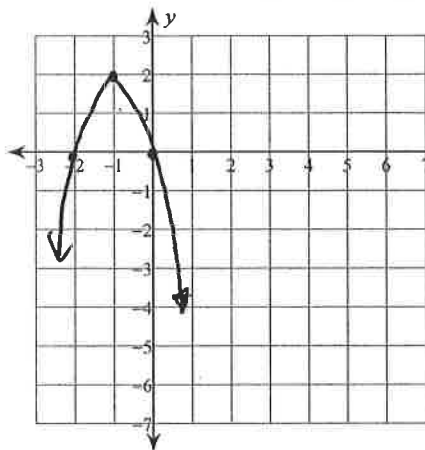


Sketch the graph of each function and then use the graph to solve the equation.

1) $y = -2x^2 - 4x$ Standard form.
 $a = -2$ $b = -4$ $c = 0$



$$-\frac{b}{2a} = \frac{4}{2(-2)} = \frac{4}{-4} = -1$$

$$y = -2(-1)^2 - 4(-1)$$

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

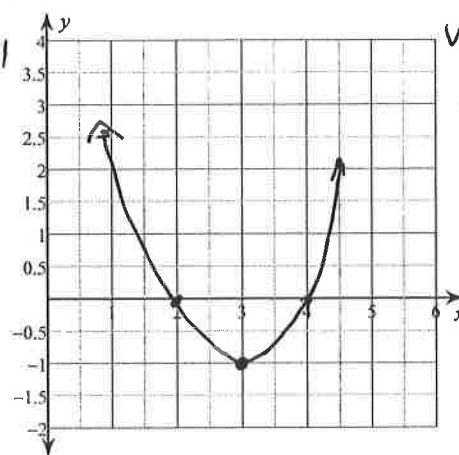
$$= -2 + 4 = 2$$

Vertex: $(-1, 2)$

a-value = $-\frac{2}{1}$

Solutions: $X = -2$ & $X = 0$

2) $y = (x-3)^2 - 1$ Vertex form



Vertex: $(3, -1)$

a-value = 1

Solutions: $X = 2$ & $X = 4$

Solve each equation by taking square roots.

3) $2p^2 - 10 = 62$
 $+10$ $+10$

$$\frac{2p^2}{2} = \frac{72}{2}$$

$$\sqrt{p^2} = \sqrt{36}$$

$p = 6$ & -6

4) $6p^2 - 9 = -93$
 $+9$ $+9$

$$\frac{6p^2}{6} = \frac{-84}{6}$$

$$\sqrt{p^2} = \sqrt{-14}$$

$p = \pm\sqrt{-14}$

$p = \pm\sqrt{14}i$

5) $8m^2 + 1 = 81$
 -1 -1

$$\frac{8m^2}{8} = \frac{80}{8}$$

$$\sqrt{m^2} = \sqrt{100}$$

$m = \pm\sqrt{100}$

$m = \pm 10$

6) $7p^2 + 7 = 28$
 -7 -7

$$\frac{7p^2}{7} = \frac{21}{7}$$

$$p^2 = 3$$

$\sqrt{p^2} = \sqrt{3}$

$p = \pm\sqrt{3}$

7) $4n^2 - 2 = 62$
 $+2$ $+2$

$$\frac{4n^2}{4} = \frac{64}{4}$$

$$\sqrt{n^2} = \sqrt{16}$$

$n = 4$ & -4

8) $9n^2 - 10 = -55$
 $+10$ $+10$

$$\frac{9n^2}{9} = \frac{-45}{9}$$

$$n^2 = -5$$

$\sqrt{n^2} = \sqrt{-5}$

$n = \pm\sqrt{5}i$

9) $10k^2 + 3 = 643$
 -3 -3

$$\frac{10k^2}{10} = \frac{640}{10}$$

$$\sqrt{k^2} = \sqrt{64}$$

$k = \pm 8$

10) $-10 - 10v^2 = -50$
 $+10$ $+10$

$$\frac{-10v^2}{-10} = \frac{-40}{-10}$$

$$\sqrt{v^2} = \sqrt{4}$$

$v = 2$ & -2

Solving Quadratic Equations (ladders)

Name _____

Solve each equation by factoring.

