

Solving Quadratic Equations with Square Roots

Solve each equation by taking square roots.

1) $k^2 = 76$

2) $k^2 = 16$

3) $x^2 = 21$

4) $a^2 = 4$

5) $x^2 + 8 = 28$

6) $2n^2 = -144$

7) $-6m^2 = -414$

8) $7x^2 = -21$

9) $m^2 + 7 = 88$

10) $-5x^2 = -500$

11) $-7n^2 = -448$

12) $-2k^2 = -162$

13) $x^2 - 5 = 73$

14) $16n^2 = 49$

Solving Quadratic Equations with Square Roots

Date _____ Period _____

Solve each equation by taking square roots.

1) $k^2 = 76$

$$\sqrt{k^2} = \pm\sqrt{76}$$

$$k = \pm 8.717$$

$$\{8.717, -8.717\}$$

3) $x^2 = 21$

$$\sqrt{x^2} = \pm\sqrt{21}$$

$$x = \pm 4.582$$

$$\{4.582, -4.582\}$$

5) $x^2 + 8 = 28$

$$\begin{array}{r} x^2 + 8 = 28 \\ -8 \quad -8 \\ \hline x^2 = 20 \end{array}$$

$$\sqrt{x^2} = \pm\sqrt{20} \quad \{4.472, -4.472\}$$

$$x = \pm 4.472$$

7) $-6m^2 = -414$

$$\begin{array}{r} -6m^2 = -414 \\ -6 \quad -6 \\ \hline m^2 = 69 \end{array}$$

$$m^2 = 69$$

$$m = \pm 8.306$$

$$\sqrt{m^2} = \pm\sqrt{69} \quad \{8.306, -8.306\}$$

9) $m^2 + 7 = 88$

$$\begin{array}{r} m^2 + 7 = 88 \\ -7 \quad -7 \\ \hline m^2 = 81 \end{array}$$

$$\sqrt{m^2} = \pm\sqrt{81} \quad \{9, -9\}$$

$$m = \pm 9$$

11) $-7n^2 = -448$

$$\begin{array}{r} -7n^2 = -448 \\ -7 \quad -7 \\ \hline n^2 = 64 \end{array}$$

$$n^2 = 64$$

$$\sqrt{n^2} = \pm\sqrt{64} \quad \{8, -8\}$$

$$n = \pm 8$$

13) $x^2 - 5 = 73$

$$\begin{array}{r} x^2 - 5 = 73 \\ +5 \quad +5 \\ \hline x^2 = 78 \end{array}$$

$$\sqrt{x^2} = \pm\sqrt{78} \quad \{8.831, -8.831\}$$

$$x = \pm 8.831$$

2) $k^2 = 16$

$$\sqrt{k^2} = \pm\sqrt{16}$$

$$k = \pm 4$$

$$\{4, -4\}$$

4) $a^2 = 4$

$$\sqrt{a^2} = \pm\sqrt{4}$$

$$a = \pm 2$$

$$\{2, -2\}$$

6) $2n^2 = -144$

$$\frac{2n^2}{2} = \frac{-144}{2}$$

$$n^2 = -72$$

$$\sqrt{n^2} = \sqrt{-72}$$

NO SOLUTION. CANNOT TAKE A SQUARE ROOT OF A NEGATIVE NUMBER.

8) $7x^2 = -21$

$$\frac{7x^2}{7} = \frac{-21}{7}$$

$$x^2 = -3$$

$$\sqrt{x^2} = \sqrt{-3}$$

NO SOLUTION. CANNOT TAKE A SQUARE ROOT OF A NEGATIVE NUMBER.

10) $-5x^2 = -500$

$$\begin{array}{r} -5x^2 = -500 \\ -5 \quad -5 \\ \hline x^2 = 100 \end{array}$$

$$x^2 = 100$$

$$\sqrt{x^2} = \pm\sqrt{100}$$

$$x = \pm 10 \quad \{10, -10\}$$

12) $-2k^2 = -162$

$$\begin{array}{r} -2k^2 = -162 \\ -2 \quad -2 \\ \hline k^2 = 81 \end{array}$$

$$k^2 = 81$$

$$\sqrt{k^2} = \pm\sqrt{81}$$

$$k = \pm 9$$

$$k = \pm 9$$

$$\{9, -9\}$$

14) $16n^2 = 49$

$$\frac{16n^2}{16} = \frac{49}{16}$$

$$n^2 = \frac{49}{16}$$

$$\sqrt{n^2} = \pm\sqrt{\frac{49}{16}}$$

$$n = \pm \frac{7}{4}$$

$$n = \pm 1.75$$

$$\{1.75, -1.75\}$$

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$\{8.717, -8.717\}$

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$\{4, -4\}$

3) $x^2 = 21$

$\{4.582, -4.582\}$

4) $a^2 = 4$

$\{2, -2\}$

5) $x^2 + 8 = 28$

$\{4.472, -4.472\}$

6) $2n^2 = -144$

No solution.

