

1. Approximate the solution to  $8x^3 + 12x^2 + 6x + 1 = 5$ .

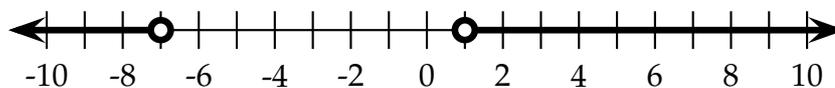
**Possibilities:**

- (a)  $x \approx 0.1713$
  - (b)  $x \approx -0.0770$
  - (c)  $x \approx 0.1775$
  - (d)  $x \approx 0.3550$
  - (e)  $x \approx 5.0000$
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2. Suppose you want to graph  $(y - 1)(x + 11) = x$  on your graphing calculator. What should you enter into your calculator?

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3. Find the inequality that corresponds to the number line below.



**Possibilities:**

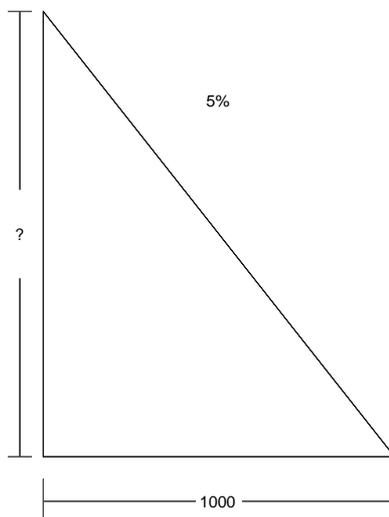
- (a)  $|x + 3| < 4$
  - (b)  $|x - 3| > 4$
  - (c)  $|x + 3| > 4$
  - (d)  $|x - 4| > 3$
  - (e)  $|x - 4| < 3$
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4. Solve the inequality  $x^2 - x - 39 \geq -9$ . Write the solution set in interval notation.

**Possibilities:**

- (a)  $(-\infty, -9]$
  - (b)  $[-9, \infty)$
  - (c)  $(-\infty, -6] \cup [5, \infty)$
  - (d)  $[-5, 6]$
  - (e)  $(-\infty, -5] \cup [6, \infty)$
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5. When you are traveling in the mountains, you will often see signs about the grade of the road. If you are traveling downhill and you see a sign indicating that the road has a 7 percent grade, then the slope of the road is  $\frac{-7}{100}$ . Suppose you are traveling downhill on a road with a 5 percent grade. If your horizontal distance has changed by 800 feet, how far have you descended?



**Possibilities:**

- (a) 40 feet
  - (b) 140 feet
  - (c) 190 feet
  - (d) -10 feet
  - (e) 90 feet
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6. Suppose you want to graph  $4x - 2y + 14 = 0$  on your graphing calculator. What should you enter into your calculator?
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7. How many solutions does the following system of equations have?

$$\begin{cases} 6x + 27y = 36 \\ -4x + 18y = 24 \end{cases}$$

**Possibilities:**

- (a) No solutions
- (b) One solution
- (c) Two solutions
- (d) Three solutions
- (e) Infinitely many solutions

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8. Let  $f(x) = 2x^2 + 6x$ . Find  $\frac{f(x+h) - f(x)}{h}$ .

**Possibilities:**

- (a)  $2h^2 + 6h$
- (b)  $-4x - 2h - 6$
- (c)  $\frac{2h^2 + 6h}{h}$
- (d)  $4x + 2h + 6$
- (e)  $\frac{4xh + 2h^2 + 12x + 6h}{h}$

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9. Suppose you need to solve a system of equations in which one equation is  $y = \sqrt{x}$  and the other equation represents a line. How many solutions could your system have?

