

$$\textcircled{1} \frac{x^2 + 3x + 2}{x^2 - x - 2} = \frac{(x+2) \cancel{(x+1)}}{(x-2) \cancel{(x+1)}} = \frac{x+2}{x-2}$$

$$\begin{aligned} \textcircled{2} \frac{x^2}{x^2 - 4} - \frac{x+1}{x+2} & \quad \text{mult by 1} \\ & = \frac{x^2}{\underline{(x-2)(x+2)}} - \frac{x+1}{x+2} \cdot \frac{x-2}{x-2} \\ & = \frac{x^2}{(x-2)(x+2)} - \frac{x^2 - x - 2}{(x-2)(x+2)} = \frac{\overbrace{x^2 - (x^2 - x - 2)}^{x^2 - x^2 + x + 2}}{(x-2)(x+2)} \\ & = \frac{\cancel{x+2}}{(x-2)\cancel{(x+2)}} = \frac{1}{x-2} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \frac{\frac{y}{y} \cdot \frac{y}{x} - \frac{x}{y} \cdot \frac{x}{x}}{\frac{x}{x} \cdot \frac{1}{y} - \frac{1}{x} \cdot \frac{y}{y}} & = \frac{\frac{y^2}{xy} - \frac{x^2}{xy}}{\frac{x}{xy} - \frac{y}{xy}} = \frac{\frac{y^2 - x^2}{xy}}{\frac{x-y}{xy}} \\ & = \frac{\underline{y^2 - x^2}}{\cancel{xy}} \cdot \frac{\cancel{xy}}{x-y} = \frac{y^2 - x^2}{x-y} = \frac{(y-x)(y+x)}{x-y} \end{aligned}$$

$$= \frac{-\overset{x-y}{\cancel{(-y+x)}}(y+x)}{\cancel{x-y}} = \frac{-(y+x)}{1} = -y-x$$

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \cdot \frac{d}{c}$$

$$\textcircled{4} \quad x^2 - 5x + 6 = 0$$

$$\hookrightarrow (x-2)(x-3) = 0$$

$$x-2=0$$

$$x-3=0$$

$$\boxed{x=2 \quad x=3}$$

$$\textcircled{5} \quad \underset{a}{2}x^2 + \underset{b}{4}x + \underset{c}{1} = 0$$

$$x = \frac{-4 \pm \sqrt{16-8}}{4} = \frac{-4 \pm \sqrt{8}}{4}$$

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

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

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

$$\begin{aligned} \sqrt{8} &= \sqrt{4 \cdot 2} \\ &= \sqrt{4} \sqrt{2} \\ &= 2\sqrt{2} \end{aligned}$$

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

$$\boxed{x = -1 + \frac{\sqrt{2}}{2}, -1 - \frac{\sqrt{2}}{2}}$$

$$(a-b)(a+b) = a^2 - b^2$$

$$\textcircled{6} \frac{\sqrt{10}}{\sqrt{5}-2} \cdot \frac{\sqrt{5+2}}{\sqrt{5+2}}$$

conjugate

$$= \frac{\sqrt{10}(\sqrt{5+2})}{5-4} = \frac{\sqrt{50} + 2\sqrt{10}}{1} = 5\sqrt{2} + 2\sqrt{10}$$

$$\textcircled{7} \frac{\sqrt{4+h}-2}{h} \cdot \frac{\sqrt{4+h}+2}{\sqrt{4+h}+2} = \frac{\cancel{4+h} - \cancel{4}}{h(\sqrt{4+h}+2)}$$

$$= \frac{\cancel{h}}{h(\sqrt{4+h}+2)} = \boxed{\frac{1}{\sqrt{4+h}+2}}$$

$$\frac{\sqrt{h^2-2h+1} + \sqrt{3h^2-7}}{h} \cdot \frac{\sqrt{h^2-2h+1} - \sqrt{3h^2-7}}{\sqrt{h^2-2h+1} - \sqrt{3h^2-7}}$$

$$\textcircled{1} \frac{x^2 + 3x + 2}{x^2 - x - 2} = \frac{(x+2)\cancel{(x+1)}}{(x-2)\cancel{(x+1)}} = \frac{x+2}{x-2}$$

$$\textcircled{2} \frac{x^2}{x^2 - 4} - \frac{x+1}{x+2} = \frac{x^2}{(x+2)(x-2)} - \frac{x+1}{x+2} \cdot \frac{x-2}{x-2}$$

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

$$= \frac{\cancel{x+2}}{(\cancel{x+2})(x-2)} = \frac{1}{x-2}$$

$x^2 - x^2 + x + 2$

$$\textcircled{3} \frac{\frac{y}{y} \cdot \frac{y}{x} - \frac{x}{y} \cdot \frac{x}{x}}{\frac{x}{x} \cdot \frac{1}{y} - \frac{1}{x} \cdot \frac{y}{y}} = \frac{\frac{y^2}{xy} - \frac{x^2}{xy}}{\frac{x}{xy} - \frac{y}{xy}} = \frac{\frac{y^2 - x^2}{xy}}{\frac{x-y}{xy}}$$

$$= \frac{y^2 - x^2}{\cancel{xy}} \cdot \frac{\cancel{xy}}{x-y} = \frac{y^2 - x^2}{x-y} = \frac{(y-x)(y+x)}{(x-y)}$$

$$= \frac{-\cancel{x-y+x}(y+x)}{\cancel{x-y}} = -(y+x) = -y-x$$

$$\textcircled{4} x^2 - 5x + 6 = 0$$

$$\hookrightarrow (x-3)(x-2) = 0$$

$$x-3=0 \quad x-2=0$$

$$\boxed{x=3 \quad x=2}$$

$$\begin{array}{r} 6 \\ -3 \quad -2 \\ \hline -5 \end{array}$$

$$\textcircled{5} 2x^2 + 4x + 1 = 0$$

a                  b                  c

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

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

$$x = \frac{-4 \pm \sqrt{16 - 8}}{4} = \frac{-4 \pm \sqrt{8}}{4}$$

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

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

$$x = \underline{-1 + \frac{\sqrt{2}}{2}}$$

$$\underline{-1 - \frac{\sqrt{2}}{2}}$$

$$\sqrt{ab} = \sqrt{a} \sqrt{b}$$

$$\sqrt{8} = \sqrt{4 \cdot 2}$$

$$= \sqrt{4} \cdot \sqrt{2}$$

$$= 2\sqrt{2}$$

$$\textcircled{6} \frac{\sqrt{10}}{\sqrt{5}-2} \cdot \frac{\sqrt{5}+2}{\sqrt{5}+2}$$

*conjugate*

$$= \frac{\sqrt{50} + 2\sqrt{10}}{5-4} = \boxed{5\sqrt{2} + 2\sqrt{10}}$$

---

$$\textcircled{7} \frac{\sqrt{4+h}-2}{h} \cdot \frac{\sqrt{4+h}+2}{\sqrt{4+h}+2} = \frac{\cancel{4+h}-\cancel{4}}{h(\sqrt{4+h}+2)}$$

$$= \frac{\cancel{h}}{\cancel{h}(\sqrt{4+h}+2)} = \boxed{\frac{1}{\sqrt{4+h}+2}}$$

$$(a-b)(a+b) = a^2 - b^2$$