

### 3.1 Finding Zeros by Square Roots

OBJ: To solve for a quadratic equation by finding square roots.

- 2 · 2 = 4
- 3 · 3 = 9
- 4 · 4 = 16
- 5 · 5 = 25
- 6 · 6 = 36
- 7 · 7 = 49
- 8 · 8 = 64
- 9 · 9 = 81
- 10 · 10 = 100
- 11 · 11 = 121
- 12 · 12 = 144
- 13 · 13 = 169
- 14 · 14 = 196

Simplify each radical.

a)  $\sqrt{50}$   
 $= \sqrt{25 \cdot 2}$   
 $= 5\sqrt{2}$

b)  $\sqrt{18}$   
 $= \sqrt{9 \cdot 2}$   
 $= 3\sqrt{2}$

c)  $\sqrt{72}$   
 $= \sqrt{36 \cdot 2}$   
 $= 6\sqrt{2}$

d)  $\sqrt{128}$   
 $= \sqrt{64 \cdot 2}$   
 $= 8\sqrt{2}$

d)  $\sqrt{\frac{9}{4}} = \frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$

Solve:  $x = ?$   
 1.)  $x^2 - 9 = 9$   
 $\frac{-9 \quad -9}{x^2 - 9 = 0}$   
 $\frac{+9 \quad +9}{\sqrt{x^2} = \sqrt{9}}$   
 $x = 3, -3$   
 $x = \pm 3$

\* b=0  
Use  $\sqrt{\quad}$   
method

2.)  $x^2 + 4 = 28$   
 $\frac{-28 \quad -28}{x^2 - 24 = 0}$   
 $\frac{+24 \quad +24}{\sqrt{x^2} = \sqrt{24}}$   
 $x = \sqrt{4 \cdot 6}$   
 $x = 2\sqrt{6}$   
 $x = \pm 2\sqrt{6}$

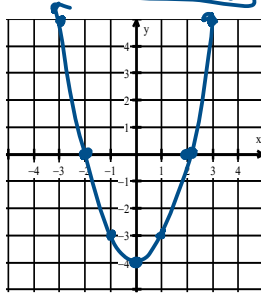
\* b=0  
Use  $\sqrt{\quad}$

3.)  $2x^2 - 15 = 49$   
 $\frac{-49 \quad -49}{2x^2 - 64 = 0}$   
 $\frac{+64 \quad +64}{\frac{2x^2}{2} = \frac{64}{2}}$   
 $\sqrt{x^2} = \sqrt{32}$   
 $x = \sqrt{16 \cdot 2}$   
 $x = \pm 4\sqrt{2}$

\* b=0  
Use  $\sqrt{\quad}$   
\* Get  $x^2$  alone  
\* Take  $\sqrt{\quad}$

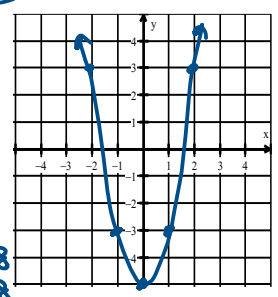
4. Find the zeros for  $y = x^2 - 4$   
 $x = ? \quad y = 0$   
 $0 = x^2 - 4$   
 $\frac{+4 \quad +4}{\sqrt{4} = \sqrt{x^2}}$   
 $x = 2, -2$

\* b=0  
Use  $\sqrt{\quad}$



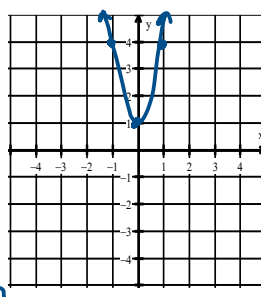
5. Find the zeros for  $y = 2x^2 - 5$   
 $x = ? \quad y = 0$   
 $0 = 2x^2 - 5$   
 $\frac{+5 \quad +5}{\frac{5}{2} = \frac{2x^2}{2}}$   
 $\sqrt{\frac{5}{2}} = \sqrt{x^2}$   
 $\pm \sqrt{\frac{5}{2}} = x \quad x \approx 1.58, -1.58$

