Marked example 2

Paper 1 style · No calculator

2 7 marks AHL 2.14 ●●○ Typical

Let $f(x) = \dfrac{3x+5}{x-3}$, for $x \neq 3$.

(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]**

MARKSCHEME (a)

$f(f(x)) = \dfrac{3\frac{3x+5}{x-3}+5}{\frac{3x+5}{x-3}-3}$ **M1**

$= \dfrac{9x+15+5x-15}{3x+5-3x+9}$ **A1**

$= \dfrac{14x}{14} = x$ **A1**

Total 3 marks

Note Multiplying above and below by $x-3$.

Note AG.

MARKSCHEME (b)

$f^{-1}(x) = \dfrac{3x+5}{x-3}$ **A1**

Total 1 mark

MARKSCHEME (c)

$y = x$ **A1**

Total 1 mark

MARKSCHEME (d)

$3x+5 = x^2-3x,\ x^2-6x-5=0$ **M1**

$x = 3 \pm \sqrt{14}$ **A1**

Total 2 marks

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