

Evaluate each expression. $a = -9, b = \frac{1}{3}, c = 8, d = -6$

1.
$$\frac{db + 4c}{2a - d} = \frac{-6(\frac{1}{3}) + 4(8)}{2(-9) - (-6)} = \frac{30}{-12}$$

Answer: $-\frac{5}{2}$ OR -2.5

2.
$$2b(4a + a^2) = 2(\frac{1}{3})(4(-9) + (-9)^2)$$

$$(\frac{2}{3})(-36 + 81)$$

$$(\frac{2}{3})(45)$$

Answer: 30

Simplify each expression.

3.
$$7(m-3) - 5(m^2 + m)$$

$$7m - 21 - 5m^2 - 5m$$

$$-5m^2 + 2m - 21$$

Answer: $-5m^2 + 2m - 21$

4.
$$9x - \frac{1}{2}(4x - 14) + 31$$

$$9x - 2x + 7 + 31$$

Answer: $7x + 38$

Solve each equation.

5.
$$-\frac{2}{5}b + 10 = 14$$

$$-\frac{2}{5}b = 4$$

$$b = 4(-\frac{5}{2})$$

Answer: $b = -10$

6.
$$2x - 3(x+11) = -(x+10)$$

$$2x - 3x - 33 = -x - 10$$

$$-x - 33 = -x - 10$$

$$-33 = -10$$

Answer: no solution

7.
$$\frac{1}{2}(14x + 2) = 3(2 - 3x)$$

$$7x + 1 = 6 - 9x$$

$$16x = 5$$

$$x = \frac{5}{16}$$

Answer: $x = \frac{5}{16}$

8.
$$20 \left(\frac{3}{4}x - \frac{2}{5}x = \frac{7}{5} \right)$$

$$15x - 8x = 28$$

$$7x = 28$$

$$x = 4$$

Answer: $x = 4$

9. When solving a linear equation, what must occur to have an answer of all real numbers?

• The variable cancels out and values are equal.
 ...to have an answer of no solutions?

The variable cancels out and values are Not equal.

Solve each inequality.

10.
 $3(2 - m) < 2(2 - m) - m$
 $6 - 3m < 4 - 2m - m$
 $6 - 3m < 4 - 3m$
 $6 < 4$ False

Answer: no solutions

11.
 $2(x + 4) \geq -2(8 - 2x) + 10$
 $2x + 8 \geq -16 + 4x + 10$
 $2x + 8 \geq -6 + 4x$
 $14 \geq 2x$
 $7 \geq x$

Answer: $x \leq 7$

12.
 $-2 < 5(x + 1) + 2 < 2$
 $-2 < 5x + 5 + 2 < 2$
 $-2 < 5x + 7 < 2$
 $-9 < 5x < -5$
 $-9/5 < x < -1$

Answer: $-9/5 < x < -1$

Use the given information to answer the question.

13. **Amusement Park Trip** Your travel arrangements to an amusement park include a ground trip driving distance of 216 miles. The planned travel time is 4 hours. What must your average speed be to make the trip in the allotted time?

Speed = 54 mph

$$d = r \cdot t$$

$$216 = r \cdot 4$$

$$54 = r$$

14. **Photography Studio** A photography studio advertises a session with a sitting fee of \$8.95 per person. The standard package of pictures costs \$29.25. Write an expression that gives the total cost of a session with the purchase of one standard package.

Evaluate the expression if a family of four purchases this package.

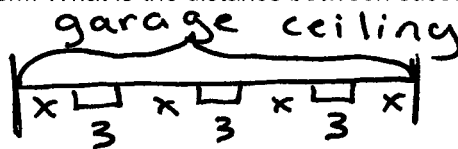
$$C = 8.95p + 29.25$$

let $p = \#$ of people

$$8.95(4) + 29.25$$

Expression for Total Cost = $C = 8.95p + 29.25$ Family of Four Cost = \$65.05

15. **Lighting Configuration** You want to install 3 ceiling lights in a row to improve the visibility in your garage. Each light is 3 feet long and your garage is 27 feet long. The distance between each light and between the lights and the walls should be the same. Draw a diagram to help solve this problem. What is the distance between successive lights?



$x = \text{distance}$

Distance = 4.5 feet

$$4x + 9 = 27$$

$$4x = 18$$

$$x = 4.5$$

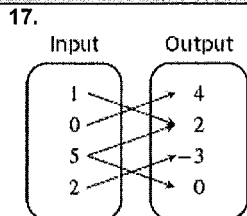
Identify the domain and range of the relation. Then, determine whether the relation is a function by answering Yes or No.

