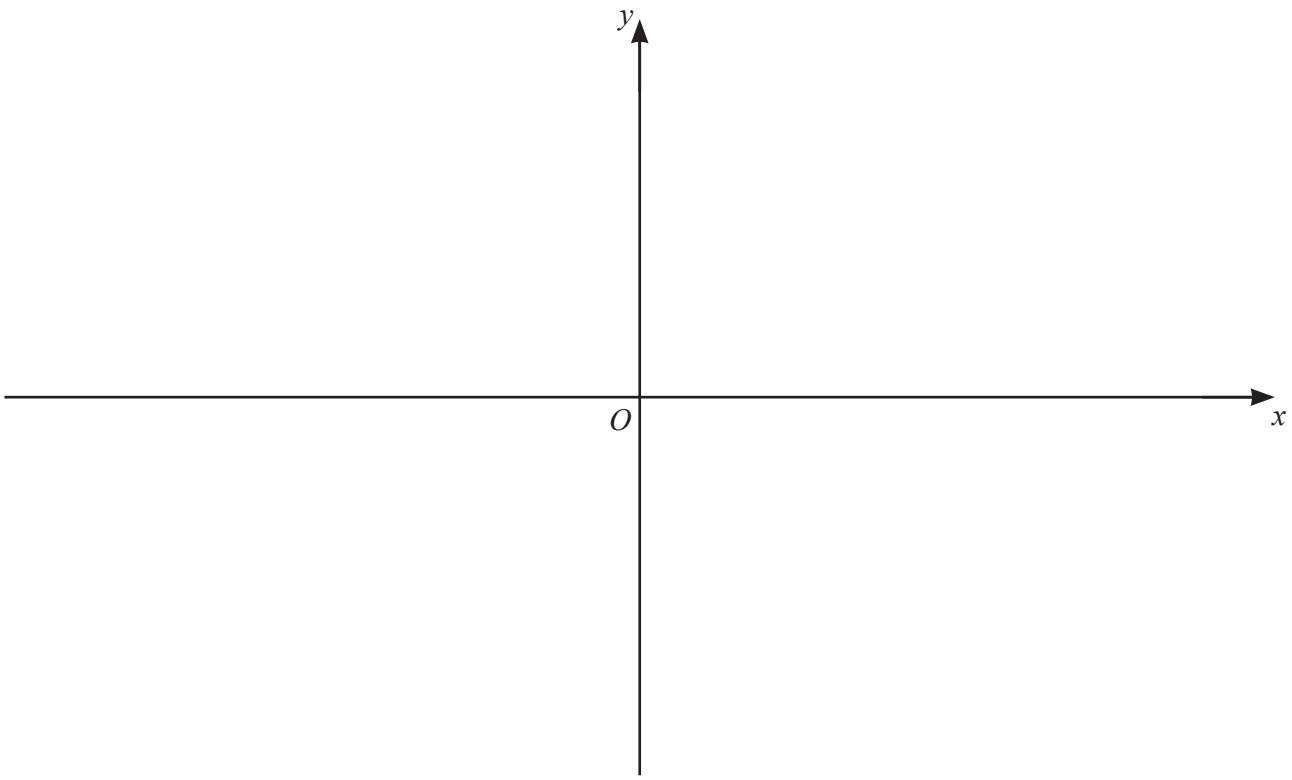
8 **(a)** It is given that $\mathrm{f}: x \to (3x+1)^2 - 4$ for $x \geqslant a$, and that f^{-1} exists.

(i) Find the least possible value of a. [1]

(ii) Using this value of a, write down the range of f. [1]

(iii) Using this value of a, sketch the graphs of $y = \mathrm{f}(x)$ and $y = \mathrm{f}^{-1}(x)$ on the axes, stating the intercepts with the coordinate axes. [4]



© UCLES 2023

(b) It is given that $\mathrm{g}(x) = \ln(2x^2 + 5)$ for $x \geqslant 0$,

$\mathrm{h}(x) = 3x - 2$ for $x \geqslant 0$.

Solve the equation $\mathrm{hg}(x) = 4$ giving your answer in exact form. [3]

9 Solve the equation $12x^{\frac{2}{3}} - 5x^{-\frac{2}{3}} - 11 = 0$ for $x > 0$. Give your answer correct to one decimal place. [4]