

Exercise 1A

$$\begin{aligned}
 1 \quad & \frac{x^2 - 64}{x^2 - 36} \div \frac{64 - x^2}{x^2 - 36} \\
 &= \frac{x^2 - 64}{x^2 - 36} \times \frac{x^2 - 36}{64 - x^2} \\
 &= \frac{\cancel{(x+8)}(x-8)}{\cancel{(x+6)}\cancel{(x-6)}} \times \frac{\cancel{(x+6)}\cancel{(x-6)}}{\cancel{(8+x)}(8-x)} \\
 &= \frac{(x-8)}{(8-x)} \\
 &= \frac{(x-8)}{-(x-8)} \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 2 \quad & \frac{2x^2 - 11x - 40}{x^2 - 4x - 32} \times \frac{x^2 + 8x + 16}{6x^2 - 3x - 45} \div \frac{8x^2 + 20x - 48}{10x^2 - 45x + 45} \\
 &= \frac{2x^2 - 11x - 40}{x^2 - 4x - 32} \times \frac{x^2 + 8x + 16}{6x^2 - 3x - 45} \times \frac{10x^2 - 45x + 45}{8x^2 + 20x - 48} \\
 &= \frac{\cancel{(2x+5)}\cancel{(x-8)}}{\cancel{(x+4)}\cancel{(x-8)}} \times \frac{\cancel{(x+4)}\cancel{(x+4)}}{3\cancel{(2x+5)}\cancel{(x-3)}} \times \frac{5\cancel{(2x-3)}\cancel{(x-3)}}{4\cancel{(2x-3)}\cancel{(x+4)}} \\
 &= 1 \times \frac{1}{3} \times \frac{5}{4} \\
 &= \frac{5}{12} \\
 &a = 5, b = 12
 \end{aligned}$$

$$\begin{aligned}
 3 \quad & \frac{x^2 + 2x - 24}{2x^2 + 10x} \times \frac{x^2 - 3x}{x^2 + 3x - 18} \\
 &= \frac{\cancel{(x+6)}(x-4)}{2\cancel{x}(x+5)} \times \frac{\cancel{x}(x-3)}{\cancel{(x+6)}\cancel{(x-3)}} \\
 &= \frac{(x-4)}{2(x+5)} \\
 &= \frac{x-4}{2x+10}
 \end{aligned}$$

$$\begin{aligned} 4 \text{ a } f(x) &= \frac{2x^2 - 3x - 2}{6x - 8} \div \frac{x - 2}{3x^2 + 14x - 24} \\ &= \frac{2x^2 - 3x - 2}{6x - 8} \times \frac{3x^2 + 14x - 24}{x - 2} \\ &= \frac{(2x+1)\cancel{(x-2)}}{2\cancel{(3x-4)}} \times \frac{\cancel{(3x-4)}(x+6)}{\cancel{x-2}} \\ &= \frac{(2x+1)(x+6)}{2} \\ &= \frac{2x^2 + 13x + 6}{2} \end{aligned}$$

$$\text{b } f(x) = x^2 + \frac{13}{2}x + 3$$

$$f'(x) = 2x + \frac{13}{2}$$

$$f'(4) = 2 \times 4 + \frac{13}{2} = \frac{29}{2}$$