16.

x	-2	-1	4	0	2
y	1	1	1	1	1

Domain = -2, -1, 4, 0, 2 Range = 1

Function? YES NO

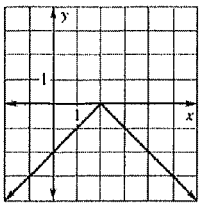


Domain = 1, 0, 5, 2 Range = 4, 2, -3, 0

Function? YES NO

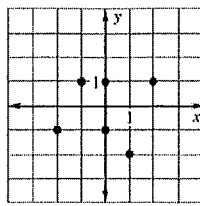
Use the vertical line test to determine whether the relation is a function. Answer Yes or No.

18.



Yes

19.



no

Evaluate the function for the given value of x .

20.

$$g(x) = -2x^3 - 18x$$

$$g(-5) = -2(-5)^3 - 18(-5) \\ = -2(-125) + 90$$

$$g(-5) = \underline{340} \quad (-5, 340)$$

21.

$$h(x) = \frac{35}{-2x + 23}$$

$$h(9) = \frac{35}{-2(9) + 23} = \frac{35}{5} = 7$$

$$h(9) = \underline{7} \quad (9, 7)$$

Find the slope of the line passing through the given points. Then tell whether the line rises, falls, is horizontal, or is vertical.

$$(8, 7), (8, 3)$$

$$\bullet \frac{3-7}{8-8} = \frac{-4}{0} = \text{undefined}$$

$$m = \underline{\text{no slope Vertical}}$$

$$23. \left(5, \frac{5}{2}\right), \left(\frac{7}{2}, \frac{9}{2}\right)$$

$$\frac{9/2 - 5/2}{7/2 - 1/2} = \frac{4/2}{6/2} = \frac{2}{3}$$

$$m = \underline{2/3} \quad \text{Rises up 2 + right 3}$$

Determine whether the lines are parallel, perpendicular, or neither.

24.

Line 1: through (7, 3), (8, 7)

Line 2: through (-5, -4), (-1, -5)

$$m_1 = \frac{7-3}{8-7} = \frac{4}{1}$$

$$m_2 = \frac{-5+4}{-1+5} = \frac{-1}{4}$$

opposite reciprocals

$$\text{Answer: } \underline{\text{perpendicular}}$$

25.

Line 1: through (5, 2), (1, -7)

Line 2: through (-1, 3), (9, -1)

$$m_1 = \frac{-7-2}{1-5} = \frac{-9}{-4} = 9/4$$

$$m_2 = \frac{-1-3}{9+1} = \frac{-4}{10} = -2/5$$

$$\text{Answer: } \underline{\text{neither}}$$

Use the information to write an equation of the line in slope-intercept form.

Slope-Intercept Form $y = mx + b$

Point-Slope Form $y - y_1 = m(x - x_1)$

Standard Form $Ax + By = C$

26.

$$m = -\frac{1}{2}, b = -14$$

$$\text{EQ: } \underline{y = -\frac{1}{2}x - 14}$$

27.

$m = -3$ through the point (-5, 11)

$$y - 11 = -3(x + 5)$$

$$y - 11 = -3x - 15$$

$$y = -3x - 4$$

$$\text{EQ: } \underline{y = -3x - 4}$$

28.

$m = \frac{4}{3}$ through the point $(-12, -7)$

$$y + 7 = \frac{4}{3}(x + 12)$$

$$y + 7 = \frac{4}{3}x + 16$$

$$y = \frac{4}{3}x + 9$$

EQ: $y = \frac{4}{3}x + 9$

29.

through the points $(2, -4)$ and $(7, 6)$

$$m = \frac{6 - (-4)}{7 - 2} = \frac{10}{5} = 2$$

$$y - 6 = 2(x - 7)$$

$$y - 6 = 2x - 14$$

$$y = 2x - 8$$

EQ: $y = 2x - 8$

30.

through the points $(-4, 9)$ and $(-7, 9)$

$$m = \frac{9 - 9}{-7 - (-4)} = 0$$

$$m = 0$$

$$y = 9$$

EQ: $y = 9$

31.

through the points $(11, 1)$ and $(11, 12)$

$$m = \frac{12 - 1}{11 - 11} = \frac{11}{0}$$

Vertical No Slope

$$x = 11$$

EQ: $x = 11$

32.

