

11.3 The Quadratic Formula

Algebra 1

Name: Solutions

Practice

Solve each equation using the quadratic formula.

1. $v^2 + 3v - 18 = 0$ $a=1$
 $b=3$
 $c=-18$

$$x = \frac{-3 \pm \sqrt{9 - 4(1)(-18)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{81}}{2}$$

$$x = \frac{-3 \pm 9}{2}$$

$$x = \frac{6}{2} \text{ or } \frac{-12}{2}$$

$$x = 3 \text{ or } x = -6$$

2. $2k^2 + 2 = 2k$ $a=2$
 $b=-2$
 $c=2$

$$2k^2 - 2k + 2 = 0$$

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

$$x = \frac{2 \pm \sqrt{-12}}{4}$$

No solution!

3. $2x^2 - 2x - 4 = 0$ $a=2$
 $b=-2$
 $c=-4$

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

$$x = \frac{2 \pm \sqrt{36}}{4}$$

$$x = \frac{2 \pm 6}{4}$$

$$\frac{8}{4} \text{ or } \frac{-4}{4}$$

$$2 \text{ or } -1$$

$$4. 5r^2 + 5r - 67 = -7 \quad a=5$$

$$5r^2 + 5r - 60 = 0 \quad b=5$$

$$c=-60$$

$$x = \frac{-5 \pm \sqrt{25 - 4(5)(-60)}}{2(5)}$$

$$x = \frac{-5 \pm \sqrt{1225}}{10}$$

$$x = \frac{-5 \pm 35}{10}$$

$$\frac{30}{10} \quad \text{or} \quad \frac{-40}{10}$$

$$\boxed{3 \quad \text{or} \quad -4}$$

$$5. 6x^2 - 13x - 69 = 3 - 7x$$

$$6x^2 - 6x - 72 = 0 \quad a=6$$

$$b=-6$$

$$c=-72$$

$$x = \frac{6 \pm \sqrt{36 - 4(6)(-72)}}{2(6)}$$

$$x = \frac{6 \pm \sqrt{1764}}{12}$$

$$x = \frac{6 \pm 42}{12}$$

$$\frac{48}{12} \quad \text{or} \quad \frac{-36}{12}$$

$$\boxed{4 \quad \text{or} \quad -3}$$

$$6. 4b^2 + 6b - 30 = -12 \quad a=4$$

$$4b^2 + 6b - 18 = 0 \quad b=6$$

$$c=-18$$

$$x = \frac{-6 \pm \sqrt{36 - 4(4)(-18)}}{2(4)}$$

$$x = \frac{-6 \pm \sqrt{324}}{8}$$

$$x = \frac{-6 \pm 18}{8}$$

$$\frac{12}{8} \quad \text{or} \quad \frac{-24}{8}$$

$$\boxed{\frac{3}{2} \quad \text{or} \quad -3}$$

$$7. x^2 - 6x + 3 = -4x^2 \quad a=5$$

$$5x^2 - 6x + 3 = 0 \quad b=-6$$

$$c=3$$

$$x = \frac{6 \pm \sqrt{36 - 4(5)(3)}}{2(5)}$$

$$x = \frac{6 \pm \sqrt{24}}{10} \rightarrow \text{STOP!}$$

$\boxed{\text{No solution!}}$

$$8. 2n^2 - 7n - 4 = 5 \quad a=2$$

$$2n^2 - 7n - 9 = 0 \quad b=-7$$

$$c=-9$$

$$x = \frac{7 \pm \sqrt{49 - 4(2)(-9)}}{2(2)}$$

$$x = \frac{7 \pm \sqrt{121}}{4}$$

$$x = \frac{7 \pm 11}{4}$$

$$\frac{18}{4} \quad \text{or} \quad \frac{-4}{4}$$

$$\boxed{\frac{9}{2} \quad \text{or} \quad -1}$$

$$9. 6g^2 - 7g - 88 = 10 \quad a=6$$

$$6g^2 - 7g - 98 = 0 \quad b=-7$$

$$c=-98$$

$$x = \frac{7 \pm \sqrt{49 - 4(6)(-98)}}{2(6)}$$

$$x = \frac{7 \pm \sqrt{2401}}{12}$$

$$x = \frac{7 \pm 49}{12}$$

