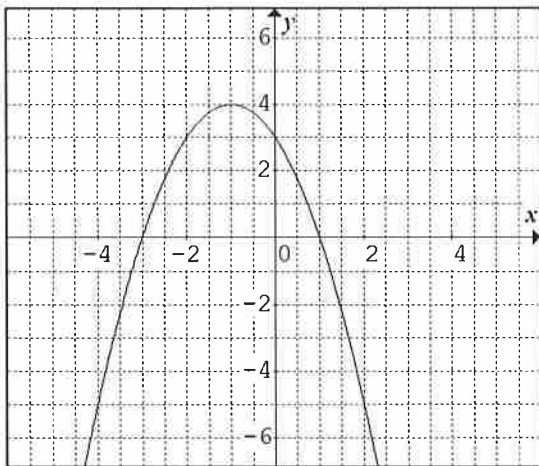


KEL

9-1 Quadratic Graphs and Their Properties

1. Given the quadratic graph below, identify the following:



a. Vertex: $(-1, 4)$ Is vertex max or min? max

b. Domain: \mathbb{R}

Range: $y \leq 4$

c. Equation of axis of symmetry: $x = -1$

2. Given the quadratic function $y = \frac{1}{2}x^2 - 8$

$x = \frac{-0}{2(\frac{1}{2})} = 0$

a. Choose appropriate values for x and complete the table below (min 5 points):

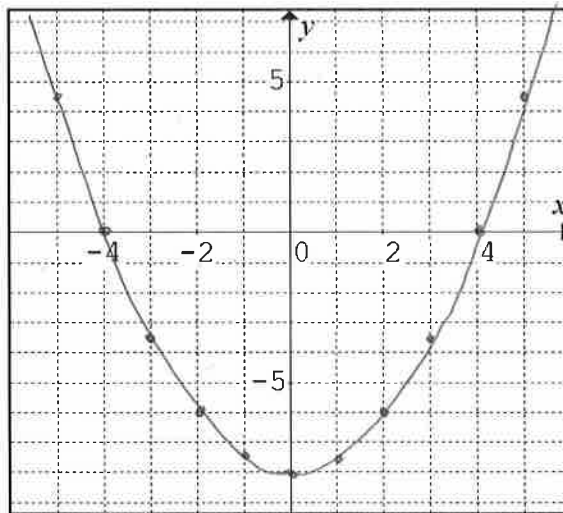
x	$y = \frac{1}{2}x^2 - 8$	y
-3	$\frac{1}{2}(-3)^2 - 8$	-3.5
-2	$\frac{1}{2}(-2)^2 - 8$	-6
-1	$\frac{1}{2}(-1)^2 - 8$	-7.5
0	$\frac{1}{2}(0)^2 - 8$	-8
1	$\frac{1}{2}(1)^2 - 8$	-7.5
2	$\frac{1}{2}(2)^2 - 8$	-6
3	$\frac{1}{2}(3)^2 - 8$	-3.5

vertex

$\frac{4}{5}$

0

b. Use your points to graph the function. Graph accurately to the edge of the grid.



3. Put the following quadratic functions in order from widest to narrowest:

$y = 2x^2, y = -\frac{1}{3}x^2, y = \frac{1}{4}x^2$

$y = \frac{1}{4}x^2, y = -\frac{1}{3}x^2, y = 2x^2$

454

9-2 Quadratic Functions

1. Suppose Daniel kicks a soccer ball up into the air with an initial velocity of 64 feet per second, and the ball is 2 ft above the ground when it is kicked. The formula that describes the height of the ball at any time t is $h = -16t^2 + 64t + 2$

a. What is the equation of the axis of symmetry for this function?

$$x = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2$$

$x = 2$

b. What are the coordinates of the vertex for this function?

