Algebra 2

Summer Prep 2022

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225 + 193 =

GLASBERGEN
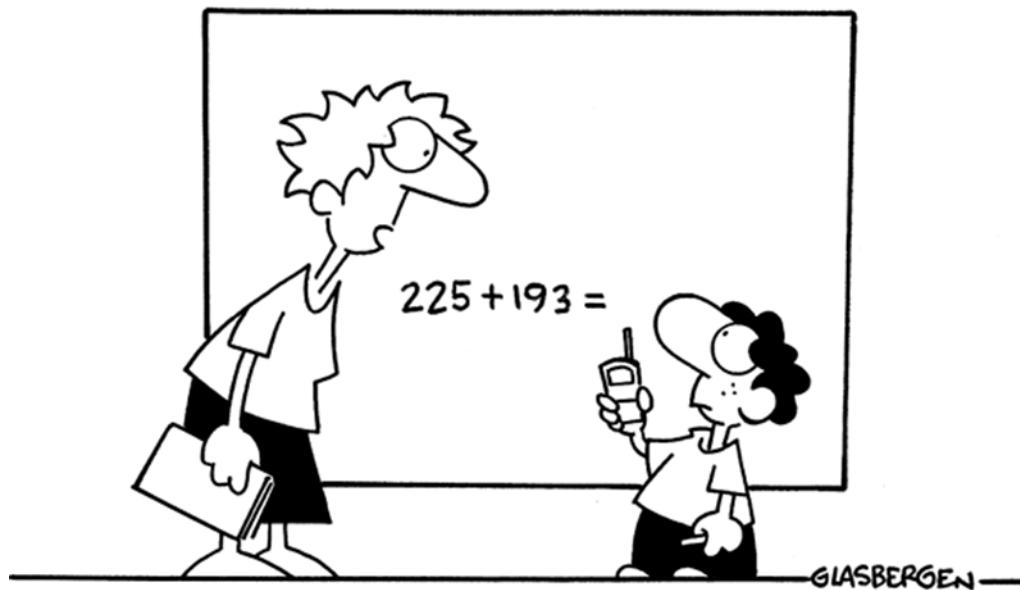
"You have to solve this problem by yourself. You can't call tech support."

Name:_____

Directions: Choose the most appropriate answer from the choices listed. Show your work when appropriate.

Solving Equations with Variables on Both Sides/Proportions: Solve for the variable:

_____ 1. $2(h-8)-h = h-16$

     a.   8   c.   infinitely many solutions

     b.   −8   d.   no solution

_____ 2. $2 + 3z = 5 + 3z$

     a. $-\dfrac{1}{2}$ c.   no solution

     b.   infinitely many solutions   d. $2\dfrac{1}{3}$

_____ 3. $\dfrac{14}{12} = \dfrac{d}{48}$

     a.   56   c.   168

     b.   672   d.   576

Rearranging Equations

_____ 4. Rearrange the equation to solve for v.

$$KE = \frac{1}{2}mv^2$$

_____ 5. Rearrange the equation to solve for a.

$$s = ut + \tfrac{1}{2}at^2$$

_____ 6. Rearrange the equation to solve for T.

$$\frac{pV}{T} = nR$$

Inequalities, Set Notation, Compound Inequalities

_____ 7.   Solve the inequality. $\dfrac{m}{6} \geq \dfrac{7}{12}(m+1)$

     a. $m \geq \dfrac{7}{12}$ b. $m \leq -\dfrac{7}{5}$ c. $m \leq \dfrac{7}{12}$ d. $m \geq -\dfrac{7}{5}$
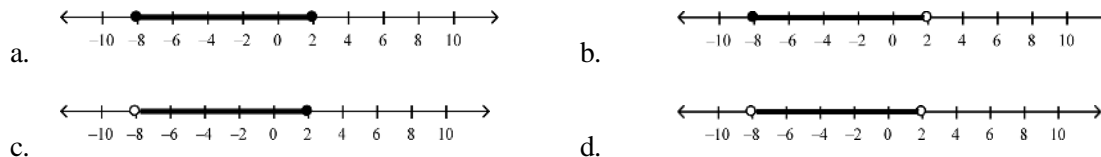
_____ 8.   Solve the inequality. $8 < x\,(7-x)$

     a.   2   b.   8   c.   −1   d.   0

9. Write $-2-x \geq -1$ in set builder notation

a. $\left\{ x \mid x \leq 1 \right\}$ b. $\left\{ x \mid x \geq 1 \right\}$ c. $\left\{ x \mid x \geq -1 \right\}$ d. $\left\{ x \mid x \leq -1 \right\}$

