

$$1.) \quad x^2 + 14x - 15 = 0$$

$$\quad \quad \quad +15 \quad +15$$

$$\hline x^2 + 14x \quad = 15$$

$$\quad \quad \quad +49 \quad +49$$

$$\hline x^2 + 14x + 49 = 64$$

$$\sqrt{(x+7)^2} = \sqrt{64}$$

$$x+7 = \pm 8$$

$$\quad \quad \quad -7 \quad -7$$

$$\hline x = -7 \pm 8$$

$$\swarrow \quad \searrow$$
$$x=1 \quad \text{or} \quad x=-15$$

$$2.) \quad 4x^2 + 6x - 6 = 2$$

$$\qquad \qquad \qquad +6 \quad +6$$

$$\frac{4x^2 + 6x}{4} = \frac{8}{4}$$

$$x^2 + \frac{3}{2}x = 2$$

$$\qquad \qquad \qquad + \left(\frac{3}{4}\right)^2 \qquad + \left(\frac{3}{4}\right)^2$$

$$\sqrt{\left(x + \frac{3}{4}\right)^2} = \sqrt{\frac{41}{16}}$$

$$x + \frac{3}{4} = \pm \sqrt{\frac{41}{16}}$$

$$\qquad -\frac{3}{4} \qquad -\frac{3}{4}$$

$$x = -\frac{3}{4} \pm \sqrt{\frac{41}{16}}$$

$$\frac{ax^2}{a} + \frac{bx}{a} + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$- \frac{c}{a} \quad - \frac{c}{a}$$

$$x^2 + \frac{b}{a}x = - \frac{c}{a}$$

$$\begin{aligned} 1.) \quad x^2 + 14x - 15 &= 0 = \\ &= x^2 + 14x - 15 \quad \begin{array}{r} +15 \quad +15 \\ \hline \end{array} \\ &\quad \begin{array}{r} +49 \quad +49 \\ \hline \end{array} \\ x^2 + 14x + 49 &= 64 \\ \sqrt{(x+7)^2} &= \sqrt{64} \end{aligned}$$

$$\begin{aligned} x+7 &= \pm 8 \\ \underline{-7} \quad \underline{-7} \\ x_{1,2} &= -7 \pm 8 \\ &\searrow \\ &\boxed{\begin{array}{l} x_1 = 1 \\ x_2 = -15 \end{array}} \end{aligned}$$

$$2.) \quad 4x^2 + 6x - 6 = 2$$

$+6 \quad +6$

$$\frac{4x^2 + 6x}{4} = \frac{8}{4}$$

$$x^2 + \frac{3}{2}x = 2$$

$+ \left(\frac{3}{4}\right)^2 \quad + \left(\frac{3}{4}\right)^2$

$$x^2 + \frac{3}{2}x + \left(\frac{3}{4}\right)^2 = \frac{41}{16}$$

$$\sqrt{\left(x + \frac{3}{4}\right)^2} = \sqrt{\frac{41}{16}}$$

$$x + \frac{3}{4} = \pm \sqrt{\frac{41}{16}}$$

$$x = -\frac{3}{4} \pm \sqrt{\frac{41}{16}}$$

$$x \approx 0.85 \text{ or } x \approx -2.35$$

$$3.) \quad \frac{2x^2}{2} - \frac{4x}{2} = \frac{2}{2}$$

$$x^2 - 2x = 1$$

$$+1 \quad +1$$

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

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

$$x-1 = \pm \sqrt{2}$$

$$+1 \quad +1$$

$$x = 1 \pm \sqrt{2}$$

$$2.41 \text{ or } -0.41$$

$$\begin{array}{r} \frac{ax^2}{a} + \frac{bx}{a} + \frac{c}{a} = \frac{0}{a} \\ \hline x^2 + \frac{b}{a}x + \frac{c}{a} = 0 \\ \phantom{x^2 + \frac{b}{a}x} - \frac{c}{a} \quad - \frac{c}{a} \\ \hline x^2 + \frac{b}{a}x = -\frac{c}{a} \\ \phantom{x^2 + \frac{b}{a}x} + \left(\frac{b}{2a}\right)^2 \quad + \left(\frac{b}{2a}\right)^2 \\ \hline x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a} \end{array}$$