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10. Solve the inequality.

$$\frac{x+8}{x-7} \geq 0$$

**Possibilities:**

- (a)  $[-8, 7)$
  - (b)  $(-\infty, -8) \cup (7, \infty)$
  - (c)  $(-\infty, -8] \cup (7, \infty)$
  - (d)  $(-8, 7)$
  - (e)  $[-8, 7]$
-

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11. Solve the inequality.

$$\frac{x+2}{x-5} \geq 0$$

**Possibilities:**

- (a)  $(-\infty, -2] \cup (5, \infty)$
- (b)  $[-2, 5)$
- (c)  $(-\infty, -2) \cup (5, \infty)$
- (d)  $(-2, 5)$
- (e)  $[-2, 5]$

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12. Carol has \$4000. She invests  $x$  dollars at a simple interest rate of 6% and the rest of her money at a simple interest rate of 5%. After one year, the total interest earned on these investments is \$215.00. Which of the equations below would you solve to find  $x$ ?

**Possibilities:**

- (a)  $0.06x \times 0.05(4000 - x) = 215.00$
- (b)  $6x + 5(4000 - x) = 215.00$
- (c)  $\frac{x}{6} + \frac{4000 - x}{5} = 215.00$
- (d)  $0.06x + 0.05(4000 - x) = 215.00$
- (e)  $\frac{x}{0.06} + \frac{4000 - x}{0.05} = 215.00$

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13. Solve the inequality.

$$(x+4)(x-2) \geq 0$$

**Possibilities:**

- (a)  $[-4, 2]$
  - (b)  $(-4, 2)$
  - (c)  $(-\infty, -4) \cup (2, \infty)$
  - (d)  $(-\infty, \infty)$
  - (e)  $(-\infty, -4] \cup [2, \infty)$
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14. What quantity,  $x$ , of a 30% acid solution must be mixed with a 25% acid solution to produce 2500 mL of a 26.4% solution?

**Possibilities:**

- (a) 500 mL
- (b) 900 mL
- (c) 700 mL
- (d) 600 mL
- (e) 800 mL

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15. Solve the inequality.

$$\frac{x + 5}{x - 6} \geq 0$$

**Possibilities:**

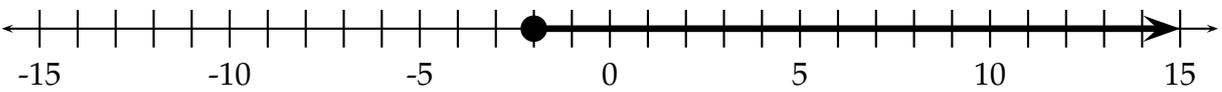
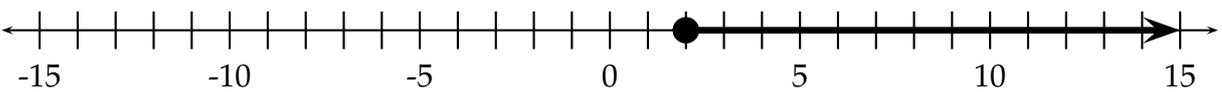
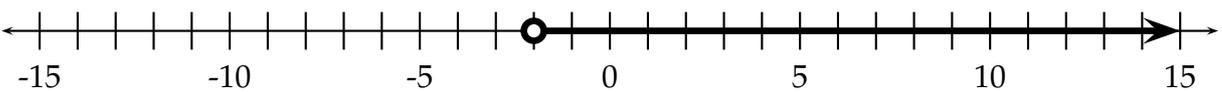
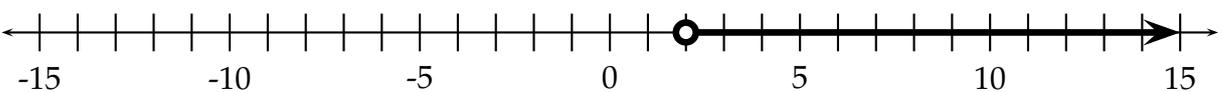
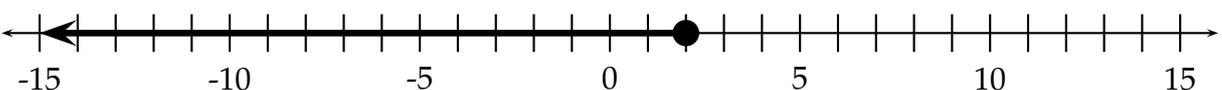
- (a)  $(-\infty, -5] \cup (6, \infty)$
- (b)  $(-\infty, -5) \cup (6, \infty)$
- (c)  $[-5, 6)$
- (d)  $[-5, 6]$
- (e)  $(-5, 6)$

