1. Simplify the expression using the product rule for square roots. $\sqrt{59400}$

A. $6\sqrt{70}$

B. $2\sqrt{11}$

C. $30\sqrt{66}$

D. $\sqrt{30}$

E. 2

F. $3\sqrt{5}$

G. $15\sqrt{3}$

H. $\sqrt{210}$

2. Simplify the expression by rationalizing the denominator. $\frac{21}{\sqrt{13}}$

A. $\frac{13}{13\sqrt{21}}$

B. $\frac{21\sqrt{13}}{13}$

C. $\frac{21\sqrt{21}}{13}$

D. $\frac{21\sqrt{13}}{21}$

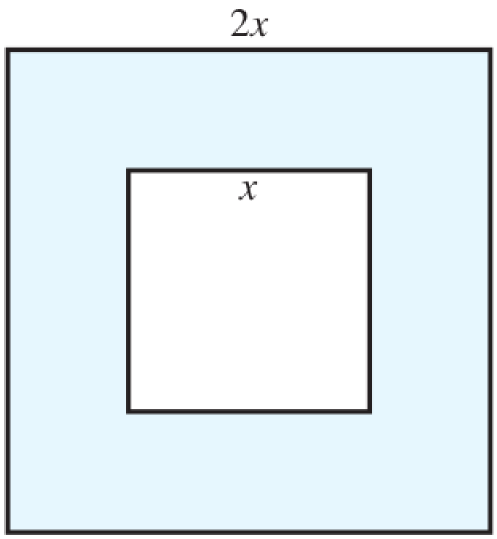
E. $\frac{13\sqrt{21}}{21}$

F. $\frac{13}{21\sqrt{13}}$

G. $\frac{13\sqrt{13}}{21}$

H. $\frac{13\sqrt{21}}{13}$

3. Framing a Print A square print is surrounded by a mat and then framed. The width of the square mat is twice that of the print. If the area covered by the mat is 507 in^2, determine the width of the print.



A. The width of the print is 9 in.

B. The width of the print is 11 in.

C. The width of the print is 10 in.

D. The width of the print is 3 in.

E. The width of the print is 13 in.

F. The width of the print is 14 in.

G. The width of the print is 7 in.

H. The width of the print is 8 in.

4. Complete the square by filling in the missing number. $c^2 + 11c +$ ________

A. $\frac{121}{4}$

B. 4

C. 81

D. $\frac{225}{4}$

E. $\frac{49}{4}$

F. $\frac{361}{4}$

G. 9

H. 1

5. Solve the quadratic equation. Leave the radical unsimplified. $-3c^2 + 9c - 9 = 0$

A. $c = \frac{9 \pm \sqrt{15}}{-6}$

B. $c = \frac{9 \pm \sqrt{29}}{-6}$

C. $c = \frac{-9 \pm \sqrt{27}}{-6}$

D. $c = \frac{9 \pm \sqrt{17}}{6}$

E. $c = \frac{-9 \pm \sqrt{12}}{-6}$

F. $c = \frac{-9 \pm \sqrt{193}}{-6}$

G. $c = \frac{9 \pm \sqrt{176}}{6}$

H. This equation has no real number solutions.

6. Solve the quadratic equation and completely simplify your answer. $4\beta^2 + 12\beta - 51 = 0$

A. $\beta = \frac{-3 \pm 2\sqrt{5}}{2}$

B. $\beta = \frac{3 \pm \sqrt{15}}{2}$

C. $\beta = \frac{-3 \pm 2\sqrt{3}}{2}$

D. $\beta = \frac{-3 \pm 2\sqrt{15}}{2}$

E. $\beta = \frac{3 \pm 3\sqrt{10}}{2}$

F. $\beta = \frac{3 \pm \sqrt{30}}{2}$

G. $\beta = \frac{-3 \pm 6\sqrt{5}}{2}$

H. $\beta = \frac{3 \pm 1}{2}$

7. If the bottom of a 18-ft ladder is 7 ft from the base of the chimney, how far is it from the bottom of the chimney to the top of the ladder? Round your answer to the nearest tenth.

