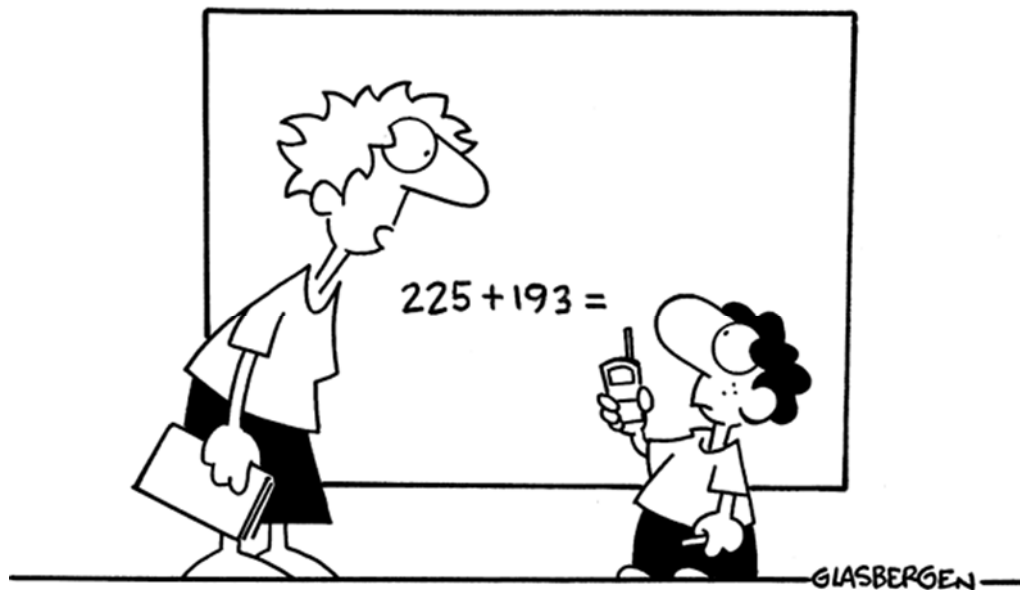


# Algebra 2

## Summer Prep 2021

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**"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.

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

\_\_\_\_\_ 1.  $2(k - 8) - k = k - 16$

- a. 8  
b. -8  
c. infinitely many solutions  
d. no solution
- 

\_\_\_\_\_ 2.  $2 + 3z = 5 + 3z$

- a.  $-\frac{1}{2}$   
b. infinitely many solutions  
c. no solution  
d.  $2\frac{1}{3}$
- 

\_\_\_\_\_ 3.  $\frac{14}{12} = \frac{d}{48}$

- a. 56  
b. 672  
c. 168  
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.

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

---

\_\_\_\_\_ 6. Rearrange the equation to solve for T.

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

**Inequalities, Set Notation, Compound Inequalities**

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

- a.  $m \geq \frac{7}{12}$   
b.  $m \leq -\frac{7}{5}$   
c.  $m \leq \frac{7}{12}$   
d.  $m \geq -\frac{7}{5}$

\_\_\_\_\_ 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

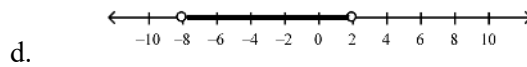
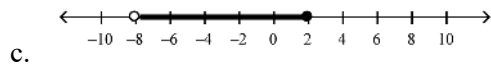
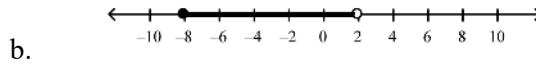
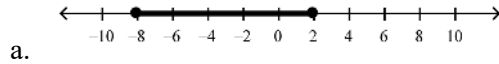
a.  $\{x \mid x \leq 1\}$

b.  $\{x \mid x \geq 1\}$

c.  $\{x \mid x \geq -1\}$

d.  $\{x \mid x \leq -1\}$

10. What is the graph of  $(-8, 2]$ ?



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

a.  $[-6, -3]$

b.  $(-6, -3)$

c.  $[-6, -3)$

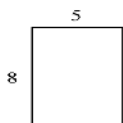
d.  $(-6, -3]$

### Patterns and Linear Functions

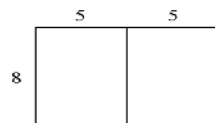
12. Identify a pattern and find the next three numbers in the pattern: 5, 8, 11, 14, ...