10. What is the graph of (–8, 2]?

a.
```
<---+--●--+--+--+--+--+--●--+--+--+-->
   -10 -8 -6 -4 -2  0  2  4  6  8  10
```
b.
```
<---+--●--+--+--+--+--+--○--+--+--+-->
   -10 -8 -6 -4 -2  0  2  4  6  8  10
```
c.
```
<---+--○--+--+--+--+--+--●--+--+--+-->
   -10 -8 -6 -4 -2  0  2  4  6  8  10
```
d.
```
<---+--○--+--+--+--+--+--○--+--+--+-->
   -10 -8 -6 -4 -2  0  2  4  6  8  10
```

11. How do you write $x \geq -6$ and $x < -3$ in interval notation?

a. [–6, –3]
b. (–6, –3)
c. [–6, –3)
d. (–6, –3]

Patterns and Linear Functions

12. Identify a pattern and find the next three numbers in the pattern: 5, 8, 11, 14, . . .

13. Identify a pattern and find the next three numbers in the pattern: 3, 1, −1, −3, . . .

14. Which of the following tables represent the relationship in the diagram below?

1 rectangle (5 × 8)
2 rectangles (5, 5 × 8)
3 rectangles (5, 5, 5 × 8)
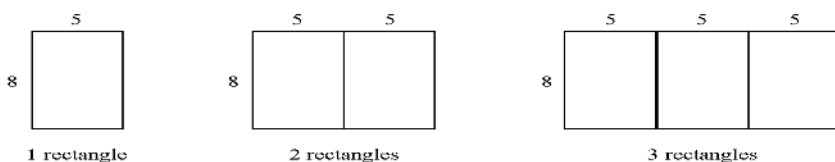
a.

Number of Rectangles	Perimeter
1	52
2	72
3	92

b.

Number of Rectangles	Perimeter
1	13
2	18
3	23

c.

Number of Rectangles	Perimeter
1	26
2	36
3	46

d.

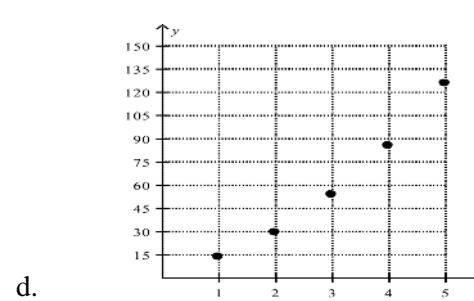| Number of Rectangles	Perimeter
1	26
2	44
3	62

Patterns and Non-Linear Functions
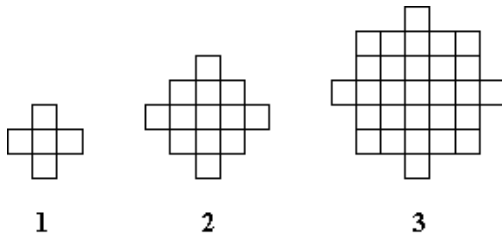
Number of Figure, x	Total Number of Squares, y	Ordered Pair (x, y)
1	5	(1, 5)
2	13	(2, 13)
3	29	(3, 29)
4		
5		

15. Which of the following equations represents the pattern above?

a. $y = (2x + 4)^2$

c. $y = (2x)^2 + 4$

b. $y = (2x + 1)^2 + 4$

d. $y = (2x - 1)^2 + 4$

16. Which of the following graphs matches the pattern described in question 15?

a.

c.

b.