A. The ladder reaches about 16.7 feet up the chimney.

B. The ladder reaches about 16 feet up the chimney.

C. The ladder reaches about 15.7 feet up the chimney.

D. The ladder reaches about 16.8 feet up the chimney.

E. The ladder reaches about 16.2 feet up the chimney.

F. The ladder reaches about 17.4 feet up the chimney.

G. The ladder reaches about 16.9 feet up the chimney.

H. The ladder reaches about 16.6 feet up the chimney.

8. The size of a computer monitor is usually given as the length of a diagonal of the screen. A new computer comes with a 15-in monitor (diagonal length). Give the height of the screen if the width is 12 in.

A. The height of the screen is about 9.7 inches.

B. The height of the screen is about 9.6 inches.

C. The height of the screen is about 8.5 inches.

D. The height of the screen is about 9.3 inches.

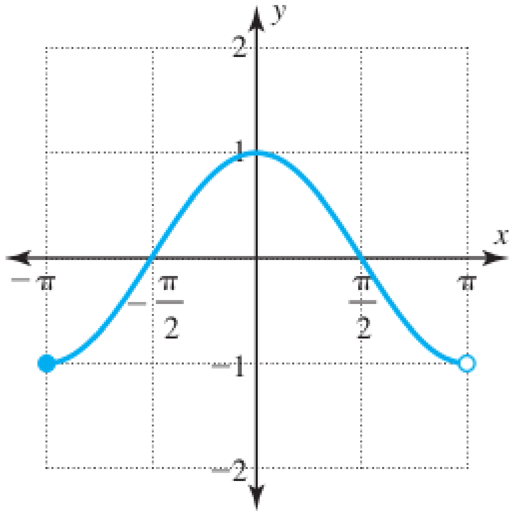
E. The height of the screen is about 8.6 inches.

F. The height of the screen is about 9 inches.

G. The height of the screen is about 9.1 inches.

H. The height of the screen is about 8.7 inches.

9. Use the given graph to determine the domain and range of the function.



A. The domain is $D = [-1, 1]$ and the range is $R = [-\pi, \pi]$.

B. The domain is $D = (-\pi, \pi]$ and the range is $R = [-1, 1]$.

C. The domain is $D = [-\pi, \pi)$ and the range is $R = [-1, 1]$.

D. The domain is $D = [-1, 1]$ and the range is $R = (-\pi, \pi]$.

E. The domain is $D = [-1, 1]$ and the range is $R = (-\pi, \pi)$.

F. The domain is $D = [-\pi, \pi]$ and the range is $R = [-1, 1]$.

G. The domain is $D = [-1, 1]$ and the range is $R = [-\pi, \pi)$.

H. The domain is $D = (-\pi, \pi)$ and the range is $R = [-1, 1]$.

10. Determine whether the relation below is a function. If it is a function, identify the domain and range.

x	y
-2	-8
-1	1
0	0
1	1
2	8

A. The relation is not a function.

B. The relation is a function with domain $D = \{-2, -1, 1, 2\}$ and range $R = \{-8, 1, 1, 8\}$.

C. The relation is a function with domain $D = \{-8, 1, 0, 1, 8\}$ and range $R = \{-2, -1, 0, 1, 2\}$.

D. The relation is a function with domain $D = \{-8, 1, 1, 8\}$ and range $R = \{-2, -1, 1, 2\}$.

E. The relation is a function with domain $D = \{-2, -1, 0, 1, 2\}$ and range $R = \{-8, 1, 0, 1, 8\}$.

11. The main fuel tank on one aircraft contains 3700 gal of jet fuel when fuel begins to be pumped from this tank. The volume of fuel remaining in the tank x minutes after the fuel pump has been turned on is displayed in the table.

x minutes	y gallons
0	3700
7	3602
14	3504
21	3406
28	3308

(a.) Determine the slope of the line containing these points. (b.) Interpret the meaning of the slope from part (a.). (c.) Write a function f so that $f(x)$ gives the number of gallons of fuel left after x minutes. Caution: be careful with units.

A. (a.) The slope is -14 gallons/second. (b.) This means that for every second of travel, the volume of fuel in the tank will decrease by 14 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = -14x + 3700$.