$$y = -16(2)^2 + 64(2) + 2$$

$$= -64 + 128 + 2$$

$$= 66$$

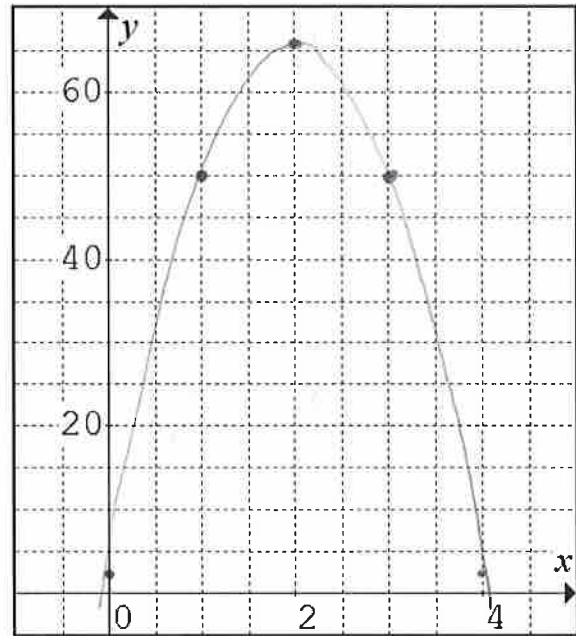
$(2, 66)$

c. Choose appropriate values for x and complete the table below (min 5 points):

t	$h = -16t^2 + 64t + 2$	h
0	$-16(0)^2 + 64(0) + 2$	2
1	$-16(1)^2 + 64(1) + 2$	50
2	$-16(2)^2 + 64(2) + 2$	66
3	$-16(3)^2 + 64(3) + 2$	50
4	$-16(4)^2 + 64(4) + 2$	2
5	$-16(5)^2 + 64(5) + 2$	-78

vertex

d. Use your points to graph the function.



e. What is the maximum height of the ball, and how long does it take to reach that height?

It takes 2 seconds for the ball to reach its maximum height of 66 ft.

9-4 Solving Quadratic Equations by Factoring

Solve each equation by factoring. Show all your work clearly. Circle your answers.

1. $(2a+1)(a-3)=0$

$2a+1=0$ or $a-3=0$

$2a = -1$

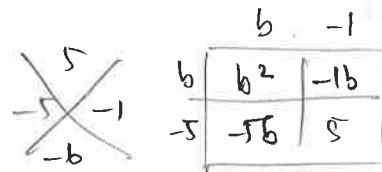
$a = -\frac{1}{2}$ or $a = 3$

2. $b^2 - 6b + 5 = 0$

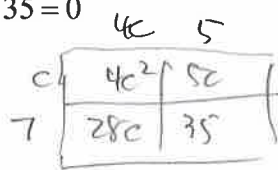
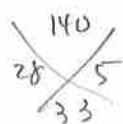
$(b-5)(b-1) = 0$

$b-5=0$ or $b-1=0$

$b = 5$ or $b = 1$



3. $4c^2 + 33c + 35 = 0$

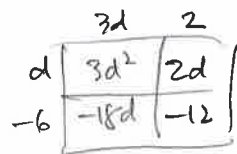


$(c+7)(4c+5) = 0$

$c+7=0$ or $4c+5=0$

$c = -7$ or $c = -\frac{5}{4}$

4. $3d^2 - 16d = 12$ $3d^2 - 16d - 12 = 0$



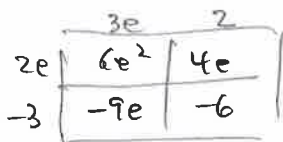
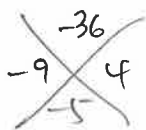
$(d-6)(3d+2) = 0$

$d-6=0$ or $3d+2=0$

$d = 6$ or $d = -\frac{2}{3}$

5. $6e^2 - 5e = 6$

$6e^2 - 5e - 6 = 0$



$(2e-3)(3e+2) = 0$

$2e-3=0$ or $3e+2=0$

$2e = 3$ $3e = -2$

$e = \frac{3}{2}$ or $e = -\frac{2}{3}$

9-5 Completing the Square

Answer each question as directed.

