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Rational Expressions - Add & Subtraction | Past Paper Question | C3 Edexcel June 2014 Q5(a)

$$g(x) = \frac{x}{x+3} + \frac{3(2x+1)}{x^2+x-6}, \quad x > 3$$

(a) Show that $g(x) = \frac{x+1}{x-2}, \quad x > 3$ (4)

$$\begin{aligned} g(x) &\equiv \frac{x}{x+3} + \frac{3(2x+1)}{x^2+x-6} \\ &\equiv \frac{x}{x+3} + \frac{3(2x+1)}{(x+3)(x-2)} \\ &\equiv \frac{x}{x+3} \cdot \frac{x-2}{x-2} + \frac{3(2x+1)}{(x+3)(x-2)} \\ &\equiv \frac{x(x-2) + 3(2x+1)}{(x+3)(x-2)} \end{aligned}$$
$$\begin{aligned} \therefore g(x) &\equiv \frac{x^2 - 2x + 6x + 3}{(x+3)(x-2)} \\ &\equiv \frac{x^2 + 4x + 3}{(x+3)(x-2)} \\ &\equiv \frac{(x+1)(x+3)}{(x+3)(x-2)} \\ &\equiv \frac{x+1}{x-2} \end{aligned}$$

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