Algebra 2 3.4 The Quadratic Formula

Pg. 127 (5-13, 63)

5 $x^2 - 4x + 3 = 0$

$a = 1$, $b = -4$, $c = 3$

$$\frac{4 \pm \sqrt{16 - 4(1)(3)}}{2(1)} \rightarrow \frac{4 \pm \sqrt{16-12}}{2} \rightarrow \frac{4 \pm \sqrt{4}}{2} \rightarrow \frac{4 \pm 2}{2} = \frac{6}{2} = 3, \quad \frac{2}{2} = 1$$

6 $3x^2 + 6x + 3 = 0$

$a = 3$, $b = 6$, $c = 3$

$$\frac{-6 \pm \sqrt{36 - 4(3)(3)}}{2(3)} \rightarrow \frac{-6 \pm \sqrt{36-36}}{6} = \frac{-6 \pm 0}{6} = -1$$

7 $x^2 + 6x + 15 = 0$

$a = 1$, $b = 6$, $c = 15$

$$\frac{-6 \pm \sqrt{36 - 4(1)(15)}}{2(1)} \rightarrow \frac{-6 \pm \sqrt{36-60}}{2} \rightarrow \frac{-6 \pm \sqrt{-24}}{2}$$

$$\frac{-6 \pm \sqrt{24}i}{2} \quad \begin{matrix} 24:1 \\ 12:2 \\ 8:3 \\ 4:6 \end{matrix} \quad \frac{-6 \pm \sqrt{4}\sqrt{6}i}{2} \rightarrow \frac{-6 \pm 2\sqrt{6}i}{2} = -3 \pm \sqrt{6}i$$

8 $6x^2 - 2x + 1 = 0$

$a = 6$, $b = -2$, $c = 1$

$$\frac{2 \pm \sqrt{4 - 4(6)(1)}}{2(6)} \rightarrow \frac{2 \pm \sqrt{4-24}}{12} \rightarrow \frac{2 \pm \sqrt{-20}}{12} \rightarrow \frac{2 \pm \sqrt{20}i}{12}$$

$20:1$, $10:2$, $4:5$

$$\frac{2 \pm \sqrt{4}\sqrt{5}i}{12} \rightarrow \frac{2 \pm 2\sqrt{5}i}{12} \rightarrow \frac{2}{12} \pm \frac{2\sqrt{5}i}{12} \rightarrow \frac{1}{6} \pm \frac{1}{6}\sqrt{5}i$$

or

$$\frac{1}{6} \pm \frac{\sqrt{5}i}{6}$$

(9) $x^2 - 14x = -49$

$x^2 - 14x + 49 = 0$

$a = 1$, $b = -14$, $c = 49$

$$\frac{14 \pm \sqrt{196 - 4(1)(49)}}{2(1)} \rightarrow \frac{14 \pm \sqrt{196 - 196}}{2} \rightarrow \frac{14 \pm 0}{2} = 7$$

(10) $2x^2 + 4x = 30$

$-30 \quad -30$

$2x^2 + 4x - 30 = 0$

$a = 2$, $b = 4$, $c = -30$

$$\frac{-4 \pm \sqrt{16 - 4(2)(-30)}}{2(2)} \quad (-8(-30)) \rightarrow \frac{-4 \pm \sqrt{16 + 240}}{4} \rightarrow \frac{-4 \pm \sqrt{256}}{4}$$

$$\frac{-4 \pm 16}{4} \qquad \frac{-4+16}{4} = \frac{12}{4} = 3 \qquad \frac{-4-16}{4} = \frac{-20}{4} = -5$$

(11) $3x^2 + 5 = -2x$

$3x^2 + 2x - 5 = 0$

$a = 3$, $b = 2$, $c = -5$

$$\frac{-2 \pm \sqrt{4 - 4(3)(-5)}}{2(3)} \quad (-12(-5)) \rightarrow \frac{-2 \pm \sqrt{4 + 60}}{6} \rightarrow \frac{-2 \pm \sqrt{64}}{6}$$

$$\frac{-2 \pm 8}{6} \qquad \frac{-2+8}{6} = \frac{6}{6} = 1 \qquad \frac{-2-8}{6} = \frac{-10}{6} = -1.67$$

(12) $-3x = 2x^2 - 4$

$2x^2 + 3x - 4 = 0$

$a = 2$, $b = 3$, $c = -4$

$$\frac{-3 \pm \sqrt{9 - 4(2)(-4)}}{2(2)} \quad (-8(-4)) \rightarrow \frac{-3 \pm \sqrt{9 + 32}}{4} \rightarrow \frac{-3 \pm \sqrt{41}}{4}$$

(13) $-10x = -25 - x^2$

$x^2 - 10x + 25 = 0$

$a = 1$

$b = -10$

$c = 25$

$$\frac{10 \pm \sqrt{(-10)^2 - 4(1)(25)}}{2(1)} \rightarrow \frac{10 \pm \sqrt{100 - 100}}{2} \rightarrow \frac{10 \pm \sqrt{0}}{2} = \boxed{5}$$

(63) $h_0 = 10$ feet

$v = -55$ feet per second (↑ b/c down)

find $t = ?$ when $H = 0$

$H = -16t^2 + vt + h_0$

$0 = -16t^2 - 55t + 10$

$a = -16$

$b = -55$

$c = 10$

$$\frac{55 \pm \sqrt{3025 - 4(-16)(10)}}{2(-16)} \rightarrow \frac{55 \pm \sqrt{3025 + 640}}{-32}$$

$$\rightarrow \frac{55 \pm \sqrt{3665}}{-32} \rightarrow \frac{55 \pm 60.54}{-32}$$

$$\frac{55 + 60.54}{-32} = -3.6 \text{ sec} \quad \text{(not real)}$$

$$\frac{55 - 60.54}{-32} = .17 \text{ seconds}$$