Exercise 2

Paper 1 style · No calculator

2 7 marks AHL 2.14 ●●○ Typical

Let $f(x) = \dfrac{2x+7}{x-2}$, for $x \neq 2$.

(a) Show that $(f \circ f)(x) = x$. **[3]**

(b) Hence write down $f^{-1}(x)$. **[1]**

(c) Write down the equation of the line in which the graph of f is symmetric. **[1]**

(d) Find the x-coordinates of the points where the graph of f meets the line $y = x$. **[2]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$$f(f(x)) = \frac{2\frac{2x+7}{x-2}+7}{\frac{2x+7}{x-2}-2} \quad \text{M1}$$

$$= \frac{4x+14+7x-14}{2x+7-2x+4} \quad \text{A1}$$

$$= \frac{11x}{11} = x \quad \text{A1}$$

Total 3 marks

Note AG.

MARKSCHEME (b)

$$f^{-1}(x) = \frac{2x+7}{x-2} \quad \text{A1}$$

Total 1 mark

MARKSCHEME (c)

$$y = x \quad \text{A1}$$

Total 1 mark

MARKSCHEME (d)

$$2x+7 = x^2 - 2x,\ x^2 - 4x - 7 = 0 \quad \text{M1}$$

$$x = 2 \pm \sqrt{11} \quad \text{A1}$$

Total 2 marks