d.
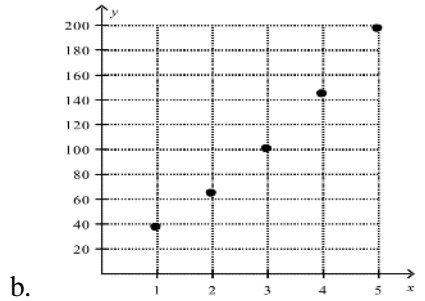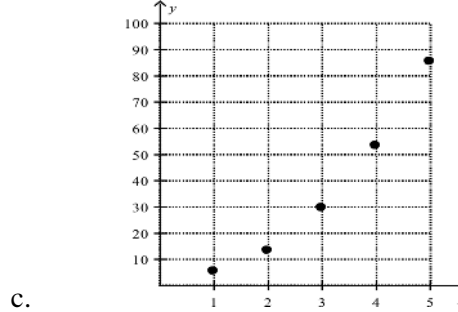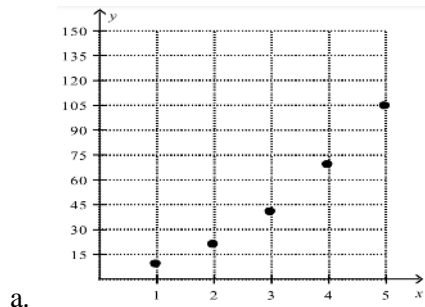
17. The ordered pairs (1, 1), (2, 4), (3, 9), (4, 16), and (5, 25) represent a function. What is a rule that represents   this function?

a. $y = x^2$

c. $y = x + 2$

b. $y = 2^x$

d. $y = 2x$

18. Write a function rule for the area, A, of a triangle whose base, b, is 2 cm less than seven times the height, h. What is the area of the triangle when the height is 14 cm?
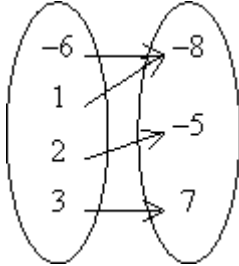
a. $A = \dfrac{7h^2 - 2h}{2}$; 672 cm^2

c. $A = 7h - 2$; 96 cm^2

b. $A = \dfrac{7h - 2}{2}$; 48 cm^2

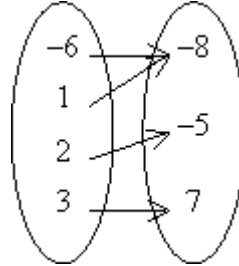d. $A = 7h^2 - 2h$; 1344 cm^2

Relations and Functions

_____ 19. Identify the mapping diagram that represents the relation and determine whether the relation is a function.
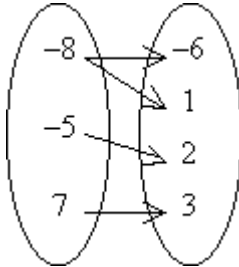$\left\{(-8, -6), (-5, 2), (-8, 1), (7, 3)\right\}$
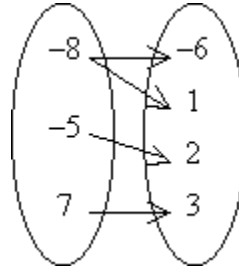
a.

The relation is a function.

c.

The relation is not a function

b.

The relation is a function.

d.

The relation is not a function

_____ 20. The function $j(x) = 39x$ represents the number of jumping jacks $j(x)$ you can do in x minutes. How many jumping jacks can you do in 5 minutes?

a. 195 jumping jacks
b. 7 jumping jacks

c. 144 jumping jacks
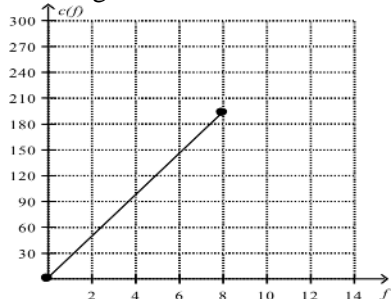d. 234 jumping jacks

_____ 21. The function $b(n) = 6n$ represents the number of light bulbs $b(n)$ that are needed for n chandeliers. How many light bulbs are needed for 15 chandeliers?

a. 90 light bulbs
b. 2 light bulbs

c. 96 light bulbs
d. 80 light bulbs

_____ 22. Write an equation to solve the problem. Two brothers are saving money to buy tickets to a concert. Their combined savings is $55. One brother has $15 more than the other. How much has each saved?

