

The Quadratic Formula

Simplify.

1) $\sqrt{192}$

$$\sqrt{64} \cdot \sqrt{3}$$

$$\boxed{8\sqrt{3}}$$

2) $\sqrt{294}$

$$\sqrt{49} \cdot \sqrt{6}$$

$$\boxed{7\sqrt{6}}$$

Solve each equation with the quadratic formula.

3) $x^2 - 2x - 24 = 0$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-24)}}{2(1)}$$

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

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

$$x = \frac{2}{2} \pm \frac{10}{2} = 1 \pm 5 = \boxed{6, -4}$$

5) $5n^2 - 5n - 1 = 0$

$$n = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(5)(-1)}}{2(5)}$$

$$n = \frac{5 \pm \sqrt{45}}{10}$$

$$n = \frac{5}{10} \pm \frac{\sqrt{45}}{10}$$

$$n = \frac{5}{10} \pm \frac{3\sqrt{5}}{10} = \boxed{\frac{1}{2} \pm \frac{3\sqrt{5}}{10}}$$

7) $8a^2 = 10a + 16 \rightarrow 8a^2 - 10a - 16 = 0$

$$a = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(8)(-16)}}{2(8)}$$

$$a = \frac{10 \pm \sqrt{612}}{16}$$

$$a = \frac{10 \pm 6\sqrt{17}}{16}$$

$$a = \frac{10}{16} \pm \frac{6\sqrt{17}}{16} = \boxed{\frac{5}{8} \pm \frac{3\sqrt{17}}{8}}$$

4) $3k^2 + 5k - 1 = 0$

$$k = \frac{-5 \pm \sqrt{(-5)^2 - 4(3)(-1)}}{2(3)}$$

$$k = \frac{-5 \pm \sqrt{37}}{6}$$

$$\boxed{k = \frac{-5}{6} \pm \frac{\sqrt{37}}{6}}$$

6) $x^2 + 4x - 10 = 0$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{56}}{2}$$

$$x = \frac{-4}{2} \pm \frac{\sqrt{56}}{2}$$

$$x = \frac{-4}{2} \pm \frac{2\sqrt{14}}{2} = \boxed{-2 \pm \sqrt{14}}$$

8) $m^2 + 10 = 8m \rightarrow m^2 - 8m + 10 = 0$

$$m = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(10)}}{2(1)}$$

$$m = \frac{8 \pm \sqrt{24}}{2}$$

$$m = \frac{8}{2} \pm \frac{\sqrt{24}}{2}$$

$$m = \frac{8}{2} \pm \frac{2\sqrt{6}}{2} = \boxed{4 \pm \sqrt{6}}$$

$$9) x^2 - 49 = 0$$

$$x = \frac{0 \pm \sqrt{0^2 - 4(1)(-49)}}{2(1)}$$

$$x = \frac{0 \pm \sqrt{196}}{2}$$

$$x = \frac{0}{2} \pm \frac{\sqrt{196}}{2}$$

$$x = \frac{0}{2} \pm \frac{14}{2} = 0 \pm 7 = \boxed{\pm 7}$$

$$11) k^2 + k - 84 = -10 \rightarrow k^2 + k - 74 = 0$$

$$k = \frac{-1 \pm \sqrt{1^2 - 4(1)(-74)}}{2(1)}$$

$$k = \frac{-1 \pm \sqrt{297}}{2}$$

$$k = -\frac{1}{2} \pm \frac{\sqrt{297}}{2}$$

$$k = -\frac{1}{2} \pm \frac{3\sqrt{33}}{2}$$

$$10) 7b^2 = -8b - 2 \rightarrow 7b^2 + 8b + 2 = 0$$

$$b = \frac{-8 \pm \sqrt{8^2 - 4(7)(2)}}{2(7)}$$

$$b = \frac{-8 \pm \sqrt{8}}{14}$$

$$b = \frac{-8}{14} \pm \frac{\sqrt{8}}{14}$$

$$b = \frac{-8}{14} \pm \frac{2\sqrt{2}}{14} = \boxed{\frac{-4}{7} \pm \frac{\sqrt{2}}{7}}$$

$$12) n^2 + 11n + 21 = 9 \rightarrow n^2 + 11n + 12 = 0$$

$$n = \frac{-11 \pm \sqrt{11^2 - 4(1)(12)}}{2(1)}$$

$$n = \frac{-11 \pm \sqrt{73}}{2}$$

$$n = \frac{-11}{2} \pm \frac{\sqrt{73}}{2}$$

Solve each equation by factoring.

$$13) 30n^2 - 210 = 108n$$

$$30n^2 - 108n - 210 = 0$$

$$6(5n^2 - 18n - 35) = 0$$

$$6(5n + 7)(n - 5) = 0$$

$$6=0 \quad 5n+7=0 \quad n-5=0$$

$$\text{Nope!} \quad 5n = -7 \quad n = 5$$

$$n = -\frac{7}{5}$$

$$14) 8x^2 + 12 = -35x$$

$$8x^2 + 35x + 12 = 0$$

$$(8x+3)(x+4) = 0$$

$$8x+3=0 \quad x+4=0$$

$$8x = -3 \quad x = -4$$

$$x = -\frac{3}{8}$$

Solve each equation by taking square roots.

$$15) 8x^2 - 10 = 398$$

$$8x^2 = 408$$

$$x^2 = 51$$

$$x = \pm \sqrt{51}$$

$$16) 2(x+5)^2 + 7 = 63$$

$$2(x+5)^2 = 56$$

$$(x+5)^2 = 28$$

$$x+5 = \pm \sqrt{28}$$

$$x+5 = \pm 2\sqrt{7}$$

$$x = -5 \pm 2\sqrt{7}$$