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16. Solve the inequality and graph the solution set on the real number line.

$$15 - 2x \geq 11$$

**Possibilities:**

- (a) 
- (b) 
- (c) 
- (d) 
- (e) 

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17.

$$f(x) = \begin{cases} x + 2 & \text{if } x \leq 3 \\ x - 2 & \text{if } x > 3 \end{cases}$$

Find  $f(5)$ .

**Possibilities:**

- (a)  $\frac{7}{3}$
  - (b) Both 7 and 3.
  - (c) 21
  - (d) 7
  - (e) 3
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18. Let  $f(x) = \sqrt{8 - x}$ . Find the domain of  $f(x)$ .

**Possibilities:**

- (a)  $(-8, \infty)$
  - (b)  $(-\infty, 8)$
  - (c)  $(-\infty, 8]$
  - (d)  $(-\infty, -8) \cup (8, \infty)$
  - (e)  $[8, \infty)$
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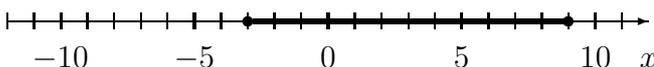
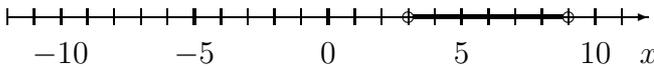
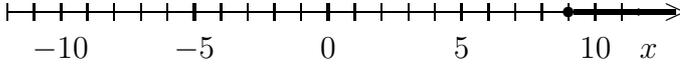
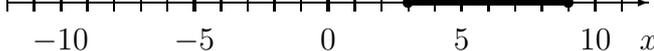
19. Suppose you need to solve a system of equations in which one equation is  $y = |x|$  and the other equation represents a line. How many solutions could your system have?

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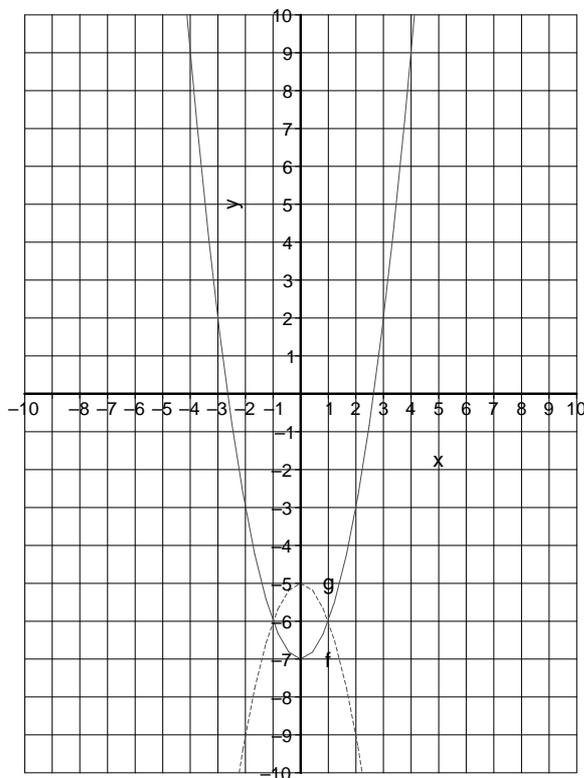
20. Solve the inequality and graph the solution set on the real number line.

$$|x - 3| \leq 6$$

**Possibilities:**

- (a) 
  - (b) 
  - (c) 
  - (d) 
  - (e) 
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21. In the graph below, the solid graph is the graph of  $y = f(x)$  and the dashed graph is the graph of  $y = g(x)$ . Which of the following statements are true?



