

## 5.2 Multiplying and Dividing Rational Expressions

①  $\frac{y^2-2y}{y^2+7y-18} \div \frac{y^2-11y+18}{y^2-81}$  → restrictions:  $y \neq 9, -9, 2$

$$\frac{y(\cancel{y-2})}{(y+9)(\cancel{y-2})} \div \frac{(\cancel{y-9})(y-2)}{(\cancel{y-9})(y+9)} = \frac{y}{y+9} \cdot \frac{y+9}{y-2} = \boxed{\frac{y}{y-2}}$$

②  $\frac{y^2-25}{y^2-16} \div \frac{2y+10}{y^2-4y}$  → restrictions:  $y \neq 4, -4, 0$

$$\frac{(y-5)(y+5)}{(y-4)(y+4)} \div \frac{2(y+5)}{y(y-4)} = \frac{(\cancel{y-5})(\cancel{y+5})}{(y-4)(y+4)} \cdot \frac{y(\cancel{y-4})}{(\cancel{y-5})(\cancel{y+5})} = \boxed{\frac{y}{y+4}}$$

③  $\frac{14x+7}{4x-6} \cdot \frac{8x-12}{42x+21}$  → restrictions:  $x = \frac{3}{2}, -\frac{1}{2}$

$$\frac{\cancel{7}(2x+1)}{2(2x-3)} \cdot \frac{4(2x-3)}{21(3x+1)} = \frac{\cancel{7} \cdot \cancel{4}}{2 \cdot 3 \cdot 3} = \boxed{\frac{2}{3}}$$

④  $\frac{x^2}{x^2+2x+1} \div \frac{3x}{x^2-1}$  → restrictions:  $x \neq -1, 1$

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

$$(5) \frac{2x+4}{3x-3} \cdot \frac{12x-12}{x+5} \rightarrow \text{restrictions: } x=1, -5$$

$$\frac{2(x+2)}{3(x-1)} \cdot \frac{12(x-1)}{x+5} = \frac{24(x+2)}{3(x+5)} = \boxed{\frac{8(x+2)}{x+5}}$$

$$(6) \frac{\frac{1}{3x}}{\frac{5}{6y}} = \frac{1}{3x} \cdot \frac{6y}{1} = \frac{6y}{3x} = \boxed{\frac{2y}{x}} \quad x \neq 0$$

$$(7) \frac{x-2}{(x+2)^2} \cdot \frac{x+2}{2x-4} \quad x \neq -2, 2$$

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

$$(8) \frac{5a}{5a+5} \cdot \frac{10a+10}{a}$$

$$\frac{5a}{5(a+1)} \cdot \frac{10(a+1)}{a} = \boxed{10}$$

$$(9) \frac{x+6}{x^2-36} = \frac{(x+6)}{(x+6)(x-6)} = \frac{1}{(x-6)} \quad x \neq 6, -6$$