B. (a.) The slope is 14 gallons/second. (b.) This means that for every second of travel, the volume of fuel in the tank will decrease by 14 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = 14x + 3700$.

C. (a.) The slope is -14 gallons/minute. (b.) This means that for every minute of travel, the volume of fuel in the tank will decrease by 14 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = -14x + 3700$.

D. (a.) The slope is 14 gallons/minute. (b.) This means that for every minute of travel, the volume of fuel in the tank will decrease by 14 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = 14x + 3700$.

E. (a.) The slope is -23 gallons/minute. (b.) This means that for every minute of travel, the volume of fuel in the tank will decrease by 23 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = -23x + 3700$.

F. (a.) The slope is 23 gallons/second. (b.) This means that for every second of travel, the volume of fuel in the tank will decrease by 23 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = 23x + 3700$.

G. (a.) The slope is -23 gallons/second. (b.) This means that for every second of travel, the volume of fuel in the tank will decrease by 23 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = -23x + 3700$.

H. (a.) The slope is 23 gallons/minute. (b.) This means that for every minute of travel, the volume of fuel in the tank will decrease by 23 gallons. (c.) The amount of fuel in terms of travel time is given by the function $f(x) = 23x + 3700$.

12. Write the equation of the line passing through the points $(4, -1)$, $(4, -3)$.

A. $x = 4$

B. $y = 4$

C. $x = -3$

D. $x = -5$

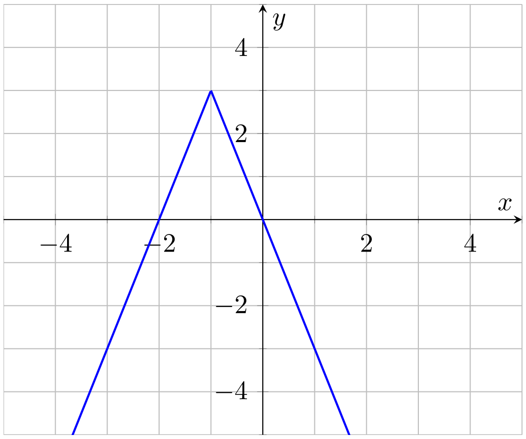
E. $y = -3$

F. $x = -1$

G. $y = -1$

H. $y = -5$

13. Find the vertex of the absolute value function $f(x)$ graphed below.



A. The vertex is $(-1, -3)$.

B. The vertex is $(0, 1)$.

C. The vertex is $(1, -3)$.

D. The vertex is $(1, 3)$.

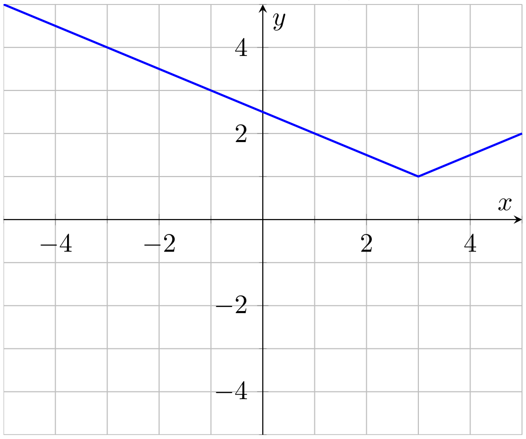
E. The vertex is $(4, 4)$.

