8 **(a)** The functions f and g are defined by

$$\mathrm{f}(x) = \sec x \qquad \text{for } \frac{\pi}{2} < x < \frac{3\pi}{2}$$

$$\mathrm{g}(x) = 3(x^2 - 1) \qquad \text{for all real } x.$$

(i) Find the range of f. [1]

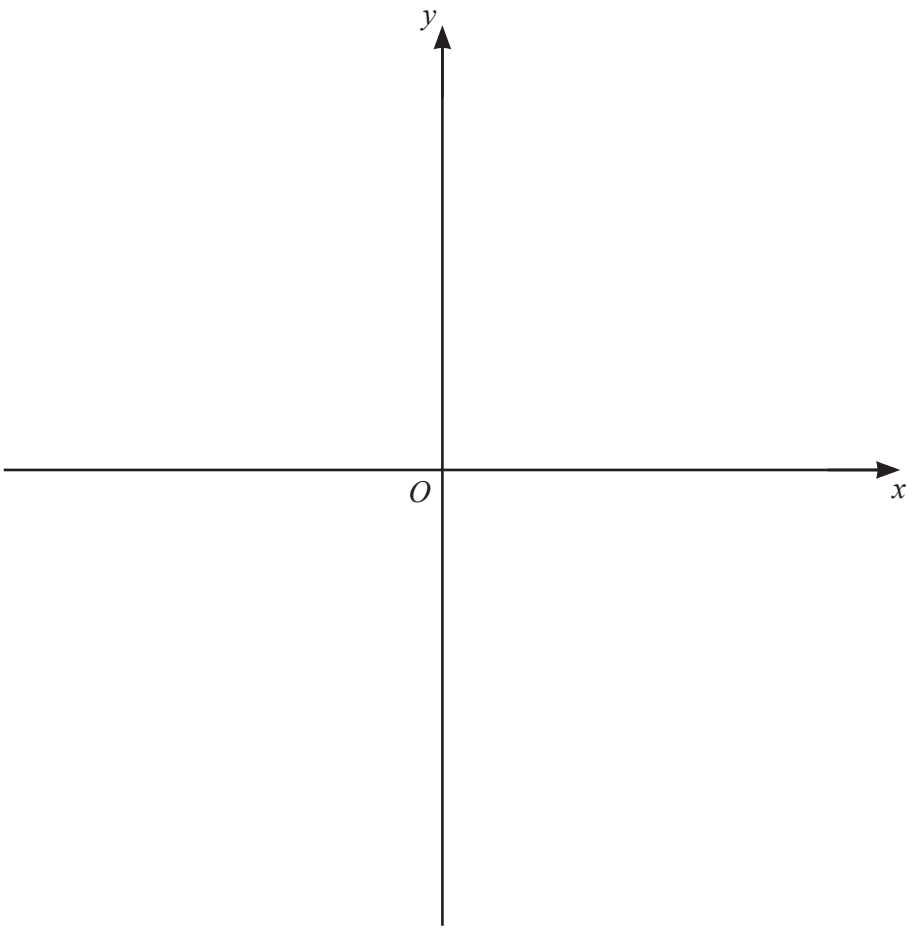
(ii) Solve the equation $\mathrm{f}^{-1}(x) = \frac{2\pi}{3}$. [3]

(iii) Given that gf exists, state the domain of gf. [1]

(iv) Solve the equation $\mathrm{gf}(x) = 1$. [5]

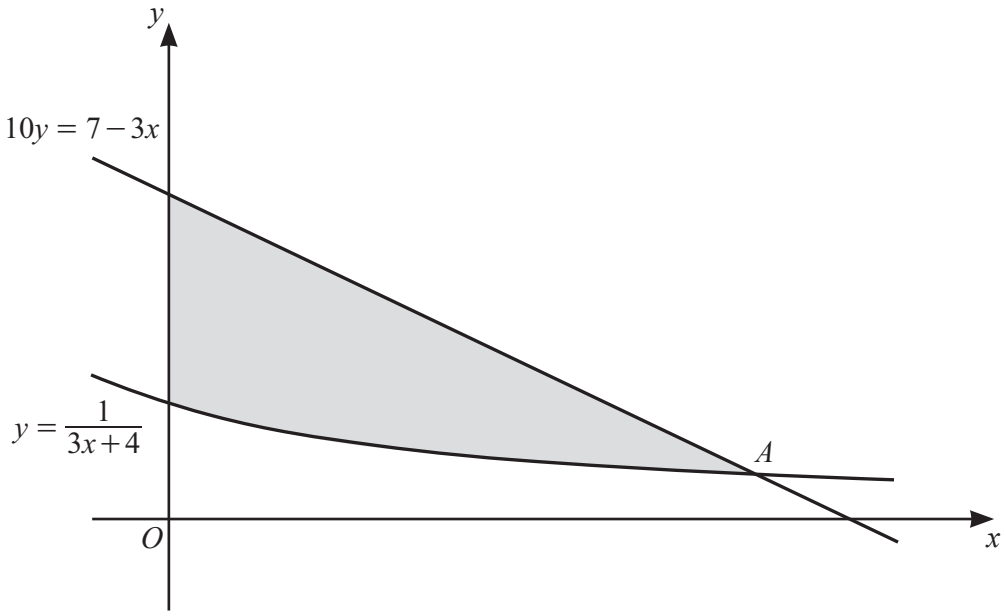
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(b) The function h is defined by $\mathrm{h}(x) = \ln(4-x)$ for $x < 4$. Sketch the graph of $y = \mathrm{h}(x)$ and hence sketch the graph of $y = \mathrm{h}^{-1}(x)$. Show the position of any asymptotes and any points of intersection with the coordinate axes. [4]



9 **(a)** Show that $\int_1^8 \frac{x+4}{\sqrt[3]{x}}\mathrm{d}x = 36.6$. [3]

(b)



The diagram shows part of the line $10y = 7 - 3x$ and part of the curve $y = \frac{1}{3x+4}$.

The line and curve intersect at the point A. Verify that the y-coordinate of A is 0.1 and calculate the area of the shaded region. [8]

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