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

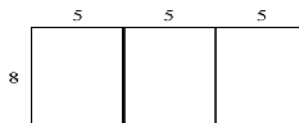
14. Which of the following tables represent the relationship in the diagram below?



1 rectangle



2 rectangles



3 rectangles

Number of Rectangles	Perimeter
1	52
2	72
3	92

a.

Number of Rectangles	Perimeter
1	13
2	18
3	23

b.

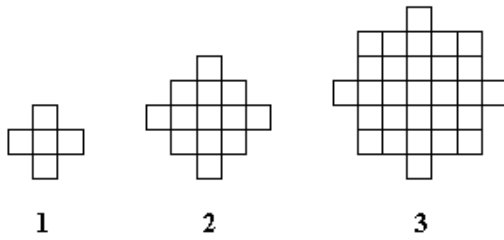
Number of Rectangles	Perimeter
1	26
2	36
3	46

c.

Number of Rectangles	Perimeter
1	26
2	44
3	62

d.

**Patterns and Non-Linear Functions**

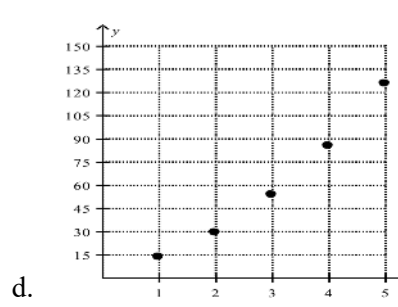
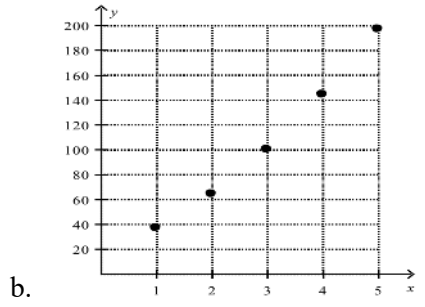
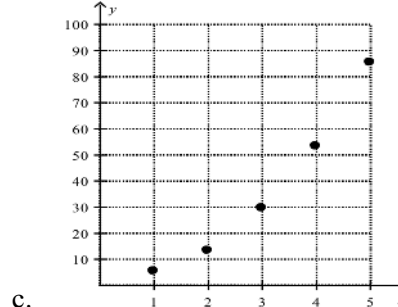
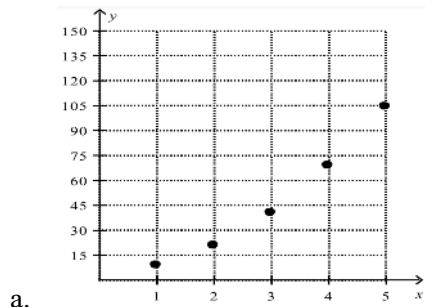


Number of Figure, $x$	Total Number of Squares, $y$	Ordered Pair $(x, y)$
1	5	(1, 5)
2	13	(2, 13)
3	29	(3, 29)
4		
5		

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?



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?

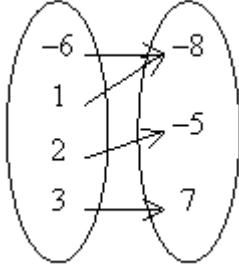
- a.  $A = \frac{7h^2 - 2h}{2}$ ;  $672 \text{ cm}^2$                       c.  $A = 7h - 2$ ;  $96 \text{ cm}^2$   
 b.  $A = \frac{7h - 2}{2}$ ;  $48 \text{ cm}^2$                               d.  $A = 7h^2 - 2h$ ;  $1344 \text{ cm}^2$

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## Relations and Functions

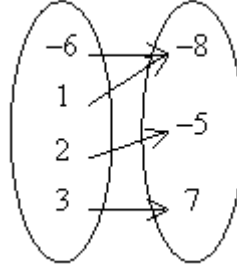
19. Identify the mapping diagram that represents the relation and determine whether the relation is a function.  
 $\{(-8, -6), (-5, 2), (-8, 1), (7, 3)\}$

a.