Parallel to $y = 5x - 8$, passes through $(2, -3)$

$$m = 5$$

$$y + 3 = 5(x - 2)$$

$$y + 3 = 5x - 10$$

EQ: $y = 5x - 13$

33.

Perpendicular to $y = \frac{1}{3}x$, passes through $(5, 3)$

$$m = -3$$

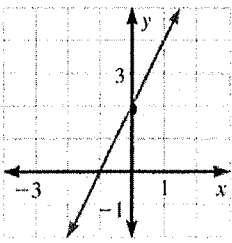
$$y - 3 = -3(x - 5)$$

$$y - 3 = -3x + 15$$

EQ: $y = -3x + 18$

Use the graph to write an equation of the line.

34.

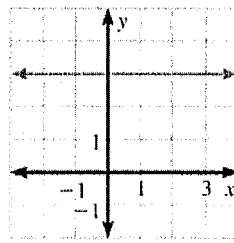


$$m = \frac{2}{1} = 2$$

$$b = 2$$

EQ: $y = 2x + 2$

35.



Horizontal

$$m = 0$$

EQ: $y = 3$

Use the information to graph the equation.

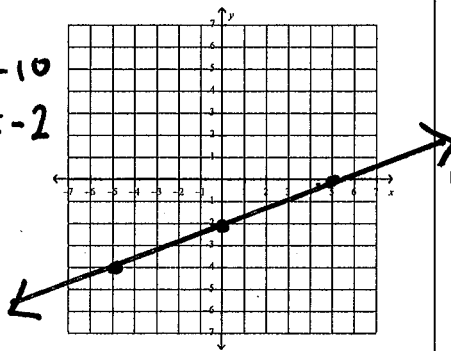
36. Graph using the slope and y-intercept

$$-2x + 5y = -10$$

$$5y = 2x - 10$$

$$y = \frac{2}{5}x - 2$$

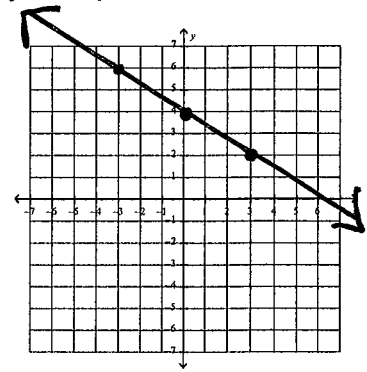
$m = \frac{2}{5}$ $b = -2$



37. Graph using the slope and y-intercept

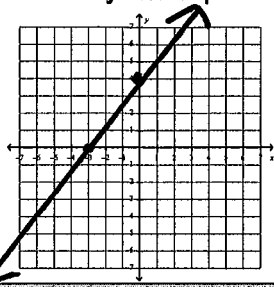
$$y = -\frac{2}{3}x + 4$$

$m = -\frac{2}{3}$ $b = 4$



38. Graph a line using the x- and y-intercept

x-intercept: -3
y-intercept: 4



39. Write the equation that is the translation of $y = |x|$ right 3 units and up 4 units.

Answer: $y = |x-3| + 4$

40. An absolute value equation b has an extraneous solution.

- a. always
- b. sometimes
- c. never

Solve the equation. Check for extraneous solutions.

41. $|x - 5| = 7$

$$\begin{aligned} x-5 &= 7 & x-5 &= -7 \\ x &= 12 & x &= -2 \end{aligned}$$

Answer: $x = 12$ or $x = -2$

42. $3|x + 1| - 3 = 15$

$$\begin{aligned} 3|x+1| &= 18 \\ |x+1| &= 6 \\ x+1 &= 6 & x+1 &= -6 \\ x &= 5 & x &= -7 \end{aligned}$$

Answer: $x = 5$ or $x = -7$

43. $4|4 - 3x| = 4x + 6$

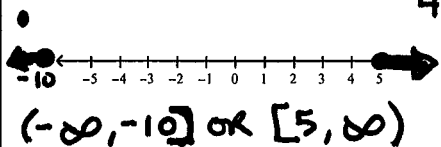
$$\begin{aligned} |4-3x| &= x + 3/2 \\ 4-3x &= x + 3/2 & 4-3x &= -x - 3/2 \\ 5/2 &= 4x & -2x &= -11/2 \\ 5/8 &= x & x &= 11/4 \end{aligned}$$

Answer: $x = 5/8$ or $x = 11/4$

Solve the inequality. Graph the solution. Show the interval notation.