1. Find the missing value and complete the square:

$$x^2 + 18x + \underline{81} = (x + a)^2$$

\downarrow \nearrow
 9

2. Find the missing value and complete the square

$$x^2 - 12x + 36 = (x - 6)^2$$

\uparrow \swarrow
 6

Solve each quadratic equation by completing the square. Express your answer in simplest radical form.

3. $x^2 - 4x - 30 = 0$

$$\begin{array}{r} x^2 - 4x - 30 = 0 \\ +30 \quad +30 \\ \hline x^2 - 4x + 4 = 30 + 4 \end{array}$$

$$\sqrt{(x - 2)^2} = \sqrt{34}$$

$$\begin{array}{r} x - 2 = \pm\sqrt{34} \\ +2 \quad +2 \end{array}$$

$$x = 2 \pm \sqrt{34}$$

4. $x^2 + 59 = -16x$

$$\begin{array}{r} x^2 + 59 = -16x \\ +16x \quad +16x \\ \hline x^2 + 16x + 59 = 0 \end{array}$$

$$\begin{array}{r} x^2 + 16x + 59 = 0 \\ +64 \quad -59 \\ \hline x^2 + 16x + 64 = -59 + 64 \end{array}$$

$$\sqrt{(x + 8)^2} = \sqrt{5}$$

$$\begin{array}{r} x + 8 = \pm\sqrt{5} \\ -8 \quad -8 \end{array}$$

$$x = -8 \pm \sqrt{5}$$

5. $\frac{4x^2}{4} - \frac{8x}{4} - \frac{24}{4} = 0$

$$\begin{array}{r} x^2 - 2x - 6 = 0 \\ +6 \quad +6 \end{array}$$

$$\begin{array}{r} x^2 - 2x + 1 = 6 + 1 \end{array}$$

$$\sqrt{(x - 1)^2} = \sqrt{7}$$

$$\begin{array}{r} x - 1 = \pm\sqrt{7} \\ +1 \quad +1 \end{array}$$

$$x = 1 \pm \sqrt{7}$$

KEY

9-6 The Quadratic Formula

Answer each question as directed.

1. Given the quadratic equation

$$2x^2 - 16x = -25 \quad 2x^2 - 16x + 25 = 0$$

+25 +25

a. What value should be used for a in the quadratic formula?

$$a = 2$$

b. What value should be used for b in the quadratic formula?

$$b = -16$$

c. What value should be used for c in the quadratic formula?

$$c = 25$$

2. Given the quadratic equation

$$9x^2 + 12x + 4 = 0$$

a. What is the value of the discriminant?

$$b^2 - 4ac = (12)^2 - 4(9)(4)$$

$$= 144 - 144$$

$$= 0$$

b. Use the discriminant to tell how many solutions the equation will have.

$$1 \text{ solution}$$

Solve each quadratic equation using the quadratic formula. Give your answer in the form indicated.

3. Give your answer in simplified radical form.

$$x^2 - 2x = 4$$

-4 -4

$$x^2 - 2x - 4 = 0$$

$$a = 1, b = -2, c = -4$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-4)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4 + 16}}{2}$$

$$= \frac{2 \pm \sqrt{20}}{2}$$

$$\sqrt{20} = \sqrt{4 \cdot 5}$$

$$= 2\sqrt{5}$$

$$= \frac{2 \pm 2\sqrt{5}}{2}$$

Answer: _____

$$1 \pm \sqrt{5}$$

4. Give your answer rounded to the nearest hundredth. $3x^2 + 2x - 4 = 0$

$$a = 3, b = 2, c = -4$$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(3)(-4)}}{2(3)}$$

$$= \frac{-2 \pm \sqrt{4 + 48}}{6}$$

$$= \frac{-2 \pm \sqrt{52}}{6}$$

$$x = \frac{-2 \pm \sqrt{52}}{6}$$

$$\text{or } x = \frac{-2 - \sqrt{52}}{6}$$

$$\approx 0.87$$

$$\approx -1.54$$

Answer: _____

$$x = 0.87 \text{ or } -1.54$$