

## Exam Review: Rational Expressions

$$1. a) \begin{aligned} 2x^2 + 4x - 6 \\ = 2(x^2 + 2x - 3) \\ = 2(x+3)(x-1) \end{aligned}$$

$$b) \begin{aligned} 9x^2 - 4y^2 \\ = (3x-2y)(3x+2y) \end{aligned}$$

$$c) \begin{aligned} 6x^2 + 5x - 4 & \quad \begin{matrix} x(2y) \\ + (5) \end{matrix} \end{aligned}$$

$$\begin{aligned} & \text{Decomposition} \\ 6x^2 + 5x - 4 \\ = 6x^2 + 8x - 3x - 4 \\ = 2x(3x+4) - 1(3x+4) \\ = (2x-1)(3x+4) \end{aligned}$$

$$\begin{aligned} & \text{or Australian} \\ 6x^2 + 5x - 4 \\ = \frac{(3x+4)(2x-1)}{1} \\ = (3x+4)(2x-1) \end{aligned}$$

$$\left. \begin{matrix} x(-2y) \\ + (5) \end{matrix} \right\} \begin{matrix} 8, -3 \end{matrix}$$

$$2. a) \begin{aligned} \frac{32x^5y^3}{8xy^2} \\ = 4x^4y \quad ; x, y \neq 0 \end{aligned}$$

$$b) \begin{aligned} \frac{5y}{8x^2} \cdot \frac{12x^6y^3}{6x^2y} \\ = \frac{60x^6y^4}{48x^4y} \\ = \frac{5x^2y^3}{4} \quad ; x, y \neq 0 \end{aligned}$$

$$c) \begin{aligned} \frac{2x-6}{x+2} \cdot \frac{x+1}{x-3} \\ = \frac{2(\cancel{x-3})}{x+2} \cdot \frac{x+1}{\cancel{x-3}} \\ = \frac{2(x+1)}{x+2} \quad ; x \neq -2, 3 \end{aligned}$$

$$d) \begin{aligned} \frac{2}{x-3} - \frac{3}{x+5} \\ = \frac{2(x+5)}{(x-3)(x+5)} - \frac{3(x-3)}{(x-3)(x+5)} \\ = \frac{2(x+5) - 3(x-3)}{(x-3)(x+5)} \\ = \frac{2x+10 - 3x+9}{(x-3)(x+5)} \\ = \frac{-x+19}{(x-3)(x+5)} \quad ; x \neq 3, -5 \end{aligned}$$

$$\left. \begin{array}{l} x(-6) \\ +(-5) \end{array} \right\} -6, 1$$

Decomp

$$\begin{aligned} & 2x^2 - 5x - 3 \\ &= 2x^2 - 6x + x - 3 \\ &= 2x(x-3) + 1(x-3) \\ &= (2x+1)(x-3) \end{aligned}$$

e)

$$\frac{x^2 - 9}{2x^2 - 5x - 3}$$

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

$$= \frac{x+3}{2x+1} \quad ; x \neq -\frac{1}{2}, 3$$

f)

$$\frac{2}{x^2 + x - 6} + \frac{3x}{x^2 - 4}$$

$$= \frac{2}{(x+3)(x-2)} + \frac{3x}{(x+2)(x-2)}$$

$$= \frac{2(x+2)}{(x+3)(x-2)(x+2)} + \frac{3x(x+3)}{(x+2)(x-2)(x+3)}$$

$$= \frac{2(x+2) + 3x(x+3)}{(x+3)(x-2)(x+2)}$$

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

$$= \frac{3x^2+11x+4}{(x+3)(x-2)(x+2)} \quad ; x \neq \pm 2, -3$$

can't factor numerator

3. a)

$$\frac{7x}{(x+3)(x-5)} \cdot \frac{2(x-8)}{3}$$

$x \neq -3$        $x \neq 5$

b)

$$\frac{4}{2x-5} - \frac{2x}{x^2}$$

$2x-5 \neq 0$        $x \neq 0$

$$\frac{2x \neq 5}{2} \quad \frac{2x \neq 5}{2}$$

$$x \neq \frac{5}{2}$$

c)

$$\frac{2x}{5(x-y)} - \frac{x}{7}$$

$x-y \neq 0$   
 $x \neq y$

d)

$$\frac{x+4}{x-5} \div \frac{3-x}{x-1}$$

$x \neq 5$        $x \neq 3$        $x \neq 1$