**(I)**  $f(0) < g(0)$

**(II)**  $f(1) = g(1)$

**(III)**  $f(2) > g(2)$

**Possibilities:**

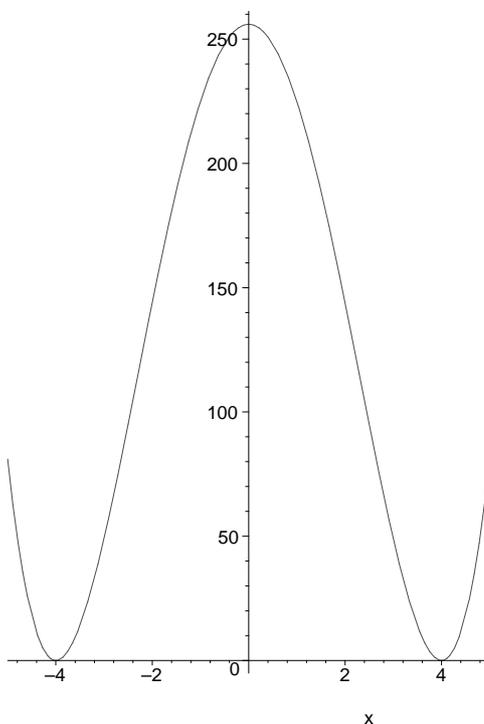
- (a) **(I)**, **(II)**, and **(III)** are all true.
- (b) Only **(I)** is true.
- (c) None of the statements are true.
- (d) Only **(II)** is true.
- (e) Only **(I)** and **(III)** are true.

22. Find all the solutions of the system of equations.

$$\begin{cases} -3x + y = 4 \\ x^2 - 10x - y = -44 \end{cases}$$

23. Let  $f(x) = |x - 4|$ . Evaluate  $f(7 - 9)$ .

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24. The graph of  $y = f(x)$  is shown below. Use the graph to find the solutions of  $f(x) = 0$ . (HINT: All of the solutions are integers.)



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25. Solve the inequality.

$$(x + 8)(x - 7) < 0$$

**Possibilities:**

- (a)  $(-8, 7)$
- (b)  $[-8, 7]$
- (c)  $(-\infty, \infty)$
- (d)  $(-\infty, -8) \cup (7, \infty)$
- (e)  $(-\infty, -8] \cup [7, \infty)$

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26. Let  $f(x) = 4x + 7$ . Find  $\frac{f(x+h) - f(x)}{h}$ .
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27. Find the interval on the Celsius scale corresponding to a Fahrenheit temperature between  $30^{\circ}F$  and  $110^{\circ}F$ . Recall that the relationship between degrees Celsius ( $C$ ) and degrees Fahrenheit ( $F$ ) is given by the equation  $F = \frac{9}{5}C + 32$ .

**Possibilities:**

- (a) The temperature is between about  $-1.11^{\circ}C$  and  $43.33^{\circ}C$ .
- (b) The temperature is between about  $-3.60^{\circ}C$  and  $140.40^{\circ}C$ .
- (c) The temperature is between about  $60.40^{\circ}C$  and  $204.40^{\circ}C$ .
- (d) The temperature is between about  $111.60^{\circ}C$  and  $255.60^{\circ}C$ .
- (e) The temperature is between about  $86.00^{\circ}C$  and  $230.00^{\circ}C$ .

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28. A ball is thrown straight upward at an initial speed of 96 ft/sec. From Physics it is known that, after  $t$  seconds, the ball reaches a height  $h$  feet given by the formula

$$h = -16t^2 + 96t.$$

When does the ball hit the ground?