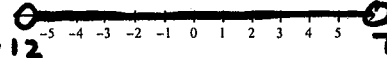
44. $|4x + 10| \geq 30$

$$\begin{aligned} 4x+10 &\geq 30 & \text{or} & & 4x+10 &\leq -30 \\ 4x &\geq 20 & & & 4x &\leq -40 \\ x &\geq 5 & \text{or} & & x &\leq -10 \end{aligned}$$



45. $|2x + 5| < 19$

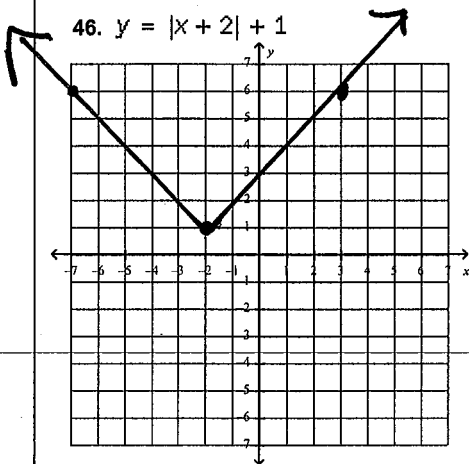
$$\begin{aligned} -19 &< 2x+5 < 19 \\ -24 &< 2x < 14 \\ -12 &< x < 7 \end{aligned}$$



Graph the Absolute Value equation. Be sure to include ALL of the following for each graph.

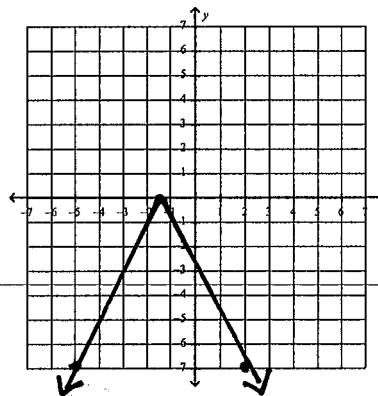
- A. Find the Vertex
- B. Graph the Function
- C. Find the Axis of Symmetry
- D. Does it stretch, if so by how much?
- E. State the domain and range.
- F. Describe end behavior.

46. $y = |x + 2| + 1$



47. $y = -|2x + 3|$

$$\begin{aligned} 2x+3 &= 0 \\ 2x &= -3 \\ x &= -3/2 \end{aligned}$$



A	$(-2, 1)$
B	See graph above
C	$x = -2$
D	no
E	Domain: $(-\infty, \infty)$ Range: $[1, \infty)$
F	As $x \rightarrow \infty, f(x) \rightarrow \infty$ As $x \rightarrow -\infty, f(x) \rightarrow \infty$

A	$(-3/2, 0)$
B	See graph above
C	$x = -3/2$
D	yes, by 2
E	Domain: $(-\infty, \infty)$ Range: $(-\infty, 0]$
F	As $x \rightarrow \infty, f(x) \rightarrow -\infty$ As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Solve the System of Equations using any method.

48.
$$\begin{cases} -3x - 5y = 3 \\ 3x - y = -3 \end{cases}$$

$$\begin{aligned} -6y &= 0 \\ y &= 0 \\ -3x &= 3 \\ x &= -1 \end{aligned}$$

Answer: $(-1, 0)$

49.
$$\begin{cases} 3x + 3y = -6 \\ 2x - 3y = -14 \end{cases}$$

$$\begin{aligned} 5x &= -20 \\ x &= -4 \\ 3(-4) + 3y &= -6 \\ -12 + 3y &= -6 \\ 3y &= 6 \\ y &= 2 \end{aligned}$$

Answer: $(-4, 2)$

50.
$$\begin{cases} -x - y = 7 \\ 2x + 2y = -14 \end{cases}$$

$$\begin{aligned} -y &= x + 7 \\ y &= -x - 7 \\ 2x + 2(-x - 7) &= -14 \\ 2x - 2x - 14 &= -14 \\ -14 &= -14 \end{aligned}$$

Same line

Answer: infinite solutions

51. A rental car agency charges a flat fee of \$24.00 plus \$2.00 per day to rent a certain car. Another agency charges a fee of \$18.75 plus \$3.75 per day to rent the same car. Write a system of equations to represent the cost c for renting a car at each agency for d days. Using a graphing calculator, find the number of days for which the costs are the same. Round your answer to the nearest whole day.