_____ 23. You have 8 cups of flour. It takes 1 cup of flour to make 24 cookies. The function $c(f) = 24f$ represents the number of cookies, c, that can be made with f cups of flour. What domain and range are reasonable for the function? What is the graph of the function?
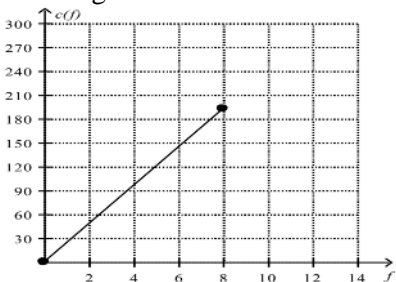
a.
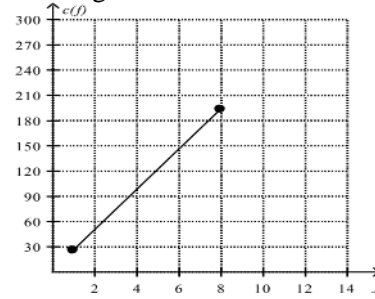The domain is $0 \le c(f) \le 192$.

The range is $0 \le f \le 8$.

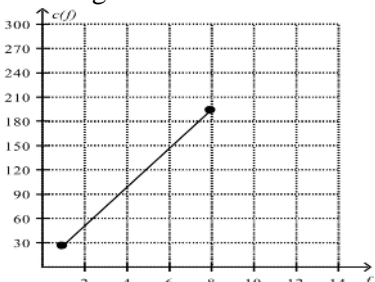c.
The domain is $24 \le c(f) \le 192$.

The range is $1 \le f \le 8$.

b.
The domain is $0 \le f \le 8$.

The range is $0 \le c(f) \le 192$.

d.
The domain is $1 \le f \le 8$.

The range is $24 \le c(f) \le 192$.

_____ 24. Bamboo plants grow rapidly. A bamboo plant is 130 inches tall. Tomorrow it will be 143 inches tall, the next day it will be 156 inches tall, and on the next day it will be 169 inches tall. Write an explicit formula to represent the height of the bamboo plant as an arithmetic sequence. How tall will the plant be in 13 days?