\* b=0  
Use  $\sqrt{\quad}$   
\* Get  $x^2$  alone



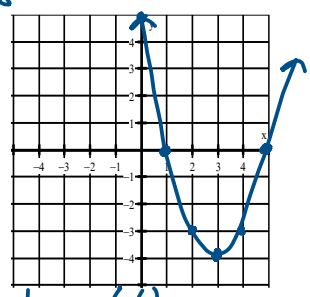
6. Solve/Graph  $3x^2 + 18 = 17$   
 $x = ?$   
 $\frac{-17 \quad -17}{3x^2 + 1 = 0}$   
 $\frac{-1 \quad -1}{\frac{3x^2}{3} = \frac{-1}{3}}$   
 $\sqrt{x^2} = \sqrt{-\frac{1}{3}}$   
 $x = \pm \sqrt{-\frac{1}{3}}$   
 No real zeros

\* b=0  
Use  $\sqrt{\quad}$   
\* Get  $x^2$  alone



7. Solve/Graph  $x^2 - 6x + 5 = 0$   
 $x = ?$   
 $\frac{+5 \quad +5}{x^2 - 6x + 5 = 0}$   
 $\frac{-1 \quad -5}{(x-1)(x-5) = 0}$   
 $x - 1 = 0 \quad x - 5 = 0$   
 $x = 1 \quad x = 5$

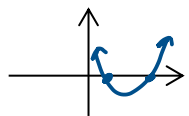
\* b=-6



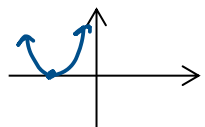
$x = -\frac{b}{2a} = -\frac{-6}{2(1)} = 3$   
 $y = (3)^2 - 6(3) + 5 = -4$   
 vertex (3, -4)

8. Draw a parabola for a quadratic equation that meets the following conditions:

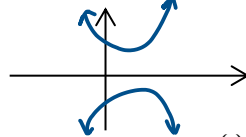
2 Solutions



1 Solution



No real solutions



9. A ball is dropped from a window 19 feet high. The height is modeled by the equation  $h(t) = -16t^2 + 19$  where  $h$  is the height (in feet) and  $t$  is the time (in seconds). After how many seconds will the ball hit the ground?

$t = ?$   
 $h = 0$   
 $-16t^2 + 19 = 0$   
 $19 = 16t^2$   
 $\frac{19}{16} = t^2$   
 $\sqrt{\frac{19}{16}} = \sqrt{t^2}$   
 $t \approx 1.08 \text{ Sec}$

3.1 Solve Quadratic Equations-Square Roots

Name \_\_\_\_\_

Pd \_\_\_\_\_ Date \_\_\_\_\_

Simplify each radical.

1.)  $\sqrt{32}$

2.)  $\sqrt{27}$

3.)  $\sqrt{75}$

4.)  $\sqrt{162}$

5.)  $\sqrt{\frac{16}{25}}$

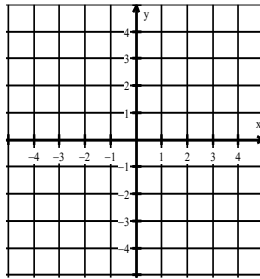
Solve. Simplify all radicals.

6.)  $2x^2 - 12 = 60$

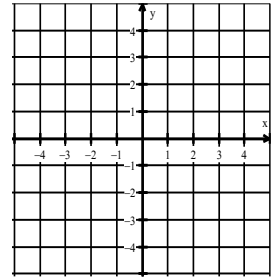
7.)  $x^2 + 4 = 22$

8.)  $2x^2 + 5 = 95$

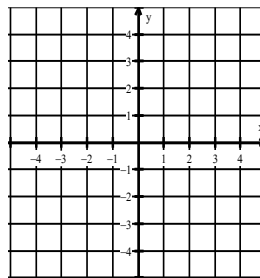
9. Find the zeros for  $y = x^2 - 9$



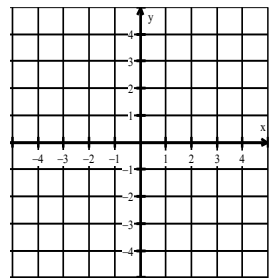
10. Find the zeros for  $y = 2x^2 - 6$



11. Solve/Graph  $3x^2 + 23 = 22$



12. Solve/Graph  $x^2 - 4x = -3$



13. Sketch a parabola for a quadratic equation that meets the following conditions: No Real Solutions

14. A ball is dropped from a window 31 feet high. The height is modeled by the equation  $h(t) = -16t^2 + 31$  where  $h$  is the height (in feet) and  $t$  is the time (in seconds). After how many seconds will the ball hit the ground?

Warm-Up

1. Find  $\sqrt{25}$

2. Solve  $x^2 = 25$