$$\begin{aligned} C &= 2d + 24 \\ C &= 3.75d + 18.75 \end{aligned}$$

$$\begin{aligned} 2(3) + 24 &= 30 \\ 3.75(3) + 18.75 &= 30 \end{aligned}$$

Answer: 3 days \$30.00 cost

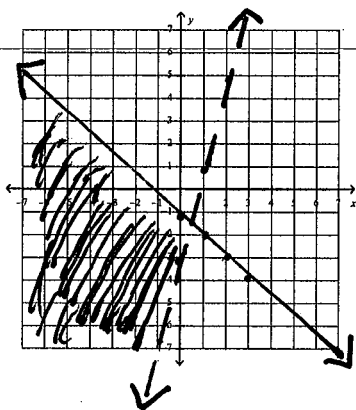
52. A group of 75 people attended a ball game. There were four times as many children as adults in the group. Set up a system of equations that represents the numbers of adults and children who attended the game and solve the system to find the number of children who were in the group.

$$\begin{aligned} a + 4a &= 75 & a + c &= 75 \\ 5a &= 75 & c &= 4a \\ a &= 15 & & \end{aligned}$$

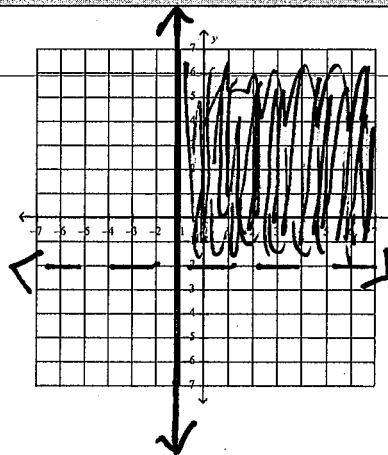
Answer: 15 # of Adults 60 # of children

Solve the system of Inequalities by graphing.

53.
$$\begin{cases} y \leq -x - 1 \\ y > 4x - 3 \end{cases}$$

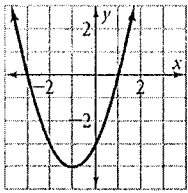


54.
$$\begin{cases} x \geq -1 \\ y > -2 \end{cases}$$



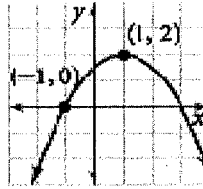
Identify the vertex, axis of symmetry, domain, and range of each parabola. Use Interval Notation.

55.



Vertex: $(-1, -4)$
 Axis of Symmetry: $x = -1$
 Domain: $(-\infty, \infty)$
 Range: $[-4, \infty)$

56.



Vertex: $(1, 2)$
 Axis of Symmetry: $x = 1$
 Domain: $(-\infty, \infty)$
 Range: $(-\infty, 2]$

Rewrite each function in standard form. Determine whether the function is linear or quadratic.

57.

$$2x(x+1) - 4 + x$$

$$2x^2 + 2x - 4 + x$$

$$2x^2 + 3x - 4$$

Standard Form:

$$y = 2x^2 + 3x - 4$$

Circle: Linear or Quadratic

58.

$$4x^2 + 12x + 9 - 4x^2 + 3$$

$$12x + 12$$

Standard Form:

$$y = 12x + 12$$

Circle: Linear or Quadratic

59.

$$(2x+3)(x-4)$$

$$y = 2x^2 - 8x + 3x - 12$$

$$y = 2x^2 - 5x - 12$$

Standard Form:

$$y = 2x^2 - 5x - 12$$

Linear or Quadratic

60.

$$3(x^2 - 2x) - 3(x^2 - 2)$$

$$3x^2 - 6x - 3x^2 + 6$$

$$-6x + 6$$

Standard Form:

$$y = -6x + 6$$

Linear or Quadratic

Factor the Following Polynomials.