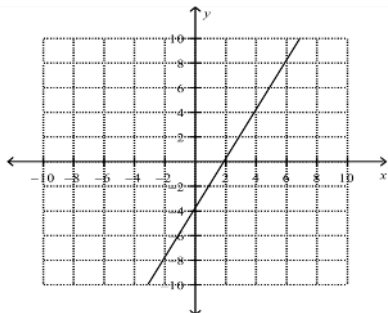a. $A(n) = 130 + (n-1)13$; 286 inches

b. $A(n) = 130 + (n-1)13$; 299 inches

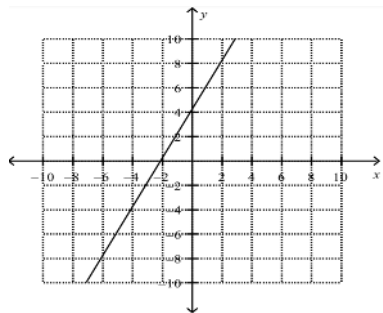c. $A(n) = 130 + 13n$; 286 inches

d. $A(n) = 130 + 13n$; 299 inches

Direct Variation, Graphing Linear Functions and Intercepts

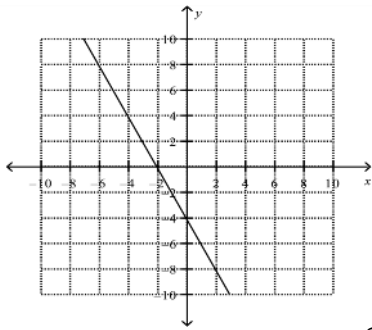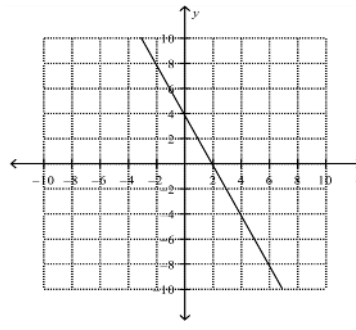_____ 25. Match the equation with its graph. $-4x - 2y = 8$
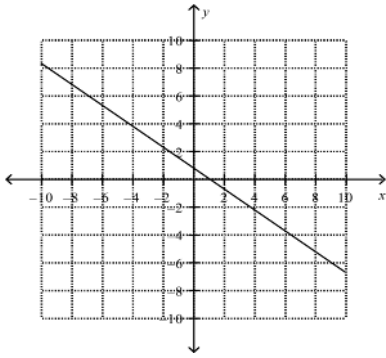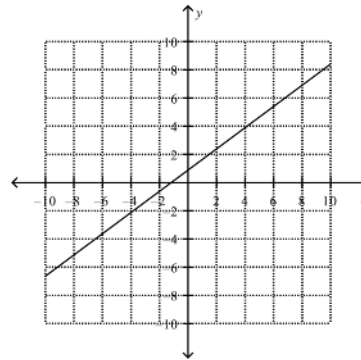
a.

c.

b.

d.

_____ 26. Match the equation with its graph. $\dfrac{3}{4}x - y = -\dfrac{3}{4}$

a.

c.

b.

d.

_____ 27. For the data in the table, does y vary directly with x? If it does, write an equation for the direct variation
.

x	y
8	11
16	22
24	33

a. yes; $y = 2.75x$ c. yes; $y = 1.375x$
b. yes; $y = 0.6875x$ d. no; y does not vary directly with x

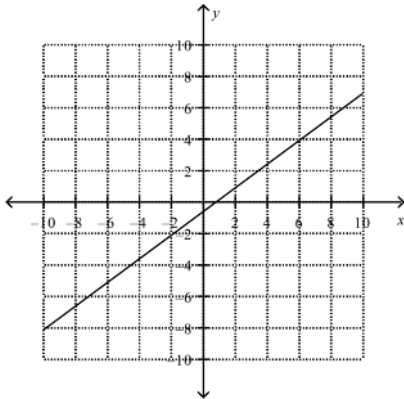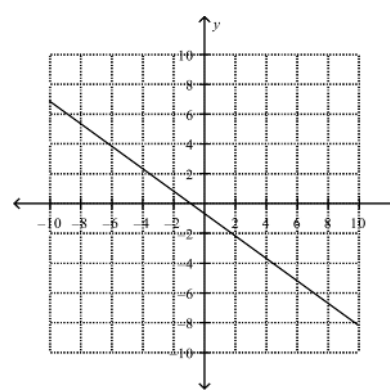_____ 28. For the data in the table, does y vary directly with x? If it does, write an equation for the direct variation.

x	y
16	4
32	16
48	36

a. yes; $y = 2x$ c. yes; $y = 8x$
b. yes; $y = 4x$ d. no; y does not vary directly with x

Rational, Radical and Exponential Expressions

29. Simplify $\sqrt[3]{27}$

30. Simplify $\left(\dfrac{81}{64}\right)^{-\frac{1}{2}}$

31 Simplify $\sqrt{196x^4y^6}$

32. Simplify $\dfrac{16x^4 - 8x^2 + 16}{(x+4)(x+2)}$

Operations with Polynomials

_____ 33. A biologist studied the populations of white-sided jackrabbits and black-tailed jackrabbits over a 5-year period. The biologist modeled the populations, in thousands, with the following polynomials where x is time, in years. White-sided jackrabbits: $9.7x^2 - 0.8x + 2.3$
   Black-tailed jackrabbits: $-1.1x^2 + 7.7x + 5.4$