$$21.) \quad 4y^2 + 4y - 9 = 0$$

$$\frac{4y^2 + 4y}{4} = \frac{9}{4}$$

$$y^2 + y = \frac{9}{4}$$

$$y^2 + y + \left(\frac{1}{2}\right)^2 = \frac{9}{4} + \frac{1}{4}$$

$$\sqrt{\left(y + \frac{1}{2}\right)^2} = \sqrt{\frac{10}{4}}$$

$$y + \frac{1}{2} = \pm \sqrt{\frac{10}{4}}$$

$$-\frac{1}{2} \quad -\frac{1}{2}$$

$$y = -\frac{1}{2} \pm \sqrt{\frac{10}{4}}$$

$$y = -\frac{1}{2} + \sqrt{\frac{10}{4}} \text{ or } y = -\frac{1}{2} - \sqrt{\frac{10}{4}}$$

$$\approx 1.08$$

$$\approx -2.08$$

$$\sqrt{\frac{41}{16}} = \frac{\sqrt{41}}{\sqrt{16}} = \frac{\sqrt{41}}{4}$$

$$13.) \quad 2x^2 - 6x - 15 = 5$$

$$\begin{array}{rcl} 2x^2 - 6x & & \\ \hline 2 & 2 & \\ \hline x^2 - 3x & = & 10 \end{array}$$

$$\begin{array}{rcl} & + \left(-\frac{3}{2}\right)^2 & + \left(\frac{3}{2}\right)^2 \\ \hline x^2 - 3x + \frac{9}{4} & = & 10 + \frac{9}{4} \\ \sqrt{\left(x - \frac{3}{2}\right)^2} & = & \sqrt{\frac{49}{4}} \end{array}$$

$$\begin{array}{rcl} x - \frac{3}{2} & = & \pm \sqrt{\frac{49}{4}} \\ + \frac{3}{2} & + \frac{3}{2} & \\ \hline x & = & \frac{3}{2} \pm \frac{7}{2} \\ \swarrow & & \searrow \\ x = \frac{3}{2} + \frac{7}{2} & x = \frac{3}{2} - \frac{7}{2} & \\ = \frac{10}{2} = 5 & = \frac{-4}{2} = -2 & \end{array}$$

$$25.) \quad 3x^2 + 4x + 4 = 3$$

$$\quad \quad \quad -4 \quad -4$$

$$\frac{3x^2 + 4x}{3} = \frac{-1}{3}$$

$$x^2 + \frac{4}{3}x = -\frac{1}{3}$$

$$+ \left(\frac{2}{3}\right)^2 + \left(\frac{2}{3}\right)^2$$

$$x^2 + \frac{4}{3}x + \frac{4}{9} = -\frac{1}{3} + \frac{4}{9}$$

$$\sqrt{\left(x + \frac{2}{3}\right)^2} = \sqrt{\frac{1}{9}}$$

$$x + \frac{2}{3} = \pm \sqrt{\frac{1}{9}}$$

$$x + \frac{2}{3} = \pm \frac{1}{3}$$

$$-\frac{2}{3} \quad -\frac{2}{3}$$

$$x = -\frac{2}{3} \pm \frac{1}{3}$$

$$x = -\frac{2}{3} + \frac{1}{3} \text{ or } x = -\frac{2}{3} - \frac{1}{3}$$

$$= -\frac{1}{3} \quad = -\frac{3}{3} = -1$$

$$\begin{aligned} 27.) \quad x^2 + 2x &= 2 \\ &\quad + (1)^2 + (1)^2 \\ \hline x^2 + 2x + 1 &= 3 \\ \sqrt{(x+1)^2} &= \sqrt{3} \\ \cdot \quad x+1 &= \pm \sqrt{3} \\ \frac{-1}{x} &\quad \frac{-1}{-1} \\ \hline x &= -1 \pm \sqrt{3} \end{aligned}$$

Quadratic Formula

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