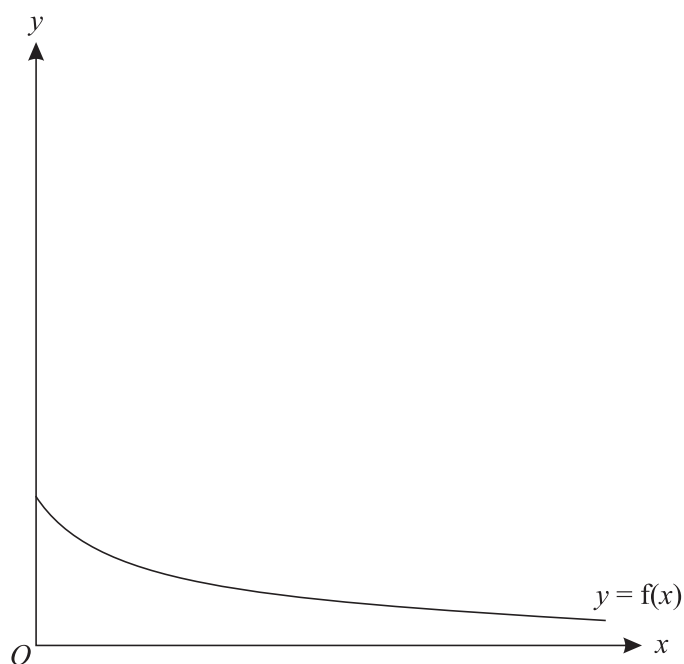**11**

The diagram shows the graph of $y = f(x)$, where $f : x \mapsto \dfrac{6}{2x+3}$ for $x \geqslant 0$.

  (i) Find an expression, in terms of x, for $f'(x)$ and explain how your answer shows that f is a decreasing function.   [3]

  (ii) Find an expression, in terms of x, for $f^{-1}(x)$ and find the domain of f^{-1}.   [4]

 (iii) Copy the diagram and, on your copy, sketch the graph of $y = f^{-1}(x)$, making clear the relationship between the graphs.   [2]

The function g is defined by $g : x \mapsto \tfrac{1}{2}x$ for $x \geqslant 0$.

  (iv) Solve the equation $fg\, x \quad \tfrac{3}{2}$.   [3]