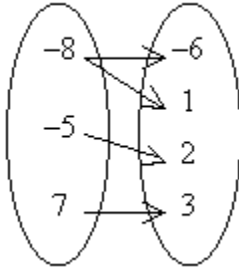
The relation is a function.

c.



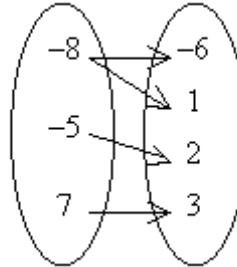
The relation is not a function

b.



The relation is a function.

d.



The relation is not a function

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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
- 

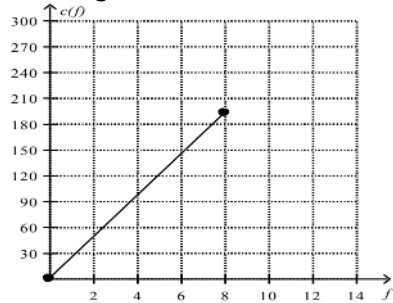
21. The function  $b(n) = 6n$  represents the number of light bulbs  $b(n)$  that are needed for  $n$  chandeliers. How many light bulbs are needed for 15 chandeliers?
- a. 90 light bulbs  
b. 2 light bulbs  
c. 96 light bulbs  
d. 80 light bulbs
- 

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?

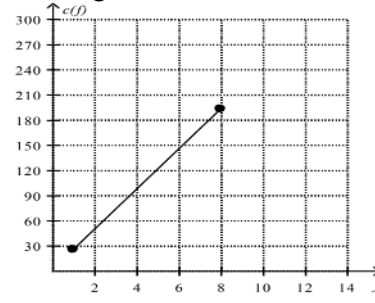
a. The domain is  $0 \leq c(f) \leq 192$ .

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



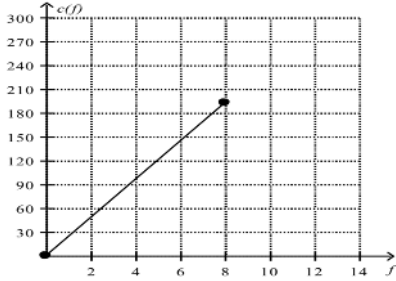
c. The domain is  $24 \leq c(f) \leq 192$ .

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



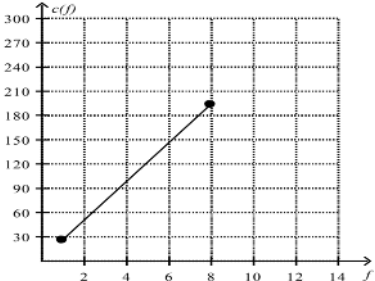
b. The domain is  $0 \leq f \leq 8$ .

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



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

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



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

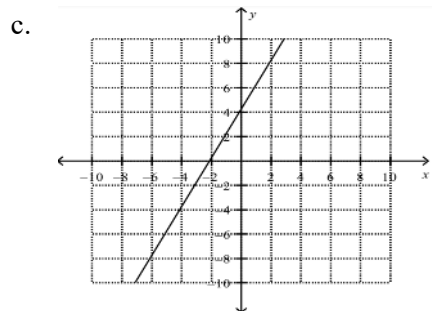
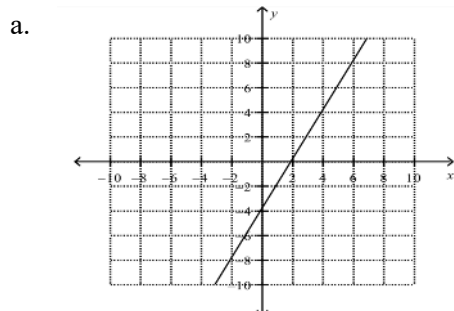
b.  $A(n) = 130 + (n - 1)13$ ; 299 inches