1) $x^2 - 48 = -2x$ 48.1
24.2
16.3
12.4
8.6

$$x^2 + 2x - 48 = 0$$

$$(x + 8)(x - 6) = 0$$

$$x + 8 = 0 \quad x - 6 = 0$$

$$x = -8 \quad \& \quad x = 6$$

3) $v^2 - 15v = -56$ 56.1
28.2
14.4
8.7

$$v^2 - 15v + 56 = 0$$

$$(v - 8)(v - 7) = 0$$

$$v - 8 = 0 \quad v - 7 = 0$$

$$v = 8 \quad \& \quad v = 7$$

5) $n^2 = 2 + n$ 2.1

$$n^2 - n - 2 = 0$$

$$(n - 2)(n + 1) = 0$$

$$n - 2 = 0 \quad n + 1 = 0$$

$$n = 2 \quad \& \quad n = -1$$

7) $3n^2 - 16 = -22n$ 48.1
24.2
16.3
12.4

$$3n^2 + 22n - 16 = 0$$

$$(3n^2 + 24n)(-2n - 16) = 0$$

$$3n(n + 8) - 2(n + 8) = 0$$

$$(n + 8)(3n - 2) = 0$$

$$n + 8 = 0 \quad 3n - 2 = 0$$

$$n = -8 \quad \& \quad n = \frac{2}{3}$$

9) $2k^2 - 21 = k$ 42.1
21.2
14.3
7.6

$$2k^2 - k - 21 = 0$$

$$(2k^2 - 7k)(+6k - 21) = 0$$

$$k(2k - 7) + 3(2k - 7) = 0$$

$$(2k - 7)(k + 3) = 0$$

$$2k - 7 = 0 \quad k + 3 = 0$$

$$k = \frac{7}{2} \quad \& \quad k = -3$$

2) $x^2 = -48 + 14x$ 48.1
24.2
16.3
12.4
8.6

$$x^2 - 14x + 48 = 0$$

$$(x - 8)(x - 6) = 0$$

$$x - 8 = 0 \quad x - 6 = 0$$

$$x = 8 \quad \& \quad x = 6$$

4) $m^2 = -5m - 6$ 6.1
3.2

$$m^2 + 5m + 6 = 0$$

$$(m + 3)(m + 2) = 0$$

$$m + 3 = 0 \quad m + 2 = 0$$

$$m = -3 \quad \& \quad m = -2$$

6) $3v^2 = -5 - 8v$ 15.1
5.3

$$3v^2 + 8v + 5 = 0$$

$$(3v^2 + 5v)(3v + 5) = 0$$

$$v(3v + 5) + 1(3v + 5) = 0$$

$$(3v + 5)(v + 1) = 0 \quad 3v + 5 = 0 \quad v + 1 = 0$$

$$v = -\frac{5}{3} \quad \& \quad v = -1$$

8) $3a^2 + 3 = 10a$ 9.1
3.3

$$3a^2 - 10a + 3 = 0$$

$$(3a^2 - 9a)(-1a + 3) = 0$$

$$3a(a - 3) - 1(a - 3) = 0$$

$$(a - 3)(3a - 1) = 0$$

$$a - 3 = 0 \quad 3a - 1 = 0$$

10) $3a^2 = -26a - 48$ 144.1
72.2
48.3
36.4
24.6
18.8

$$3a^2 + 26a + 48 = 0$$

$$(3a^2 + 18a)(8a + 48) = 0$$

$$3a(a + 6) + 8(a + 6) = 0$$

$$(a + 6)(3a + 8) = 0$$

$$a + 6 = 0 \quad 3a + 8 = 0$$

$$a = -6 \quad \& \quad a = -\frac{8}{3}$$

Solve each equation with the quadratic formula.