61. $x^2 - 10x + 16$

Answer: $(x-8)(x-2)$

62. $x^2 - 7x - 18$

Answer: $(x-9)(x+2)$

63. $x^2 - 81$

Answer: $(x+9)(x-9)$

64. $x^2 - 7x + 12$

Answer: $(x-4)(x-3)$

65. $2x^2 + 7x - 15$

Answer: $(2x-3)(x+5)$

66. $x^2 - 14x + 49$

Answer: $(x-7)(x-7)$ or $(x-7)^2$

67. $2x^2 + 15x + 7$

Answer: $(2x+1)(x+7)$

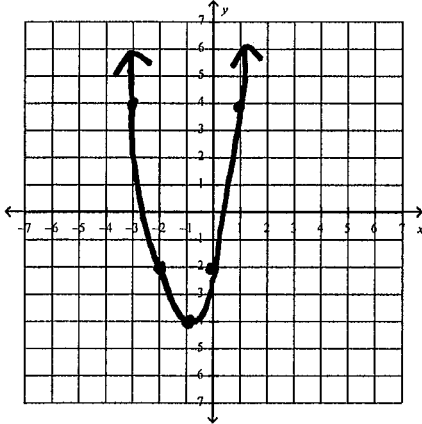
68. $9x^2 + 30x + 25$

Answer: $(3x+5)^2$

Graph the Quadratic equation. Be sure to include ALL of the following for each graph.

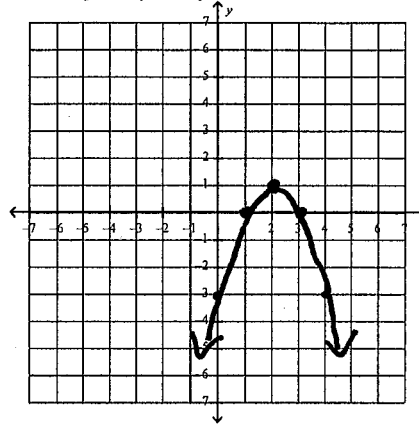
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69. $y = 2(x + 1)^2 - 4$



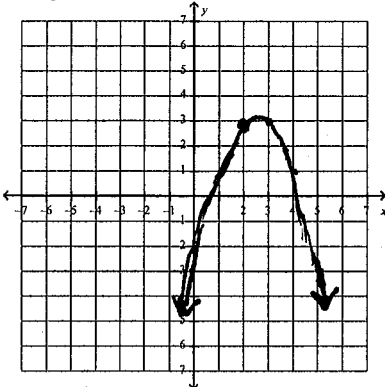
A	$(-1, -4)$
B	See graph above
C	$x = -1$
D	yes by 2
E	Domain: $(-\infty, \infty)$ Range: $[-4, \infty)$
F	As $x \rightarrow \infty, f(x) \rightarrow \infty$ As $x \rightarrow -\infty, f(x) \rightarrow \infty$

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



A	$(2, 1)$
B	See graph above
C	$x = 2$
D	no
E	Domain: $(-\infty, \infty)$ Range: $(-\infty, 1]$
F	As $x \rightarrow \infty, f(x) \rightarrow -\infty$ As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

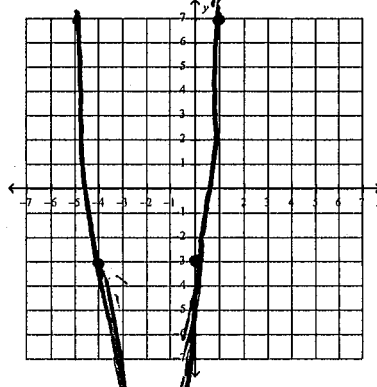
71. $y = -x^2 + 5x - 3$



$$\begin{aligned} -\frac{b}{2a} &= \frac{-5}{2(-1)} \\ &= 5/2 \\ -(5/2)^2 + 5(5/2) - 3 &= 13/4 \end{aligned}$$

A	$(2.5, 3.25)$
B	See graph above
C	$x = 2.5$
D	no
E	Domain: $(-\infty, \infty)$ Range: $(-\infty, 3.25]$
F	As $x \rightarrow \infty, f(x) \rightarrow -\infty$ As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

72. $y = 2x^2 + 8x - 3$



$$\begin{aligned} -\frac{b}{2a} &= \frac{-8}{4} = -2 \\ 2(-2)^2 + 8(-2) - 3 &= -11 \end{aligned}$$

A	$(-2, -11)$
B	See graph above
C	$x = -2$
D	yes, by 2
E	Domain: $(-\infty, \infty)$ Range: $[-11, \infty)$
F	As $x \rightarrow \infty, f(x) \rightarrow \infty$ As $x \rightarrow -\infty, f(x) \rightarrow \infty$

Solve the story problem.

73. The function $y = -16x^2 + 486$ models the heights y in feet of a stone t seconds after it is dropped from the edge of a vertical cliff. How long will it take the stone to hit the ground? Round to the nearest hundredth.

Answer: 5.51 seconds $0 = -16x^2 + 486$