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

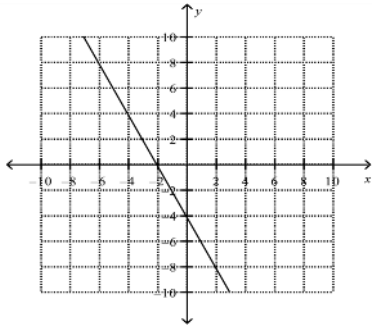
d.  $A(n) = 130 + 13n$ ; 299 inches

### Direct Variation, Graphing Linear Functions and Intercepts

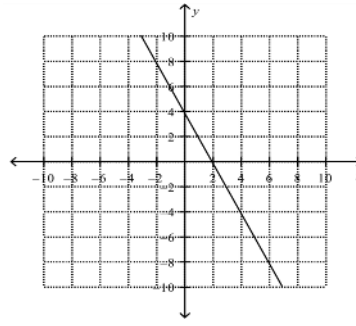
25. Match the equation with its graph.  $-4x - 2y = 8$



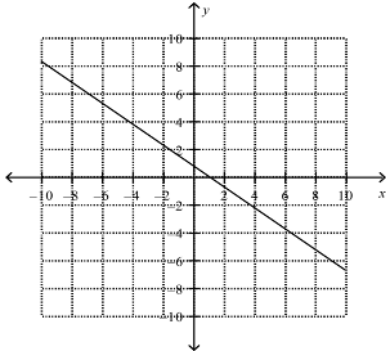
b.



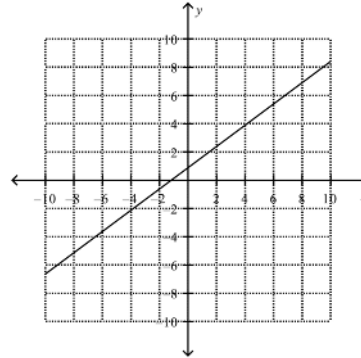
d.



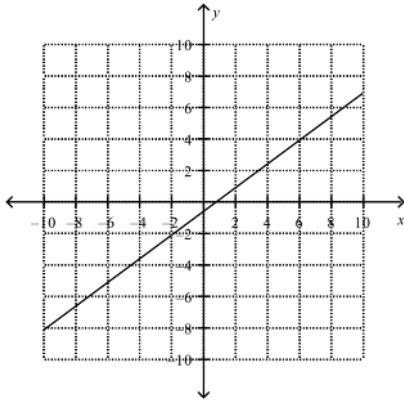
26. Match the equation with its graph.  $\frac{3}{4}x - y = -\frac{3}{4}$



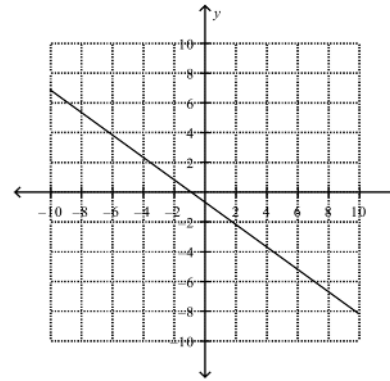
a.



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;  $y = 2.75x$

b. yes;  $y = 0.6875x$

c. yes;  $y = 1.375x$

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;  $y = 2x$

b. yes;  $y = 4x$

c. yes;  $y = 8x$

d. no;  $y$  does not vary directly with  $x$

## Rational, Radical and Exponential Expressions

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

---

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

---

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

---

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

---

## 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.  $-8.6x^2 + 6.9x - 7.7$                       c.  $8.6x^2 + 6.9x + 7.7$   
b.  $8.6x^2 - 6.9x + 7.7$                       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.  $4x^2$     c.  $74x^2$   
b.  $24x^2$     d.  $49x^2 - 25x^2$