1) $3p^2 = 12p - 9$

$$3p^2 - 12p + 9 = 0$$

$$a=3 \quad b=-12 \quad c=9$$

$$\frac{12 \pm \sqrt{144 - 4(3)(9)}}{2(3)}$$

$$\frac{12 \pm \sqrt{144 - 108}}{6}$$

$$\frac{12 \pm \sqrt{36}}{6}$$

$$\frac{12 \pm 6}{6}$$

$$\frac{18}{6} = 3$$

$$\frac{6}{6} = 1$$

2) $5x^2 = 10x + 15$

$$5x^2 - 10x - 15 = 0$$

$$a=5 \quad b=-10 \quad c=-15$$

$$\frac{10 \pm \sqrt{100 - 4(5)(-15)}}{2(5)}$$

$$\frac{10 \pm \sqrt{100 + 300}}{10}$$

$$\frac{10 \pm \sqrt{400}}{10}$$

$$\frac{10 \pm 20}{10}$$

$$\frac{30}{10} = 3$$

$$\frac{-10}{10} = -1$$

3) $x^2 - 77 = -4x$

$$x^2 + 4x - 77 = 0$$

$$a=1 \quad b=4 \quad c=-77$$

$$\frac{-4 \pm \sqrt{16 - 4(1)(-77)}}{2(1)}$$

$$\frac{-4 \pm \sqrt{16 + 308}}{2}$$

$$\frac{-4 \pm \sqrt{324}}{2}$$

$$\frac{-4 \pm 18}{2}$$

$$\frac{14}{2} = 7$$

$$\frac{-22}{2} = -11$$

4) $4b^2 + b = -8$

$$4b^2 + b + 8 = 0$$

$$a=4 \quad b=1 \quad c=8$$

$$\frac{-1 \pm \sqrt{1 - 4(4)(8)}}{2(4)}$$

$$\frac{-1 \pm \sqrt{1 - 128}}{8}$$

$$\frac{-1 \pm \sqrt{-127}}{8}$$

$$\frac{-1 \pm \sqrt{-127}i}{8}$$

5) $3n^2 + 6 = 4n$

$$3n^2 - 4n + 6 = 0$$

$$a=3 \quad b=-4 \quad c=6$$

$$\frac{4 \pm \sqrt{16 - 4(3)(6)}}{2(3)}$$

$$\frac{4 \pm \sqrt{16 - 72}}{6}$$

$$\frac{4 \pm \sqrt{-56}}{6}$$

$$\frac{4 \pm \sqrt{56}i}{6}$$

$$\frac{4 \pm \sqrt{14}i}{6}$$

$$\frac{4 \pm 2\sqrt{14}i}{6}$$

$$\frac{4}{6} \pm \frac{2\sqrt{14}i}{6}$$

$$\frac{2}{3} \pm \frac{\sqrt{14}i}{3}$$

6) $11a^2 + 5 = 2a$

$$11a^2 - 2a + 5 = 0$$

$$a=11 \quad b=-2 \quad c=5$$

$$\frac{2 \pm \sqrt{4 - 4(11)(5)}}{2(11)}$$

$$\frac{2 \pm \sqrt{4 - 220}}{22}$$

$$\frac{2 \pm \sqrt{-216}}{22}$$

$$\frac{2 \pm \sqrt{216}i}{22}$$

$$\frac{2 \pm \sqrt{36}i}{22}$$

$$\frac{2 \pm 6\sqrt{6}i}{22} = \frac{1}{11} \pm \frac{3\sqrt{6}i}{11}$$

Solving Quadratic Equations (ladders)

Name _____

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Solve each equation by completing the square.

1) $k^2 + 14k - 44 = 0$

$(k^2 + 14k + 49 - 49) - 44 = 0$

$(k^2 + 14k + 49) - 93 = 0$

$(k+7)^2 - 93 = 0$

$\sqrt{(k+7)^2} = \sqrt{93}$

$k+7 = \pm\sqrt{93}$

$k = -7 \pm \sqrt{93}$

2) $n^2 - 2n - 15 = 0$

$(n^2 - 2n + 1 - 1) - 15 = 0$

$(n^2 - 2n + 1) - 16 = 0$

$(n-1)^2 - 16 = 0$

$\sqrt{(n-1)^2} = \sqrt{16}$

$n-1 = 4 \text{ } \& \text{ } -4$

$n = 5 \text{ } \& \text{ } -3$

3) $x^2 - 12x - 64 = 0$

$(x^2 - 12x + 36 - 36) - 64 = 0$

$(x^2 - 12x + 36) - 100 = 0$

$\sqrt{(x-6)^2} = \sqrt{100}$

$x-6 = 10 \text{ } \& \text{ } -10$

$x = 16 \text{ } \& \text{ } -4$

4) $7x^2 - 14x - 21 = 0$

$(7x^2 - 14x) - 21 = 0$

$7(x^2 - 2x + 1 - 1) - 21 = 0$

$7(x^2 - 2x + 1) - 28 = 0$

$7(x-1)^2 - 28 = 0$

$7(x-1)^2 = 28$

$(x-1)^2 = 4$

$x-1 = \pm\sqrt{4}$
 $x-1 = 2 \text{ } \& \text{ } -2$
 $x = 3 \text{ } \& \text{ } -1$

