

Name (Last, First): _____

Period: #6 Date: _____

9.3: Solving Quadratic Equations Using Square Roots

Review (9.1) Write the radical in the simplest form:

1) $\sqrt{162}$

2) $-\sqrt{72}$

3) $\sqrt{\frac{13}{16}}$

4) $-\sqrt{\frac{7}{121}}$

5) $\sqrt{\frac{98}{w^2}} = \frac{\sqrt{98}}{w} = \frac{\sqrt{2 \cdot 49}}{w} = \frac{7\sqrt{2}}{w}$ 6) $\sqrt{\frac{10}{12}}$

7) $\frac{1}{6+\sqrt{5}}$

8) $\frac{\sqrt{10}}{\sqrt{3-5}}$

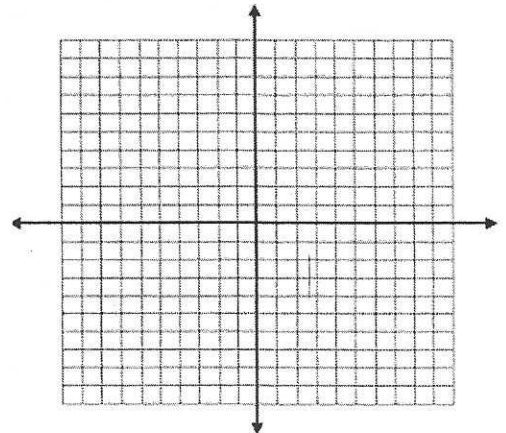
9) $\frac{7}{\sqrt{32-6}}$

Graph the equation and identify the intercepts

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

y-intercept: (,)

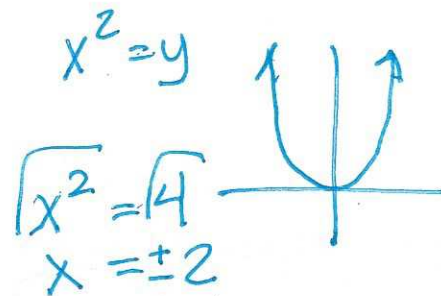
Find the x-intercepts: (,) and (,)



Essential Skills: Other methods to solve a quadratic equation:

Core Concept: Solutions of $x^2 = d$

- When $d > 0$, $x^2 = d$ has 2 real solutions, $x = \pm\sqrt{d}$
- When $d = 0$, $x^2 = d$ has 1 real solutions, $x = 0$
- When $d < 0$, $x^2 = d$ has 0 real solutions.



Example 1 – Solving a Quadratic Equations Using Square root

a) Solve $3x^2 - 27 = 0$ using square roots.

Write the equations:

$$3x^2 - 27 = 0$$

$$+27 \quad +27$$

Add 27 to each side:

$$3x^2 = 27$$

$$\frac{3x^2}{3} = \frac{27}{3}$$

$$x^2 = 9$$

Divide each side by 3:

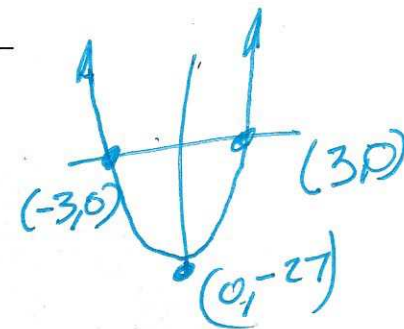
Take the square root of each side:

$$\sqrt{x^2} = \pm\sqrt{9}$$

Simplify:

$$x = \pm 3$$

The solutions are $x = 3$ and $x = -3$ or $(3, 0)$ and $(-3, 0)$



b) Solve $x^2 - 10 = -10$ using square roots.

