

Solving Quadratics with Square Root Method

Solve each equation by taking square roots.

1) $10v^2 - 7 = 153$ $10v^2 = 160$
 $\boxed{\{4, -4\}}$ ✓ $v^2 = 16$
 $v = \pm 4$

2) $100r^2 - 2 = 98$ $100r^2 = 100$
 $\boxed{\{1, -1\}}$ ✓ $r^2 = 1$
 $r = \pm 1$

3) $5x^2 - 3 = -93$ $5x^2 = -90$
 $\boxed{\{3i\sqrt{2}, -3i\sqrt{2}\}}$ ✓ $x^2 = -18$
 $x = \pm \sqrt{-18}$
 $x = \pm 3i\sqrt{2}$

4) $49x^2 - 2 = 62$ $49x^2 = 64$
 $\boxed{\{\frac{8}{7}, -\frac{8}{7}\}}$ ✓ $x^2 = \frac{64}{49}$
 $x = \pm \sqrt{\frac{64}{49}}$

5) $16x^2 - 10 = 54$ $16x^2 = 64$
 $\boxed{\{2, -2\}}$ ✓ $x^2 = 4$
 $x = \pm \sqrt{4}$
 $x = \pm 2$

6) $6b^2 + 1 = -33$ $6b^2 = -34$
 $\boxed{\{\frac{i\sqrt{51}}{3}, -\frac{i\sqrt{51}}{3}\}}$ ✓ $b^2 = \frac{-34}{6}$
 $b^2 = \frac{-17}{3}$

$\frac{\sqrt{-17}}{\sqrt{3}} = \frac{i\sqrt{17}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{i\sqrt{51}}{3}$
 Rationalize! $b = \pm \sqrt{\frac{-17}{3}}$
 $\boxed{b = \pm \frac{i\sqrt{51}}{3}}$

7) $81a^2 + 5 = 6$ $81a^2 = 1$
 $\boxed{\{\frac{1}{9}, -\frac{1}{9}\}}$ ✓ $a^2 = \frac{1}{81}$
 $a = \pm \sqrt{\frac{1}{81}}$
 $a = \pm \frac{1}{9}$

8) $8k^2 + 1 = 217$ $8k^2 = 216$
 $\boxed{\{3\sqrt{3}, -3\sqrt{3}\}}$ ✓ $k^2 = 27$
 $k = \pm \sqrt{27}$
 $k = \pm 3\sqrt{3}$

Quadratic Formula Practice

Solve each equation with the quadratic formula.

1) $3v^2 - 9v - 12 = 0$

$\boxed{4, -1}$ ✓

$$X = \frac{9 \pm \sqrt{81 - 4(3)(-12)}}{2(3)}$$

$$X = \frac{9 \pm \sqrt{81 + 144}}{6} = \frac{9 \pm \sqrt{225}}{6}$$

$$X = \frac{9 \pm 15}{6}$$

3) $6n^2 + 2 = -9n$ $6n^2 + 9n + 2 = 0$

$\boxed{\frac{-9 + \sqrt{33}}{12}, \frac{-9 - \sqrt{33}}{12}}$ ✓

$$X = \frac{-9 \pm \sqrt{81 - 4(6)(2)}}{2(6)} = \frac{-9 \pm \sqrt{81 - 48}}{12}$$

$$X = \frac{-9 \pm \sqrt{33}}{12}$$

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

$\boxed{\frac{-1 + i\sqrt{5}}{2}, \frac{-1 - i\sqrt{5}}{2}}$ ✓

$$X = \frac{-2 \pm \sqrt{4 - 4(2)(3)}}{2(2)} = \frac{-2 \pm \sqrt{4 - 24}}{4}$$

$$X = \frac{-2 \pm \sqrt{-20}}{4} = \frac{-2 \pm 2i\sqrt{5}}{4} = \frac{-1 \pm i\sqrt{5}}{2}$$

7) $x^2 - 2x = 14$ $x^2 - 2x - 14 = 0$

$\boxed{1 + \sqrt{15}, 1 - \sqrt{15}}$ ✓

$$X = \frac{2 \pm \sqrt{4 - 4(1)(-14)}}{2(1)} = \frac{2 \pm \sqrt{4 + 56}}{2}$$

$$= \frac{2 \pm \sqrt{60}}{2} = \frac{2 \pm 2\sqrt{15}}{2} = 1 \pm \sqrt{15}$$

2) $-6a^2 + a + 77 = 0$

$\boxed{\left\{ \frac{7}{2}, \frac{11}{3} \right\}}$ ✓

$$X = \frac{-1 \pm \sqrt{1 - 4(-6)(77)}}{2(-6)} = \frac{-1 \pm \sqrt{1 + 1848}}{-12}$$

$$X = \frac{-1 \pm 43}{-12}$$

(Apparently $\sqrt{1849} = 43$)
"!"

4) $4n^2 - 7 = 8n$ $4n^2 - 8n - 7 = 0$

$\boxed{\left\{ \frac{2 + \sqrt{11}}{2}, \frac{2 - \sqrt{11}}{2} \right\}}$ ✓

$$X = \frac{8 \pm \sqrt{64 - 4(4)(-7)}}{2(4)} = \frac{8 \pm \sqrt{64 + 112}}{8}$$

$$X = \frac{8 \pm \sqrt{176}}{8} = \frac{8 \pm 4\sqrt{11}}{8} = \frac{2 \pm \sqrt{11}}{2}$$

6) $5n^2 = -4 - 3n$

$5n^2 + 3n + 4 = 0$

$\boxed{\left\{ \frac{-3 + i\sqrt{71}}{10}, \frac{-3 - i\sqrt{71}}{10} \right\}}$ ✓

$$X = \frac{-3 \pm \sqrt{9 - 4(5)(4)}}{2(5)} = \frac{-3 \pm \sqrt{9 - 80}}{10}$$

$$= \frac{-3 \pm \sqrt{-71}}{10} = \frac{-3 \pm i\sqrt{71}}{10}$$

8) $a^2 = -10 - 6a$

$a^2 + 6a + 10 = 0$

$\boxed{\{-3 + i, -3 - i\}}$ ✓

$$X = \frac{-6 \pm \sqrt{36 - 4(1)(10)}}{2(1)} = \frac{-6 \pm \sqrt{36 - 40}}{2}$$

$$\frac{-6 \pm \sqrt{-4}}{2} = \frac{-6 \pm 2i}{2} = -3 \pm i$$