

Algebra 2 // Topic 4 // Practice 1

quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$ax^2 + bx + c = 0$$

1 $x^2 - 3x - 1 = 0$

$\rightarrow a=1, b=-3, c=-1$

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

$$x = \frac{3 \pm \sqrt{9+4}}{2}$$

$$x = \frac{3 \pm \sqrt{13}}{2}$$

$\rightarrow x = \frac{3}{2} + \frac{\sqrt{13}}{2}$

$\rightarrow x = \frac{3}{2} - \frac{\sqrt{13}}{2}$

2 $x^2 + 7x = 1$

$\quad \quad \quad \underline{-1} \quad \underline{-1}$

$$x^2 + 7x - 1 = 0$$

$\rightarrow a=1, b=7, c=-1$

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(1)(-1)}}{2(1)}$$

$$= \frac{-7 \pm \sqrt{49+4}}{2} = \frac{-7 \pm \sqrt{53}}{2}$$

\downarrow
 $x = \frac{-7}{2} + \frac{\sqrt{53}}{2}$

\downarrow
 $x = \frac{-7}{2} - \frac{\sqrt{53}}{2}$

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

$\rightarrow a=2, b=-1, c=-5$

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

$$= \frac{1 \pm \sqrt{1+40}}{4} = \frac{1 \pm \sqrt{41}}{4}$$

\downarrow
 $x = \frac{1}{4} + \frac{\sqrt{41}}{4}$

\downarrow
 $x = \frac{1}{4} - \frac{\sqrt{41}}{4}$

4 $x^2 - 4x = -4$

$\quad \quad \quad \underline{+4} \quad \underline{+4}$

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

$\rightarrow a=1, b=-4, c=4$

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

$$= \frac{4 \pm \sqrt{16-16}}{2} = \frac{4 \pm \sqrt{0}}{2}$$

$$= \frac{4 \pm 0}{2}$$

$x=2$



$$\boxed{5} \quad x^2 - 2x - 5 = 0$$

$$\hookrightarrow a=1 \quad b=-2 \quad c=-5$$

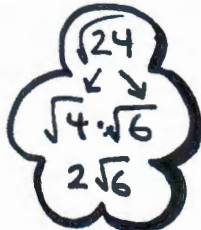
$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4+20}}{2} = \frac{2 \pm \sqrt{24}}{2}$$

$$= \frac{2 \pm 2\sqrt{6}}{2}$$

$$\downarrow$$
$$x = 1 + \sqrt{6}$$

$$\downarrow$$
$$x = 1 - \sqrt{6}$$


$$\begin{array}{c} \sqrt{24} \\ \swarrow \searrow \\ \sqrt{4 \cdot 6} \\ 2\sqrt{6} \end{array}$$

$$\boxed{6} \quad 3x^2 + x + 6 = 0$$

$$\hookrightarrow a=3 \quad b=1 \quad c=6$$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(3)(6)}}{2(3)}$$

$$= \frac{-1 \pm \sqrt{1-72}}{6}$$

$$= \frac{-1 \pm \sqrt{-71}}{6}$$

no real solution

$$\boxed{7} \quad 3x^2 = 2x + 6$$
$$-2x - 6 \quad -2x - 6$$

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

$$\hookrightarrow a=3 \quad b=-2 \quad c=-6$$

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

$$= \frac{2 \pm \sqrt{4+72}}{6}$$

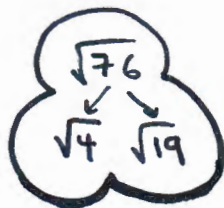
$$= \frac{2 \pm \sqrt{76}}{6}$$

$$= \frac{2 \pm 2\sqrt{19}}{6}$$

$$= \frac{1}{3} \pm \frac{\sqrt{19}}{3}$$

$$\downarrow$$
$$x = \frac{1}{3} + \frac{\sqrt{19}}{3}$$

$$\downarrow$$
$$x = \frac{1}{3} - \frac{\sqrt{19}}{3}$$


$$\begin{array}{c} \sqrt{76} \\ \swarrow \searrow \\ \sqrt{4 \cdot 19} \\ 2\sqrt{19} \end{array}$$

$$\boxed{8} \quad x^2 = 3x$$
$$-3x \quad -3x$$

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

$$\hookrightarrow a=1 \quad b=-3 \quad c=0$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(0)}}{2(1)}$$

$$= \frac{3 \pm \sqrt{9-0}}{2} = \frac{3 \pm \sqrt{9}}{2}$$

$$= \frac{3 \pm 3}{2}$$

$$\downarrow$$
$$x = \frac{6}{2}$$

$$x = 3$$

$$\downarrow$$
$$x = \frac{0}{2}$$

$$x = 0$$

$$\boxed{9} \quad 3x^2 + 2x - 4 = x^2 + 9x - 8$$

$$\quad \quad \quad -x^2 - 9x + 5 \quad \quad \quad -x^2 - 9x + 5$$

$$2x^2 - 7x + 1 = 0$$

$$\hookrightarrow a=2 \quad b=-7 \quad c=1$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(1)}}{2(2)}$$

$$= \frac{7 \pm \sqrt{49 - 8}}{4}$$

$$= \frac{7 \pm \sqrt{41}}{4}$$

$$\downarrow \qquad \qquad \downarrow$$

$$x = \frac{7}{4} + \frac{\sqrt{41}}{4} \qquad x = \frac{7}{4} - \frac{\sqrt{41}}{4}$$

$$\boxed{11} \quad 2x^2 - 6x + 1 = 0$$

$$\hookrightarrow a=2 \quad b=-6 \quad c=1$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$$

$$= \frac{6 \pm \sqrt{36 - 8}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4}$$

$$= \frac{6 \pm 2\sqrt{7}}{4}$$

$$\downarrow \qquad \downarrow$$

$$= \frac{3}{2} \pm \frac{\sqrt{7}}{2}$$

$$\downarrow \qquad \downarrow$$

$$x = \frac{3}{2} + \frac{\sqrt{7}}{2} \qquad x = \frac{3}{2} - \frac{\sqrt{7}}{2}$$



$$\boxed{10} \quad 2x^2 - 5 = 0$$

$$\hookrightarrow a=2 \quad b=0 \quad c=-5$$

$$x = \frac{-0 \pm \sqrt{0^2 - 4(2)(-5)}}{2(2)}$$

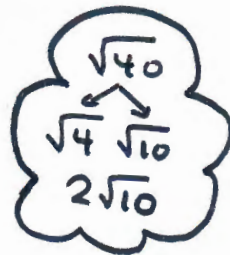
$$= \frac{0 \pm \sqrt{0 + 40}}{4}$$

$$= \frac{\pm 2\sqrt{10}}{4}$$

$$\downarrow \qquad \qquad \downarrow$$

$$x = \frac{+2\sqrt{10}}{4} \qquad x = \frac{-2\sqrt{10}}{4}$$

$$x = \frac{\sqrt{10}}{2} \qquad x = \frac{-\sqrt{10}}{2}$$



$$\boxed{12} \quad x^2 + 2x = -8$$

$$\quad \quad \quad \underline{+8} \quad \underline{+8}$$

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

$$\hookrightarrow a=1 \quad b=2 \quad c=8$$

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

$$= \frac{-2 \pm \sqrt{4 - 32}}{2}$$

$$= \frac{-2 \pm \sqrt{-28}}{2}$$

No Real Solution