What polynomial models the total number of white-sided and black-tailed jackrabbits?

a. $-8.6x^2 + 6.9x - 7.7$
b. $8.6x^2 - 6.9x + 7.7$
c. $8.6x^2 + 6.9x + 7.7$
d. $8.6x^2 - 6.9x - 7.7$

_____ 34. A sports team is building a new stadium on a rectangular lot of land. If the lot measures $7x$ by $7x$ and the sports field will be $5x$ by $5x$, how much of the lot will be left over to build bleachers on?

a. $4x^2$
b. $24x^2$
c. $74x^2$
d. $49x^2 - 25x^2$

_____ 35. $(-5h + 4)(5h - 5)$ Simplify the product using a table.

	$5h$	-5
$-5h$		
4		

a. $-25h^2 + 45h - 20$
b. $-25h^2 - 45h - 20$
c. $-25h^2 - 5h + 20$
d. $-25h^2 + 5h + 20$

36. The area of a rectangular garden is given by the trinomial $x^2 + x - 42$. What are the possible dimensions of the rectangle? Use factoring.

    a. $x - 6$ and $x + 7$ c. $x - 6$ and $x - 7$

    b. $x + 6$ and $x - 7$ d. $x + 6$ and $x + 7$

Linear and Quadratic Equations

37   Given the distance between $(x, 1)$ and $(-2, 5)$ is $2\sqrt{7}$, find the value(s) of x. Leave your answer in simplified exact form.

38. Write an equation of the line in slope-intercept form with x-intercept of -3 and a y-intercept of -5.

Systems of Equations and Linear Inequalities

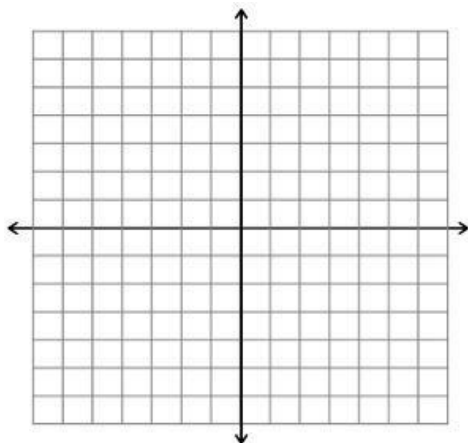39. How many solutions does the system have?

$$x = -4y + 4$$
$$2x + 8y = 8$$

40. A local citizen wants to fence a rectangular community garden. The length of the garden should be at least 110 ft, and the distance around should be no more than 380 ft. Write a system of inequalities that models the possible dimensions of the garden.

41. Solve the system of equations below by **graphing**. $\{y = 3x - 4 \quad 2x + y = 6$

42. Solve the following system of equations using **substitution**

$$\begin{cases} 2x + 5y = -5 \\ x + 3y = 3 \end{cases}$$

43. Solve the following system of equations using **elimination**
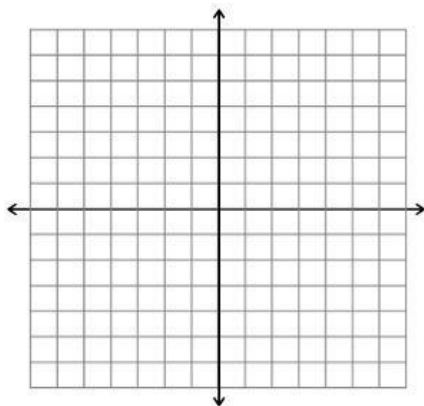
$$\begin{cases} 6x + 2y = 8 \\ 4x + 2y = 10 \end{cases}$$

44. In one week, a music store sold 9 guitars for a total of $3611. Electric guitars sold for $479 each and acoustic guitars sold for $339 each. How many of each type of guitar were sold? Set up a system of equations and use any method to solve.