7) $-6m^2 = -414$

$\{8.306, -8.306\}$

8) $7x^2 = -21$

No solution.

9) $m^2 + 7 = 88$

$\{9, -9\}$

10) $-5x^2 = -500$

$\{10, -10\}$

11) $-7n^2 = -448$

$\{8, -8\}$

12) $-2k^2 = -162$

$\{9, -9\}$

13) $x^2 - 5 = 73$

$\{8.831, -8.831\}$

14) $16n^2 = 49$

$\{1.75, -1.75\}$

Solving Quadratic Equations by Factoring

Solve each equation by factoring.

1) $(k + 1)(k - 5) = 0$

2) $(a + 1)(a + 2) = 0$

3) $(4k + 5)(k + 1) = 0$

4) $(2m + 3)(4m + 3) = 0$

5) $x^2 - 11x + 19 = -5$

6) $n^2 + 7n + 15 = 5$

7) $n^2 - 10n + 22 = -2$

8) $n^2 + 3n - 12 = 6$

9) $6n^2 - 18n - 18 = 6$

10) $7r^2 - 14r = -7$

Solving Quadratic Equations by Factoring

Solve each equation by factoring. SET EQUATIONS EQUAL TO ZERO (0)

1) $(k+1)(k-5)=0$

$$\begin{array}{r} k+1=0 \quad k-5=0 \\ -1 \quad -1 \quad +5 \quad +5 \\ \hline k=-1 \text{ or } k=5 \end{array}$$

2) $(a+1)(a+2)=0$

$$\begin{array}{r} a+1=0 \quad a+2=0 \\ -1 \quad -1 \quad +2 \quad -2 \\ \hline a=-1 \text{ or } a=-2 \end{array}$$

3) $(4k+5)(k+1)=0$

$$\begin{array}{r} 4k+5=0 \quad k+1=0 \\ -5 \quad -5 \quad -1 \quad -1 \\ \hline 4k=-5 \quad k=-1 \\ \frac{4k}{4} = \frac{-5}{4} \\ k = -\frac{5}{4} \text{ or } k=-1 \end{array}$$

4) $(2m+3)(4m+3)=0$

$$\begin{array}{r} 2m+3=0 \quad 4m+3=0 \\ -3 \quad -3 \quad -3 \quad -3 \\ \hline 2m=-3 \quad 4m=-3 \\ \frac{2m}{2} = \frac{-3}{2} \quad \frac{4m}{4} = \frac{-3}{4} \\ m = -\frac{3}{2} \text{ or } m = -\frac{3}{4} \end{array}$$

5) $x^2 - 11x + 19 = -5$ SET EQUAL TO ZERO 6) $n^2 + 7n + 15 = 5$

$x^2 - 11x + 24 = 0$ USE THE BOX

x^2	$-8x$
$-3x$	24

$24 \mid -11$
 $-8(-3) \mid -8-3$

$(x-3)(x-8)=0$

$$\begin{array}{r} x-3=0 \quad x-8=0 \\ +3 \quad +3 \quad +8 \quad +8 \\ \hline x=3 \text{ or } x=8 \end{array}$$

7) $n^2 - 10n + 22 = -2$

$n^2 - 10n + 24 = 0$

n^2	$-6n$
$-4n$	24

$24 \mid -10$
 $-6(-4) \mid -6+ -4$

$(n-4)(n-6)=0$

$$\begin{array}{r} n-4=0 \quad n-6=0 \\ +4 \quad +4 \quad +6 \quad +6 \\ \hline n=4 \text{ or } n=6 \end{array}$$

8) $n^2 + 3n - 12 = 6$

9) $6n^2 - 18n - 18 = 6$

$6n^2 - 18n - 24 = 0$

$6(n^2 - 3n - 4) = 0$

n^2	$-4n$
$1n$	-4

$-4 \mid -3$
 $-4(1) \mid -4+1$

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

$$\begin{array}{r} n-4=0 \quad n+1=0 \\ +4 \quad +4 \quad -1 \quad -1 \\ \hline n=4 \text{ or } n=-1 \end{array}$$

10) $7r^2 - 14r = -7$

Solving Quadratic Equations by Factoring

Solve each equation by factoring.

1) $(k + 1)(k - 5) = 0$

$\{-1, 5\}$

2) $(a + 1)(a + 2) = 0$

$\{-1, -2\}$

3) $(4k + 5)(k + 1) = 0$

$\left\{-\frac{5}{4}, -1\right\}$

4) $(2m + 3)(4m + 3) = 0$

$\left\{-\frac{3}{2}, -\frac{3}{4}\right\}$

5) $x^2 - 11x + 19 = -5$

$\{3, 8\}$

6) $n^2 + 7n + 15 = 5$

~~$\{-5, -2\}$~~

7) $n^2 - 10n + 22 = -2$

$\{6, 4\}$

8) $n^2 + 3n - 12 = 6$

~~$\{3, -6\}$~~

9) $6n^2 - 18n - 18 = 6$

$\{4, -1\}$

10) $r^2 - 14r = -7$

~~$\{1\}$~~