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

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

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





---

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**

$$\begin{cases} 6x + 2y = 8 \\ 4x + 2y = 10 \end{cases}$$

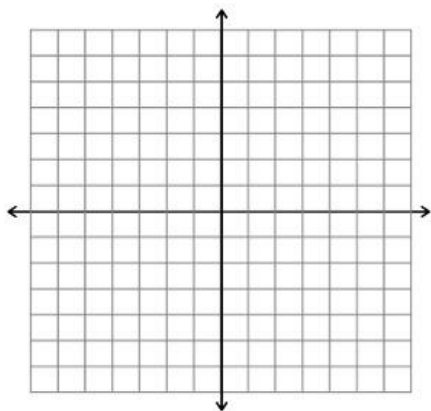
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44. In one week, a music store sold 9 guitars for a total of \$3611. Electric guitars sold for \$479 each and acoustic guitars sold for \$339 each. How many of each type of guitar were sold? Set up a system of equations and use any method to solve.

---

45. Sketch the solution to the system of inequalities.

$$\begin{cases} y \leq \frac{1}{2}x + 2 \\ y < -2x - 3 \end{cases}$$



---

**Polynomials and Factoring**

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

---

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

---

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

---

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

---

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

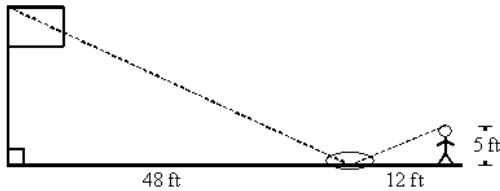
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51. Factor completely:  $t^2 + 4t - 32$

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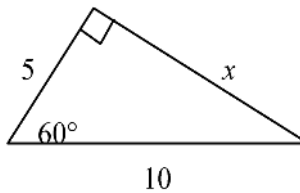
## Geometry Review

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.

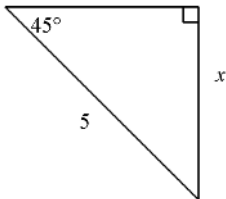


- A. 20 ft                      B. 38.4 ft                      C. 55 ft                      D. 25 ft
- 

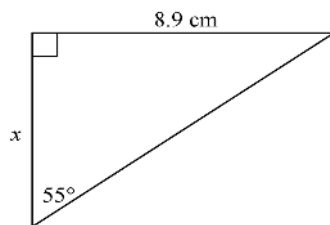
53. \_\_\_\_\_ Find the value of the variable(s). If your answer is not an integer, leave it in simplest radical form.



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

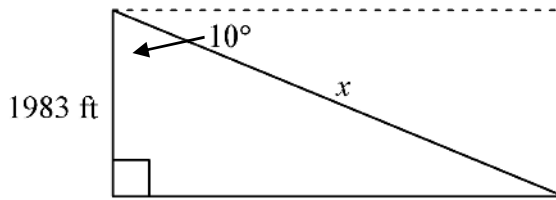


55. \_\_\_\_\_ Use a trigonometric ratio to find the value of  $x$ . Round your answer to the nearest tenth.



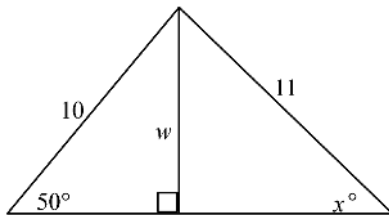
- A. 6.2 cm    B. 12.7 cm  
C. 15.5 cm    D. 10.9 cm
-

56. \_\_\_\_ To approach the runway, a pilot of a small plane must begin a  $10^\circ$  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  $5000\pi \text{ m}^3$ . What is the surface area of the sphere to the nearest square meter?

- A.  $62,832 \text{ m}^2$     B.  $1517 \text{ m}^2$     C.  $3033 \text{ m}^2$     D.  $195 \text{ m}^2$

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](http://www.Mathbitsnotebook.com)

[www.coolmath.com](http://www.coolmath.com)

[www.ck12.org](http://www.ck12.org)