**Possibilities:**

- (a) 3.00 sec
- (b) 144.00 sec
- (c) 6.00 sec
- (d) 196.30 sec
- (e) 4.30 sec

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29. Kayla earns \$8.50 per hour. If she works more than 40 hours in a week, she is paid time and a half (1.5 times her regular salary) for every hour over 40 hours. Her gross pay last week was \$403.75. How many hours did Kayla work last week?
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30. How many solutions does the following system of equation have?

$$\begin{cases} x = -1 \\ x^2 + y^2 = 4 \end{cases}$$

**Possibilities:**

- (a) No solutions
- (b) One solution
- (c) Two solutions
- (d) Three solutions
- (e) Infinitely many solutions

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31. How many solutions does the following system of equation have?

$$\begin{cases} x = -2 \\ x^2 + y^2 = 4 \end{cases}$$

**Possibilities:**

- (a) No solutions
- (b) One solution
- (c) Two solutions
- (d) Three solutions
- (e) Infinitely many solutions

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32. A chemist has two large containers of hydrochloric acid (HCl) solution. The concentration of the acid is different in the two containers. She blends 100 mL of the first solution with 300 mL of the second solution to obtain a solution that is 10.2500% acid. She blends 300 mL of the first solution with 200 mL of the second solution to obtain a solution that is 12.0000% acid. What are the concentrations of hydrochloric acid in the original containers?

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33. Let  $f(x) = 3x^2 + 2x + 1$ . Find  $\frac{f(x+h) - f(x)}{h}$

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34. Let  $f(x) = 3 + 6x - x^2$ . Find  $f(u + v)$ .

**Possibilities:**

- (a)  $3 + 6u + 6v - u^2 - 2uv - v^2$
  - (b)  $6 + 6u + 6v - u^2 - 2uv - v^2$
  - (c)  $6 + 6u - u^2 + 6v - v^2$
  - (d)  $(3 + 6x - x^2)(u + v)$
  - (e)  $3 + 6u - u^2 + 6v - v^2$
- 

35. Let  $f(x) = \sqrt{x - 2}$ . Find  $f(a + b)$ .

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36. Let  $f(x) = \frac{1}{\sqrt{x - 3}}$ . Find the domain of  $f(x)$ .

**Possibilities:**

- (a)  $(-3, \infty)$
  - (b)  $(3, \infty)$
  - (c)  $(-\infty, 3]$
  - (d)  $(-\infty, -3)$
  - (e)  $[3, \infty)$
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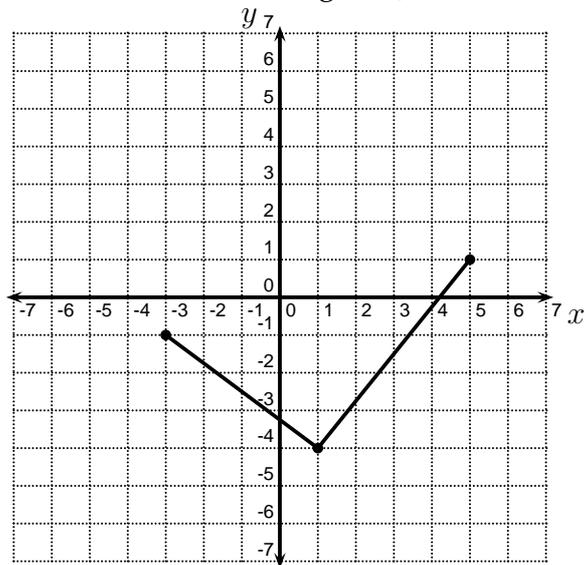
37. Joe the plumber charges a \$70 service fee plus \$50 per hour. If the total bill was \$220, how many hours did Ed work?

**Possibilities:**

- (a) 6 hours
  - (b) 4 hours
  - (c) 3 hours
  - (d) 5 hours
  - (e) 7 hours
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38. The graph of  $y = f(x)$  is shown below. Find the domain and range of  $f$ .