$$\frac{56}{12} \quad \text{or} \quad \frac{-42}{12}$$

$$\boxed{\frac{14}{3} \quad \text{or} \quad -\frac{7}{2}}$$

$$10. -6n^2 - 17n + 21 = -9 - 7n^2$$

$$n^2 - 17n + 30 = 0 \quad a=1$$

$$b=-17$$

$$c=30$$

$$x = \frac{17 \pm \sqrt{289 - 4(1)(30)}}{2(1)}$$

$$x = \frac{17 \pm \sqrt{169}}{2}$$

$$x = \frac{17 \pm 13}{2}$$

$$\frac{30}{2} \quad \text{or} \quad \frac{4}{2}$$

$$\boxed{15 \quad \text{or} \quad 2}$$

$$11. 10x^2 + 10x - 8 = 8x - 5x^2 \quad a=15$$

$$15x^2 + 2x - 8 = 0 \quad b=2$$

$$c=-8$$

$$x = \frac{-2 \pm \sqrt{4 - 4(15)(-8)}}{2(15)}$$

$$x = \frac{-2 \pm \sqrt{484}}{30}$$

$$x = \frac{-2 \pm 22}{30}$$

$$\frac{20}{30} \quad \text{or} \quad \frac{-24}{30}$$

$$\boxed{\frac{2}{3} \quad \text{or} \quad -\frac{4}{5}}$$

Solve each equation using the quadratic formula. Give your answers in both EXACT (simplified radical) and DECIMAL (round to the nearest hundredth).

12. $5x^2 - 5x = -1$
 $5x^2 - 5x + 1 = 0$
 $x = \frac{5 \pm \sqrt{25 - 4(5)(1)}}{2(5)}$
 $x = \frac{5 \pm \sqrt{5}}{10}$

$a = 5$
 $b = -5$
 $c = 1$

EXACT: $\frac{1}{2} \pm \frac{\sqrt{5}}{10}$

ROUNDED: 0.72 or 0.28

13. $-7x^2 + 1 = -3x$
 $0 = 7x^2 - 3x - 1$
 $x = \frac{3 \pm \sqrt{9 - 4(7)(-1)}}{2(7)}$
 $x = \frac{3 \pm \sqrt{37}}{14}$

$a = 7$
 $b = -3$
 $c = -1$

EXACT: $\frac{3}{14} \pm \frac{\sqrt{37}}{14}$

ROUNDED: 0.65 or -0.22

14. $11x^2 - 6x - 3 = 6x^2$
 $5x^2 - 6x - 3 = 0$
 $x = \frac{6 \pm \sqrt{36 - 4(5)(-3)}}{2(5)}$
 $x = \frac{6 \pm \sqrt{96}}{10}$
 $\frac{6}{10} \pm \frac{\sqrt{16 \cdot 6}}{10}$

$a = 5$
 $b = -6$
 $c = -3$

EXACT: $\frac{3}{5} \pm \frac{2\sqrt{6}}{5}$

ROUNDED: 1.58 or -0.38

15. $3r^2 + 6r - 4 = -r^2 + 5$
 $4r^2 + 6r - 9 = 0$
 ~~$x = \frac{-6 \pm \sqrt{36 - 4(4)(-9)}}{2(4)}$~~
 $x = \frac{-6 \pm \sqrt{180}}{8}$
 $x = \frac{-6}{8} \pm \frac{\sqrt{4 \cdot 9 \cdot 5}}{8}$
 $\frac{2.3}{4}$

$a = 4$
 $b = 6$
 $c = -9$

EXACT: $-\frac{3}{4} \pm \frac{3\sqrt{5}}{4}$

ROUNDED: 0.93 or -2.43

16. Find the vertex of
 $f(x) = -x^2 + 8x - 6$
 $-\frac{b}{2a} = \frac{-8}{2(-1)} = 4$
 $f(4) = -(4)^2 + 8(4) - 6$
 $-16 + 32 - 6$
 10
 $(4, 10)$

17. Solve by **factoring**.
 $x^2 + 5x - 36 = 0$
 $(x+9)(x-4) = 0$
 $x+9=0$ $x-4=0$
 $x=-9$ $x=4$

18. Use the function to evaluate.
 $f(x) = \begin{cases} 4x^2 - 1, & x \leq -2 \\ -x, & x > -2 \end{cases}$
a. $f(0) = 0$ b. $f(5) = -5$
 -0 -5
c. $f(-2) = 15$ d. $f(-3) = 35$
 $4(-2)^2 - 1$ $4(-3)^2 - 1$
 $16 - 1$ $36 - 1$