45. Sketch the solution to the system of inequalities. $\{y \geq \frac{1}{2}x + 2 \quad y < -2x - 3$

Polynomials and Factoring

46.   Multiply and simplify: $7(-5v - 8) =$

47.   Multiply and simplify: $(n^2 + 6n - 4)(2n - 4) =$

48.   Simplify: $\dfrac{-32x^3y^2z^4}{8x^6y^2z} =$

49.   Factor completely: $3x^3 + 6x^2 + 27x =$

50.   Factor completely: $36x^2 - 64 =$

51.   Factor completely: $t^2 + 4t - 32$

Geometry Review

52. _____ Michele wanted to measure the height of her school's flagpole. She placed a mirror on the ground 48 feet from the flagpole, then walked backwards until she was able to see the top of the pole in the mirror. Her eyes were 5 feet above the ground and she was 12 feet from the mirror. Using similar triangles, find the height of the flagpole to the nearest tenth of a foot.
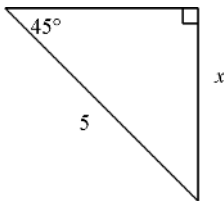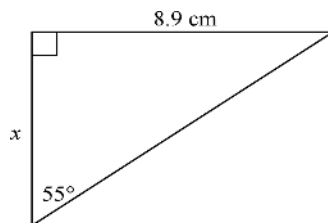

48 ft   12 ft   5 ft
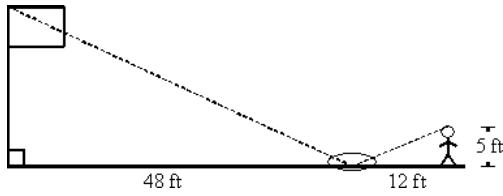
A. 20 ft   B. 38.4 ft   C. 55 ft   D. 25 ft

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53. _____ Find the value of the variable(s). If your answer is not an integer, leave it in simplest radical form.

5   x 60°   10

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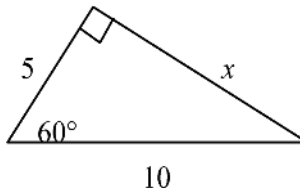
54. _____ Find the value of the variable. If your answer is not an integer, leave it in simplest radical form.

45° x 5
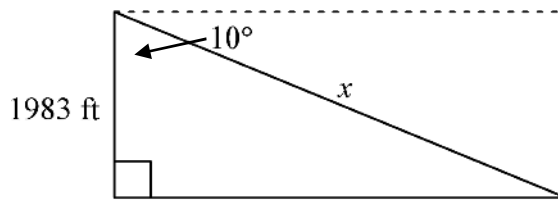
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55. _____ Use a trigonometric ratio to find the value of x. Round your answer to the nearest tenth.

8.9 cm x 55°

A.   6.2 cm   B.   12.7 cm

C.   15.5 cm   D.   10.9 cm

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56. _____ To approach the runway, a pilot of a small plane must begin a 10° descent starting from a height of 1983 feet above the ground. To the nearest tenth of a mile, how many miles from the runway is the airplane at the start of this approach?

A.	2.2 mi	B.	0.4 mi
C.	11,419.6 mi	D.	2.1 mi

57. _____ Find the value of w and then x. Round lengths to the nearest tenth and angle measures to the nearest degree.
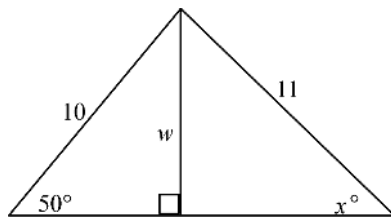
A. $w = 7.7, x = 44$
B. $w = 6.4, x = 4$
C. $w = 7.7, x = 54$
D. $w = 6.4, x = 44$

58. _____ The volume of a sphere is $5000\,\pi$ m^2. What is the surface area of the sphere to the nearest square meter?

A. 62,832 m^2 B. 1517 m^2 C. 3033 m^2 D. 195 m^2

Show work where appropriate. This summer prep packet will be your first grade of the quarter. DO NOT GUESS at the answers. You will be tested on this material during the first week of class.
Sites to use for help:
www.Mathbitsnotebook.com
www.coolmath.com
www.ck12.org