

Solving Quadratic Equations Using Different Methods

Period _____

Solve each equation by taking square roots.

1) $10a^2 - 10 = 630$

2) $3k^2 + 4 = 130$

3) $6x^2 + 1 = 121$

4) $-10 - 3a^2 = -310$

Solve each equation by factoring.

5) $x^2 - 8x + 15 = 0$

6) $x^2 - 8x + 7 = 0$

7) $p^2 + 12p + 32 = 0$

8) $x^2 + 2x = 0$

Solve each equation with the quadratic formula.

9) $6a^2 + 8a - 25 = -3$

10) $8b^2 + 11b - 11 = 6$

11) $4n^2 - 9n - 18 = 6$

12) $10n^2 - 11n - 15 = -8$

Solve each equation by completing the square.

13) $v^2 - 12v + 21 = 10$

14) $a^2 + 16a + 6 = 7$

15) $n^2 + 18n + 21 = 4$

16) $x^2 + 12x + 2 = -10$

Solving Quadratic Equations Using Different Methods

Solve each equation by taking square roots.

1) $10a^2 - 10 = 630$

$a = 8$ or $a = -8$

2) $3k^2 + 4 = 130$

$k = \sqrt{42}$ or $k = -\sqrt{42}$

3) $6x^2 + 1 = 121$

$x = 2\sqrt{5}$

or

$x = -2\sqrt{5}$

4) $-10 - 3a^2 = -310$

$a = 10$ or $a = -10$

Solve each equation by factoring.

5) $x^2 - 8x + 15 = 0$

$x = 5$ or $x = 3$

6) $x^2 - 8x + 7 = 0$

$x = 7$ or $x = 1$

7) $p^2 + 12p + 32 = 0$

$x = -8$ or $x = -4$

8) $x^2 + 2x = 0$

$x = 0$ or $x = -2$

Solve each equation with the quadratic formula.

9) $6a^2 + 8a - 25 = -3$

$x = \frac{-2 - \sqrt{37}}{3}$ or $x = \frac{-2 + \sqrt{37}}{3}$

10) $8b^2 + 11b - 11 = 6$

$x = \frac{-11 + \sqrt{665}}{16}$ or $x = \frac{-11 - \sqrt{665}}{16}$

11) $4n^2 - 9n - 18 = 6$

$x = \frac{9 + \sqrt{465}}{8}$ or $x = \frac{9 - \sqrt{465}}{8}$

12) $10n^2 - 11n - 15 = -8$

$x = \frac{11 + \sqrt{401}}{20}$ or $x = \frac{11 - \sqrt{401}}{20}$

Solve each equation by completing the square.

13) $v^2 - 12v + 21 = 10$

$y = (v-6)^2 - 25$

$v = 1$ or $v = 11$

14) $a^2 + 16a + 6 = 7$

$y = (a+8)^2 - 65$

$a = \sqrt{65} - 8$ or $a = -\sqrt{65} - 8$

15) $n^2 + 18n + 21 = 4$

$y = (n+9)^2 - 64$

$n = -1$ or $n = -17$

16) $x^2 + 12x + 2 = -10$

$y = (x+6)^2 - 24$

$x = 2\sqrt{6} - 6$ or $x = -2\sqrt{6} - 6$

Square Root Method

① $10a^2 - 10 = 630$
 $\quad \quad \quad +10 \quad \quad +10$

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

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

$$a = \pm 8$$

② $3k^2 + 4 = 130$
 $\quad \quad \quad -4 \quad \quad -4$

$$\frac{3k^2}{3} = \frac{126}{3}$$

$$\sqrt{k^2} = \sqrt{42}$$

$$k = \pm \sqrt{42}$$

42
 ② $\sqrt{42}$
 ③ ⑦

20
 ② $\sqrt{20}$
 ③ ⑤

③ $6x^2 + 1 = 121$
 $\quad \quad \quad -1 \quad \quad -1$

$$6x^2 = 120$$

$$\sqrt{x^2} = \sqrt{20}$$

$$x = \sqrt{20}$$

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

④ $-10 - 3a^2 = -310$
 $\quad \quad \quad +10 \quad \quad +10$

$$\frac{-3a^2}{-3} = \frac{-300}{-3}$$

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

$$a = \pm 10$$

FACTOR !!

⑤ $x^2 - 8x + 15 = 0$

$$(x-5)(x-3) = 0$$

$$x-5 = 0$$

$$\boxed{x=5}$$

$$x-3 = 0$$

$$\boxed{x=3}$$

-8	15
-5+3	-5-3
✓	✓

$$(6) \quad x^2 - 8x + 7 = 0$$

$$(x-7)(x-1) = 0$$

-8	7
-7-1	-7·-1
✓	✓

$$x-7=0$$
$$\boxed{x=7}$$

$$x-1=0$$
$$\boxed{x=1}$$

$$(7) \quad p^2 + 12p + 32 = 0$$

$$(x+8)(x+4) = 0$$

12	32
8+4	8·4

$$x+8=0$$

$$x=-8$$

$$x+4=0$$

$$x=-4$$

$$(8) \quad x^2 + 2x = 0$$

$$x(x+2) = 0$$

$$\boxed{x=0}$$

$$x+2=0$$

$$\boxed{x=-2}$$

Quadratic Formula

$$(9) \quad \begin{array}{ccc} 6a^2 + 8a - 25 = -3 & & \\ +3 & +3 & \end{array}$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(6)(-22)}}{2(6)}$$