F. The vertex is $(0, 0)$.

G. The vertex is $(-1, 3)$.

H. The vertex is $(-4, 4)$.

14. Find the domain and range of the of the absolute value function $f(x)$ graphed below.



A. The domain is $D = \mathbb{R}$ and the range is $R = [-1, \infty)$.

B. The domain is $D = \mathbb{R}$ and the range is $R = [1, \infty)$.

C. The domain is $D = \mathbb{R}$ and the range is $R = (-\infty, -1]$.

D. The domain is $D = [1, \infty)$ and the range is $R = \mathbb{R}$.

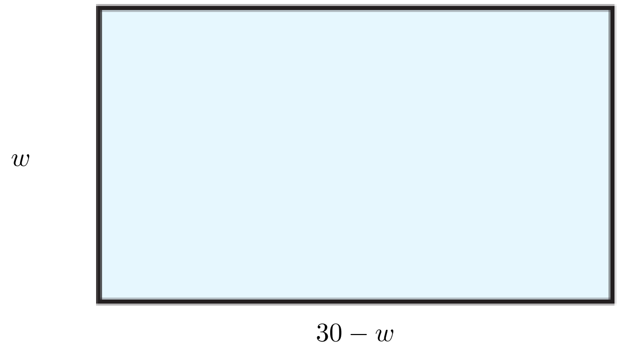
E. The domain is $D = (-\infty, -1]$ and the range is $R = \mathbb{R}$.

F. The domain is $D = [-1, \infty)$ and the range is $R = \mathbb{R}$.

G. The domain is $D = \mathbb{R}$ and the range is $R = (-\infty, 1]$.

H. The domain is $D = (-\infty, 1]$ and the range is $R = \mathbb{R}$.

15. Billy Bob wants to build a rectangular pen for his prize-winning pigs. He has a total of 60 feet of fencing. Find the length and width which maximize the area of his pig-pen.



A. The length and width which maximize the area of the pen are 17 feet and 13 feet. The maximum area is 221 square feet.

B. The length and width which maximize the area of the pen are 10 feet and 40 feet. The maximum area is 400 square feet.

C. The length and width which maximize the area of the pen are 7 feet and 37 feet. The maximum area is 259 square feet.

D. The length and width which maximize the area of the pen are 9 feet and 39 feet. The maximum area is 351 square feet.

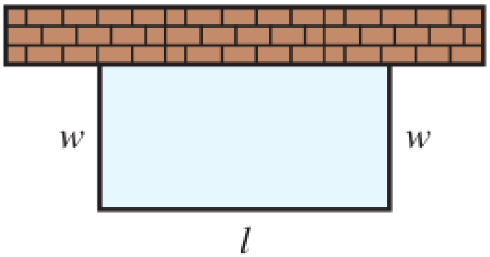
E. The length and width which maximize the area of the pen are 15 feet and 15 feet. The maximum area is 225 square feet.

F. The length and width which maximize the area of the pen are 18 feet and 12 feet. The maximum area is 216 square feet.

G. The length and width which maximize the area of the pen are 3 feet and 33 feet. The maximum area is 99 square feet.

H. The length and width which maximize the area of the pen are 16 feet and 14 feet. The maximum area is 224 square feet.

16. Wanda wants to build a rectangular pen for her prize-winning peafowl against the side of her house. She has a total of 64 feet of fencing. Find the length and width which maximize the area of her pen.



A. The length and width which maximize the area of the pen are 15 feet and 30 feet. The maximum area is 450 square feet.

B. The length and width which maximize the area of the pen are 5 feet and 10 feet. The maximum area is 50 square feet.

C. The length and width which maximize the area of the pen are 24 feet and 48 feet. The maximum area is 1152 square feet.

D. The length and width which maximize the area of the pen are 4 feet and 8 feet. The maximum area is 32 square feet.

E. The length and width which maximize the area of the pen are 26 feet and 52 feet. The maximum area is 1352 square feet.

F. The length and width which maximize the area of the pen are 19 feet and 38 feet. The maximum area is 722 square feet.

G. The length and width which maximize the area of the pen are 7 feet and 14 feet. The maximum area is 98 square feet.

H. The length and width which maximize the area of the pen are 16 feet and 32 feet. The maximum area is 512 square feet.

17. Find the y-intercept, x-intercepts, and vertex of the parabola $f(x) = 4x^2 + 8x + 3$.

A. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-4, -1)$.

B. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-1, -4)$.

C. The y-intercept is $(0, 3)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-4, -4)$.

D. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-4, -4)$.

E. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-4, -4)$.

F. The y-intercept is $(0, 3)$. The x-intercepts are $(-\frac{3}{2}, 0)$ and $(-\frac{1}{2}, 0)$. The vertex is $(-1, -1)$.

G. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{3}{2}, 0)$ and $(-\frac{7}{2}, 0)$. The vertex is $(-4, -4)$.