**Possibilities:**

- (a) Domain:  $[-1, 1]$   
Range:  $[-3, 5]$
- (b) Domain:  $[-4, 1]$   
Range:  $[-3, 5]$
- (c) Domain:  $[-3, 5]$   
Range:  $[-4, 1]$
- (d) Domain:  $[-3, 5]$   
Range:  $[-1, 1]$
- (e) Domain:  $[-3, 1]$   
Range:  $[-4, -1]$

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39. Let

$$f(x) = \begin{cases} |x + 1| & \text{if } x \leq -2 \\ x - 6 & \text{if } x > -2 \end{cases}$$

Find  $f(-7)$ .

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40. Let  $f(x) = \frac{x + 1}{\sqrt{x + 6}}$ . Find  $f(2)$ .

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41. What quantity,  $x$ , of a 55% acid solution must be mixed with a 20% acid solution to produce 800 mL of a 41.875% solution?

**Possibilities:**

- (a) 500 mL
  - (b) 700 mL
  - (c) 200 mL
  - (d) 600 mL
  - (e) 300 mL
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42. Find four consecutive integers whose sum is 266.

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43. Find all the solutions of the system of equations.

$$\begin{cases} x - 5y = 10 \\ -x + y^2 - 4y = -28 \end{cases}$$

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44. Find all the solutions of the system of equations, or state that there are no solutions.

$$\begin{cases} 7x + 6y = 6 \\ 8x + 6y = 3 \end{cases}$$

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45. A corner lot has dimensions 30 yards by 20 yards. The city plans to take a strip of uniform width along the two sides bordering the streets to widen these roads. How wide should the strip be if the remainder of the lot has an area of 416 square yards?

**Possibilities:**

- (a) 30 yards
  - (b) 416 yards
  - (c) -396 yards
  - (d) 415 yards
  - (e) 418 yards
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46. Which of the following windows is an appropriate viewing window for  $y = 18x - 3x^2$ ?

**Possibilities:**

- (a)  $-5 \leq x \leq 25, 0 \leq y \leq 20$
- (b)  $-10 \leq x \leq 10, -50 \leq y \leq 50$
- (c)  $-10 \leq x \leq 10, -10 \leq y \leq 10$
- (d)  $-30 \leq x \leq 15, -100 \leq y \leq 250$
- (e) None of the above windows gives a complete graph.

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47. A rectangle has an area of 30 square feet and a **diagonal** of 5 feet. Which system of equations would you solve to find the length  $l$  and width  $w$  of the rectangle?



**Possibilities:**

- (a)  $\begin{cases} lw = 30 \\ 2l^2 + 2w^2 = 25 \end{cases}$
- (b)  $\begin{cases} 2l + 2w = 30 \\ l^2 + w^2 = 25 \end{cases}$
- (c)  $\begin{cases} lw = 30 \\ 2l + 2w = 5 \end{cases}$
- (d)  $\begin{cases} lw = 30 \\ l^2 + w^2 = 25 \end{cases}$
- (e)  $\begin{cases} 2lw = 30 \\ l + w = 5 \end{cases}$

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48. Let

$$f(x) = \begin{cases} 8 & \text{if } x \leq -5 \\ 16 & \text{if } -5 < x < -1 \\ 24 & \text{if } x \geq -1 \end{cases}$$

Find  $f(-4) + f(0)$ .

**Possibilities:**

- (a) 32
- (b) 16
- (c) 24
- (d) 8
- (e) 40

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49. Approximate the solution to  $\frac{1}{\sqrt{x^2+1}} = \frac{1}{x+5}$ .

**Possibilities:**

- (a)  $x \approx -1.2062$
- (b)  $x \approx -2.4000$
- (c)  $x \approx -2.8320$
- (d)  $x \approx -1.2000$
- (e)  $x \approx 0.3846$

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50. Find all the solutions of the system of equations, or state that there are no solutions.

$$\begin{cases} 4x - 5y = -2 \\ 5x - 5y = 5 \end{cases}$$

**Possibilities:**

- (a)  $x = -17/20, y = -3/5$
- (b)  $x = 7, y = 6$
- (c)  $x = 4, y = -5$
- (d)  $x = 1, y = -1$
- (e)  $x = -2, y = 5$