



10. The function f is defined by

$$f(x) = \frac{8x+5}{2x+3} \quad x > -\frac{3}{2}$$

- (a) Find $f^{-1}\left(\frac{3}{2}\right)$ (2)
- (a) $\frac{8x+5}{2x+3} = \frac{3}{2} \Rightarrow 2(8x+5) = 3(2x+3)$
 $16x+10 = 6x+9$
 $10x = -1$
 $x = -\frac{1}{10}$ (1 mark)
- (b) Show that

$$f(x) = A + \frac{B}{2x+3}$$

where A and B are constants to be found.

(2)

The function g is defined by

$$g(x) = 16 - x^2 \quad 0 \leq x \leq 4$$

- (c) State the range of g^{-1} (1)
- (d) Find the range of fg^{-1} (3)

(b)

$$\begin{array}{r} 4 \\ 2x+3 \overline{) 8x+5} \\ \underline{-(8x+12)} \\ -7 \end{array} \quad \text{so } f(x) = 4 - \frac{7}{2x+3} \quad (2 \text{ marks})$$

(c) range of $g^{-1} = \text{domain of } g \Rightarrow 0 \leq g^{-1}(x) \leq 4$ (1 mark)

(d) $0 \leq g^{-1}(x) \leq 4$ From (c)

$$\frac{8(0)+5}{2(0)+3} \leq fg^{-1}(x) \leq \frac{8(4)+5}{2(4)+3} \quad (2 \text{ marks})$$

$$\frac{5}{3} \leq fg^{-1}(x) \leq \frac{37}{11} \quad (1 \text{ mark})$$