H. The y-intercept is $(0, 0)$. The x-intercepts are $(-\frac{9}{2}, 0)$ and $(-\frac{1}{2}, 0)$. The vertex is $(-1, -4)$.

18. Find the interval on which the absolute value function $f(x) = 0.5|x + 1| + 2$ is increasing.

A. The function $f(x)$ is increasing on $(-\infty, 1)$.

B. The function $f(x)$ is increasing on $(-\infty, 3) \cup (-5, \infty)$

C. The function $f(x)$ is increasing on $(1, \infty)$.

D. The function $f(x)$ is increasing on $(-\infty, -5) \cup (3, \infty)$

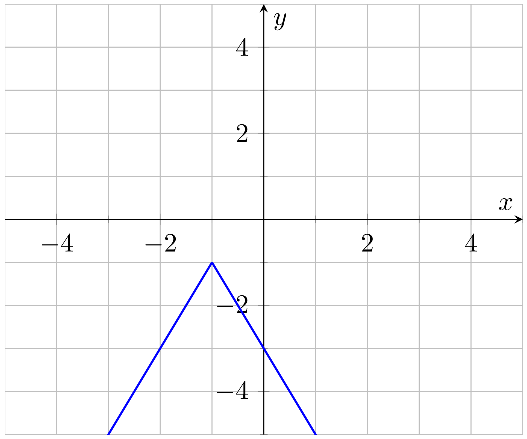
E. The function $f(x)$ is increasing on $(-5, 3)$

F. The function $f(x)$ is increasing on $(3, -5)$

G. The function $f(x)$ is increasing on $(-\infty, -1)$.

H. The function $f(x)$ is increasing on $(-1, \infty)$.

19. Find the interval on which the absolute value function $f(x)$ graphed below is decreasing.



A. The function $f(x)$ is decreasing on $(-1, \infty)$.

B. The function $f(x)$ is decreasing on $(-\infty, -1)$.

C. The function $f(x)$ is decreasing on $(-\infty, 1)$.

D. The function $f(x)$ is decreasing on $(-\infty, -1.5) \cup (-0.5, \infty)$

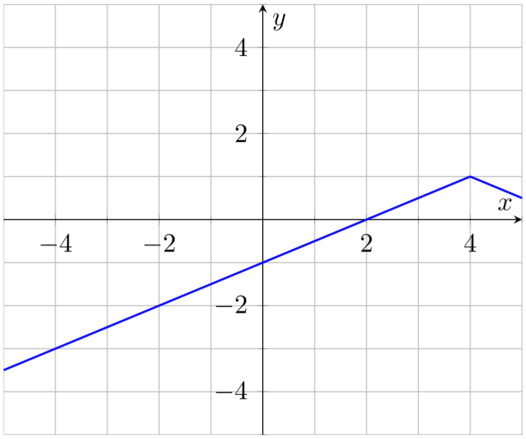
E. The function $f(x)$ is decreasing on $(-\infty, -0.5) \cup (-1.5, \infty)$

F. The function $f(x)$ is decreasing on $(-0.5, -1.5)$

G. The function $f(x)$ is decreasing on $(1, \infty)$.

H. The function $f(x)$ is decreasing on $(-1.5, -0.5)$

20. Find the interval on which the absolute value function $f(x)$ graphed below is increasing.



A. The function $f(x)$ is increasing on $(4, \infty)$.

B. The function $f(x)$ is increasing on $(-\infty, 2) \cup (6, \infty)$

C. The function $f(x)$ is increasing on $(6, 2)$

D. The function $f(x)$ is increasing on $(-\infty, -4)$.

E. The function $f(x)$ is increasing on $(2, 6)$

F. The function $f(x)$ is increasing on $(-4, \infty)$.

G. The function $f(x)$ is increasing on $(-\infty, 4)$.

H. The function $f(x)$ is increasing on $(-\infty, 6) \cup (2, \infty)$

Answers

1. C.
2. B.
3. E.
4. A.
5. H.
6. D.
7. H.
8. F.
9. C.
10. E.
11. C.
12. A.
13. G.
14. B.
15. E.
16. H.
17. F.
18. H.
19. A.
20. G.