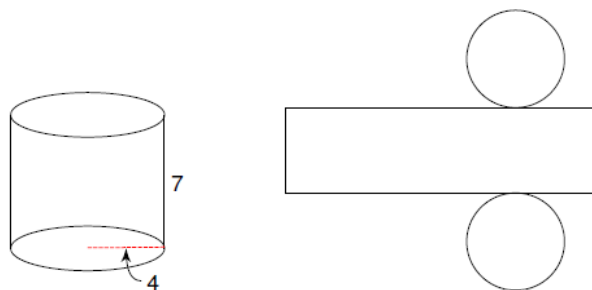
75. Find the area of the shape shown below.



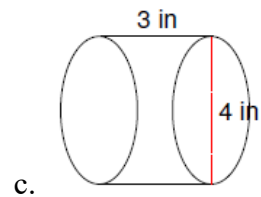
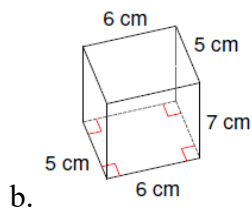
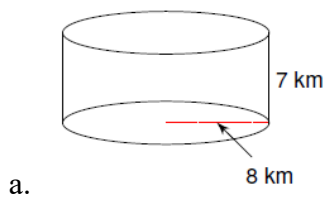
76. Copy the measurements given onto the net of the solid.



77. Copy the measurements given onto the net of the solid.

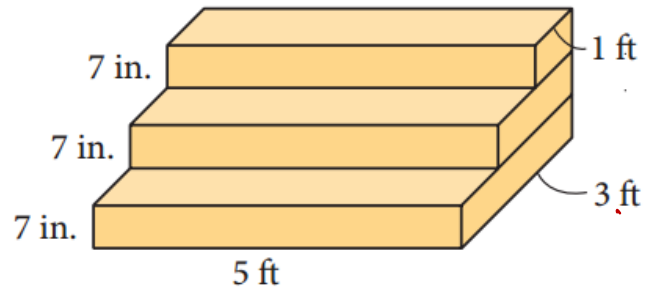


78. Find the volume of each figure shown below:



79. This set of stairs is positioned on a garage floor, against a wall.

- a. The stairs are to be painted. Find the area that needs to be painted.



- b. If 1L of paint covers 11.2ft^2 , how many liters of paint are needed to paint the stairs?

80. The exterior walls of a barn are to be painted. The barn is in the shape of a rectangular prism with an isosceles triangular prism for a roof.

- a. Find the total area to be painted.

- b. The paint is sold in 1 gallon cans. A gallon of paint will cover an area of 400ft^2 . How many gallons of paint are needed a coat?

81. A box containing 1,000 coins is shaken, and the coins are emptied onto a table. Only the coins that land heads up are returned to the box, and then the process is repeated. The accompanying table shows the number of trials and the number of coins returned to the box after each trial.

Trial	0	1	3	4	6
Coins Returned	1,000	610	220	132	45

- Write an exponential regression equation, rounding the calculated values to the nearest ten-thousandth.
- Use the equation to predict how many coins would be returned to the box after the eighth trial.

82. The accompanying table shows the number of bacteria present in a certain culture over a 5-hour period, where x is the time, in hours, and y is the number of bacteria.

x	y
0	1,000
1	1,049
2	1,100
3	1,157
4	1,212
5	1,271

- Write an exponential regression equation for this set of data, rounding all values to four decimal places.
- Using this equation, determine the number of whole bacteria present when x equals 6.5 hours.

83. The accompanying table shows the amount of water vapor, y , that will saturate 1 cubic meter of air at different temperatures, x .

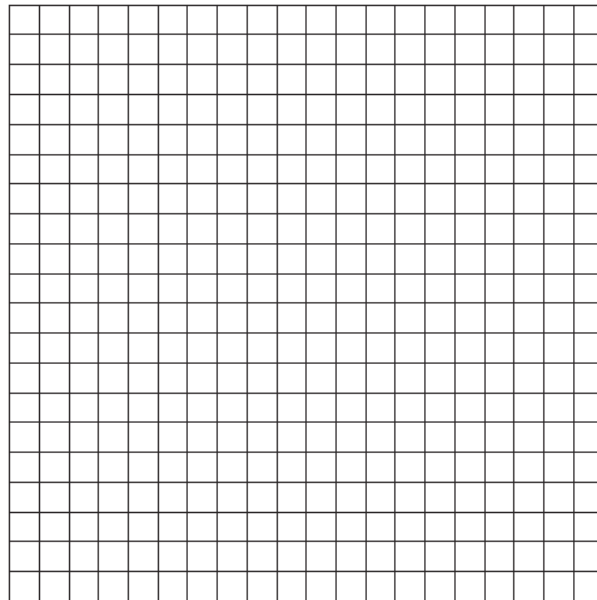
Amount of Water Vapor That Will Saturate 1 Cubic Meter of Air at Different Temperatures