5) $2n^2 + 12n - 14 = 0$

$(2n^2 + 12n) - 14 = 0$

$2(n^2 + 6n + 9 - 9) - 14 = 0$

$(3)^2 = 9$

$2(n+3)^2 - 32 = 0$

$n = 1 \text{ } \& \text{ } -7$

$2(n+3)^2 = 32$

$\sqrt{(n+3)^2} = \sqrt{16}$

$n+3 = 4 \text{ } \& \text{ } -4$

6) $9k^2 + 18k - 7 = 0$

$(9k^2 + 18k) - 7 = 0$

$9(k^2 + 2k + 1 - 1) - 7 = 0$

$(1)^2 = 1$

$9(k^2 + 2k + 1) - 16 = 0$

$\frac{9(k+1)^2}{9} = \frac{16}{9}$

$\sqrt{(k+1)^2} = \sqrt{\frac{16}{9}}$

$k+1 = \pm\sqrt{\frac{16}{9}}$

$k+1 = \pm\frac{4}{3}$

$k = -1 \pm \frac{4}{3}$

$k = \frac{1}{3} \text{ } \& \text{ } -\frac{7}{3}$

$-\frac{3}{3} + \frac{4}{3}$

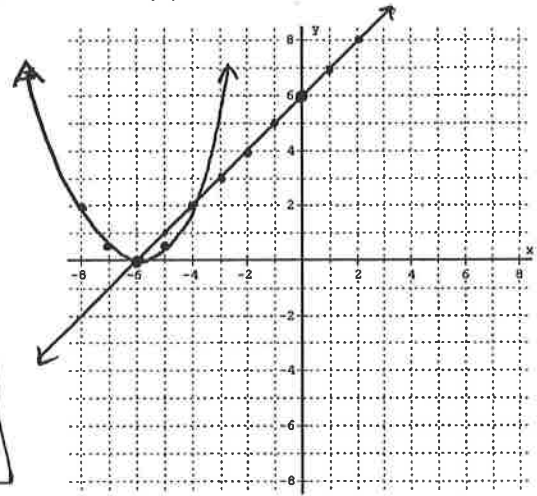
3.5

Practice A

In Exercises 1, solve the system by graphing. Check your solution(s).

1. $y = x + 6$
 $y = \frac{1}{2}(x + 6)^2$
 vertex form
 $V(-6, 0)$
 $a\text{-value} = \frac{1}{2}$

$y = 1x + 6$
 slope \uparrow $1/1$
 Y-int \uparrow 6



Solutions:
 $(-6, 0)$ & $(-4, 2)$

In Exercises 2-3, solve the system by substitution.

2. $y = x - 4$
 $y = x^2 - 4x$
 $x - 4 = x^2 - 4x$
 $-x + 4 = -x^2 + 4x$
 $x^2 - 5x + 4 = 0$

$(x - 4)(x - 1) = 0$

$x - 4 = 0$ $x - 1 = 0$

$x = 4$ $x = 1$

$(4, 0)$ $(1, -3)$

3. $y = x - 4$
 $x = 4$ $x = 1$
 $y = 4 - 4 = 0$
 $y = 1 - 4 = -3$

$y = 7$
 $3x - 6 = 4x^2 - y$
 $3x - 6 = 4x^2 - 7$
 $-3x + 6 = -4x^2 + 7$
 $4x^2 - 3x - 1 = 0$

$(4x^2 - 4x)(x - 1) = 0$

$4x(x - 1) + 1(x - 1) = 0$

$(x - 1)(4x + 1) = 0$

$x - 1 = 0$ $4x + 1 = 0$

$x = 1$ $x = -1/4$

$y = 7$
 $(1, 7)$?
 $(-1/4, 7)$

In Exercise 4, solve the system using elimination.

4. $-2x^2 + y = 14x + 16$
 $-2x^2 - y = -14x - 12$

$-4x^2 = 4$

$\sqrt{x^2} = \sqrt{-1}$

$x = i$

NO SOLUTIONS