$$6a^2 + 8a - 22 = 0$$

$$a=6 \quad b=8 \quad c=-22$$

$$x = \frac{-8 \pm \sqrt{592}}{12}$$

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$$x = \frac{-8 \pm \sqrt{592}}{12}$$

$$592$$

$$\wedge$$

$$37 \quad 16$$

$$x = \frac{-8 \pm 4\sqrt{37}}{12}$$

$$\textcircled{4} \textcircled{4}$$

$$x = \frac{-2 \pm \sqrt{37}}{3}$$

$$\textcircled{10} \quad 8b^2 + 11b - 11 = 6$$

$$\quad \quad \quad -6 \quad -6$$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(8)(-17)}}{2(8)}$$

$$8b^2 + 11b - 17 = 0$$

$$x = \frac{-11 \pm \sqrt{665}}{16}$$

$$665$$

$$\textcircled{5} \textcircled{133}$$

$$a=8 \quad b=11 \quad c=-17$$

$$\textcircled{7} \textcircled{19}$$

$$\textcircled{11} \quad 4n^2 - 9n - 18 = 6$$

$$\quad \quad \quad -6 \quad -6$$

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(4)(-24)}}{2(4)}$$

$$4n^2 - 9n - 24 = 0$$

$$a=4 \quad b=-9 \quad c=-24$$

$$465$$

$$93 \textcircled{5}$$

$$x = \frac{9 \pm \sqrt{465}}{8}$$

$$\textcircled{3} \textcircled{31}$$

$$\textcircled{12} \quad 10n^2 - 11n - 15 = -8$$

$$\qquad\qquad\qquad +8 \qquad +8$$

$$10n^2 - 11n - 7 = 0$$

$$a = 10 \quad b = -11 \quad c = -7$$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(10)(-7)}}{2(10)}$$

$$x = \frac{11 \pm \sqrt{401}}{20}$$

Complete the SQUARE

$$\textcircled{13} \quad v^2 - 12v + 21 = 10$$

$$\qquad\qquad\qquad -10 \quad -10$$

$$v^2 - 12v + 11 = 0$$

$$\downarrow -12/2 = -6 \rightarrow (-6)^2 = 36$$

$$(v^2 - 12v + 36) + 11 - 36 = 0$$

$$(v - 6)^2 - 25 = 0$$

Solve using it! (SRM)

$$\frac{(v-6)^2}{\sqrt{(v-6)^2}} = \frac{25}{\sqrt{25}}$$

$$v-6 = \pm 5$$

$$v = \pm 5 + 6$$

$$v = 5 + 6 = 11$$

$$v = -5 + 6 = 1$$

$$(14) \quad a^2 + 16a + 6 = 7$$

$$\quad \quad \quad -7 \quad -7$$

$$a^2 + 16a - 1 = 0$$

$$\downarrow 16/2 = 8 \rightarrow 8^2 = 64$$

$$(a^2 + 16a + 64) - 1 - 64 = 0$$

$$(a + 8)^2 - 65 = 0$$

Solve:

$$\sqrt{(a+8)^2} = \sqrt{65}$$

$$a + 8 = \sqrt{65}$$

$$a = \sqrt{65} - 8$$

65
^
5
13

$$(15) \quad n^2 + 18n + 21 = 4$$

$$\quad \quad \quad -4 \quad -4$$

$$n^2 + 18n + 17 = 0$$

$$\downarrow 18/2 = 9 \rightarrow 9^2 = 81$$

$$(n^2 + 18n + 81) + 17 - 81 = 0$$

$$(n + 9)^2 - 64 = 0$$

Solve: $(n+9)^2 - 64 = 0$

$$\sqrt{(n+9)^2} = \sqrt{64}$$

$$n+9 = \sqrt{64}$$

$$n+9 = \sqrt{64}$$

$$n = \sqrt{64} - 9$$

$$n = \pm 8 - 9$$

$$\left. \begin{array}{l} n = 8 - 9 \\ n = -1 \\ n = -8 - 9 \\ n = -17 \end{array} \right\}$$

$$\textcircled{16} \quad x^2 + 12x + 2 = -10$$

$$\quad \quad \quad +10 \quad \quad +10$$

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

$$\downarrow \quad 12/2 = 6 \rightarrow 6^2 = 36$$

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

$$(x+6)^2 - 24 = 0$$

$$\text{Solve: } (x+6)^2 - 24 = 0$$

$$\sqrt{(x+6)^2} = \sqrt{24}$$

$$x+6 = \sqrt{24}$$

$$x = \sqrt{24} - 6$$

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

$$\begin{array}{r} 24 \\ \wedge \\ 6 \quad 4 \\ \wedge \quad \wedge \\ 3 \quad 2 \quad \textcircled{2} \quad \textcircled{2} \end{array}$$