Write the equations:

$$x^2 - 10 = -10$$

$$+10 \quad +10$$

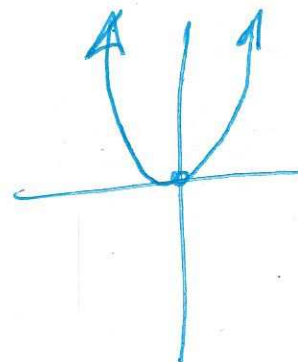
$$x^2 = 0$$

Add 10 to each side:

Take the square root of each side:

$$x = \pm\sqrt{0}$$

The only solution is $x = 0$ or $(0, 0)$



c) Solve $-5x^2 + 11 = 16$ using square roots.

Write the equations:

$$-5x^2 + 11 = 16$$

Subtract -11 from each side:

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

Divide each side by -5:

$$x^2 = -1$$

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

$X = \text{NO SOL.}$

The square root of a real number cannot be NEGATIVE. So the equation has

NO solution.

Your Turn: Solve the equations using square roots:

1) $-3x^2 = -75$

$$\frac{-3x^2}{-3} = \frac{-75}{-3}$$

$$x^2 = 25$$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5 \leftarrow 2 \text{ sol.}$$

2) $x^2 + 12 = 10$

$$\frac{x^2 + 12 - 12}{x^2} = \frac{10 - 12}{x^2}$$

$$x^2 = -2$$

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

$$x = \text{NO SOL}$$

3) $4x^2 - 15 = -15$

$$\frac{4x^2 - 15 + 15}{4x^2} = \frac{-15 + 15}{4x^2}$$

$$4x^2 = 0$$

$$\frac{4x^2}{4} = \frac{0}{4}$$

$$x^2 = 0$$

$$\sqrt{x^2} = \sqrt{0}$$

$$x = 0 \text{ | 1 sol.}$$

Example 2 – Solving a Quadratic Equations Using Square Roots:

Solve $(x - 1)^2 = 25$ using square roots.

Write the equations:

$$(x - 1)^2 = 25$$

$$\sqrt{(x-1)^2} = \sqrt{25}$$

Take the square root of each side:

$$\sqrt{(x-1)^2} = \pm \sqrt{25}$$

$$x - 1 = \pm 5$$

$$x - 1 = 5$$

Add 1 to each side:

$$x = 1 \pm 5$$

$$x = 6$$

The solutions are $x = 1 + 5 = 6$ and $x = 1 - 5 = -4$ or $(6, 0)$ and $(-4, 0)$

$$x - 1 = -5$$

$$x = -4$$

Your Turn: Solve the equation using square roots:

4) $\sqrt{(x + 7)^2} = 0$

$$x + 7 = 0$$

$$\frac{x + 7 - 7}{x} = \frac{0 - 7}{x}$$

$$x = -7$$

5) $\frac{4(x - 3)^2}{4} = \frac{9}{4}$

$$(x - 3)^2 = \frac{9}{4}$$

$$\sqrt{(x-3)^2} = \sqrt{\frac{9}{4}}$$

$$x - 3 = \pm 1.5$$

$$x - 3 = 1.5$$

$$x = 4.5$$

$$x - 3 = -1.5$$

$$x = 1.5$$

6) $\sqrt{(2x + 1)^2} = \sqrt{36}$

$$\frac{\sqrt{36}}{\sqrt{4}} = \frac{6}{2}$$

$$2x + 1 = \pm 6$$

$$2x + 1 = 6$$

$$2x = 5$$

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

$$2x + 1 = -6$$

$$\frac{2x + 1 - 1}{2x} = \frac{-6 - 1}{2x}$$

$$2x = -7$$

$$x = -\frac{7}{2}$$

9.3 Practice Questions

Use the graph to solve the equation (see example 1):

1) $x^2 - 16 = 0$

4) $-3x^2 - 5 = -5$

2) $3x^2 + 12 = 0$

5) $4x^2 - 371 = -29$

3) $2x^2 - 98 = 0$

6) $7x^2 - 35 = 14$

Use the graph to solve the equation (see example 2):

7) $(x + 3)^2 = 0$

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

8) $(2x - 1)^2 = 81$

11) $(4x + 5)^2 = 9$

9) $9(x + 1)^2 = 144$

12) $4(x - 2)^2 = 25$