Air Temperature (x) (°C)	Water Vapor (y) (g)
-20	1
-10	2
0	5
10	9
20	17
30	29
40	50

- Write a regression equation for this set of data, rounding all values to the nearest thousandth.
- Using this equation, predict the amount of water vapor that will saturate 1 cubic meter of air at a temperature of 50°C, and round your answer to the nearest tenth of a gram.

84. The table below, created in 1996, shows a history of transit fares from 1955 to 1995.

Year	55	60	65	70	75	80	85	90	95
Fare (\$)	0.10	0.15	0.20	0.30	0.40	0.60	0.80	1.15	1.50



- On the accompanying grid, construct a scatter plot where the independent variable is years.
- State the exponential regression equation with the coefficient and base rounded to the *nearest thousandth*.
- Using this equation, determine the prediction that could have been made for the year 2010, to the *nearest cent*.

85. A bag contains 45 dyed eggs: 15 yellow, 12 green and 18 red. What is the probability of selecting a green or a red egg?
86. The letters of L,I,F,E are placed in a hat. What is the probability of choosing a vowel?
87. A bowl has 10 whole wheat crackers, 16 sesame crackers and 14 rye crackers. What is the probability of choosing a wheat or rye cracker when choosing one randomly?
88. A pair of dice is rolled. What is the probability that the sum is less than 4?
89. Using theoretical probability of tossing a head when flipping a coin, how many times would you expect to get a head if you flipped the coin 200 times?
90. A lunch menu consists of three different kinds of sandwiches, three different kinds of soups, and six different kinds of drinks. How many choices are there for ordering a sandwich, a bowl of soup, and a drink?
- a. 15
 - b. 12
 - c. 80
 - d. 54
 - e. 36

Use the following table to answer questions 91. and 92.

A survey was taken of students. The following are the results of a gender and eye color.

	Blue	Green	Brown
Female	15	7	21
Male	10	4	18

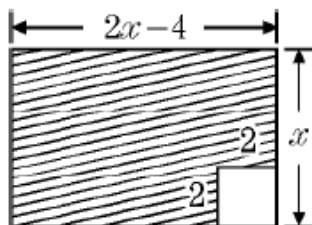
91. What is the probability of randomly selecting a female that participated in the survey?

92. What is the probability of randomly selecting a blue-eyed student that participated in the survey?

93. Find three consecutive integers such that three times the first, added to the third, is 102.

94. Scott has a board 7 yards long. He wants to cut it to make shelves 5 feet long. How many shelves can he make?

95. Write a function $A(x)$, to determine the shaded area of the given figure.



96. Sandra bicycled from her home to school at 8mph. She returned home at 4mph. If the round trip took 3 hours, how many miles is it from school to Sandra's house.
97. A jet ski uses a mixture of gasoline and oil. For each ounce of oil, the mixture contains 16ounces of gasoline. If the tank holds 68 ounces of gasoline, how mnay ounces of oil does it require.
98. The measure of the length of a rectangle is 2 less than 5 times the measure of the width. If the perimeter of rectangle is 32units, what is the measure of the length?
99. A woman put \$580 into a savings account for one year. The rate of interest on the account was $6\frac{1}{2}\%$. How much was the interest for the year in dollars and cents? (Round to the nearest cent)
100. As the owner of a local bakery, you bake fresh bagels every morning. You charge \$0.50 for one bagel, but when a customer orders more than one bagel each additional one costs \$0.45.
- Show how you will find the cost of one dozen bagels.
 - Make a list to show the price of 1 through 12 bagels.

The following may be helpful for the problem below:

Cylinder	$SA = C_b h + 2\mathcal{B}$	$V = \mathcal{B}h$
Sphere	$SA = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$

101. A storage silo is in the shape of a cylinder with a hemisphere at the top. The total height of the silo is 35ft. The circumference of the cylinder is 22ft.

- Find the radius of the silo.
- Find the height of the cylindrical portion of the silo.
- Find the volume of the cylindrical portion of the silo.
- Find the volume of the hemispherical portion of the silo.
- What is the total volume of the silo?

