

SECTION 2

Instructions for Section 2

Answer **all** questions in the spaces provided.

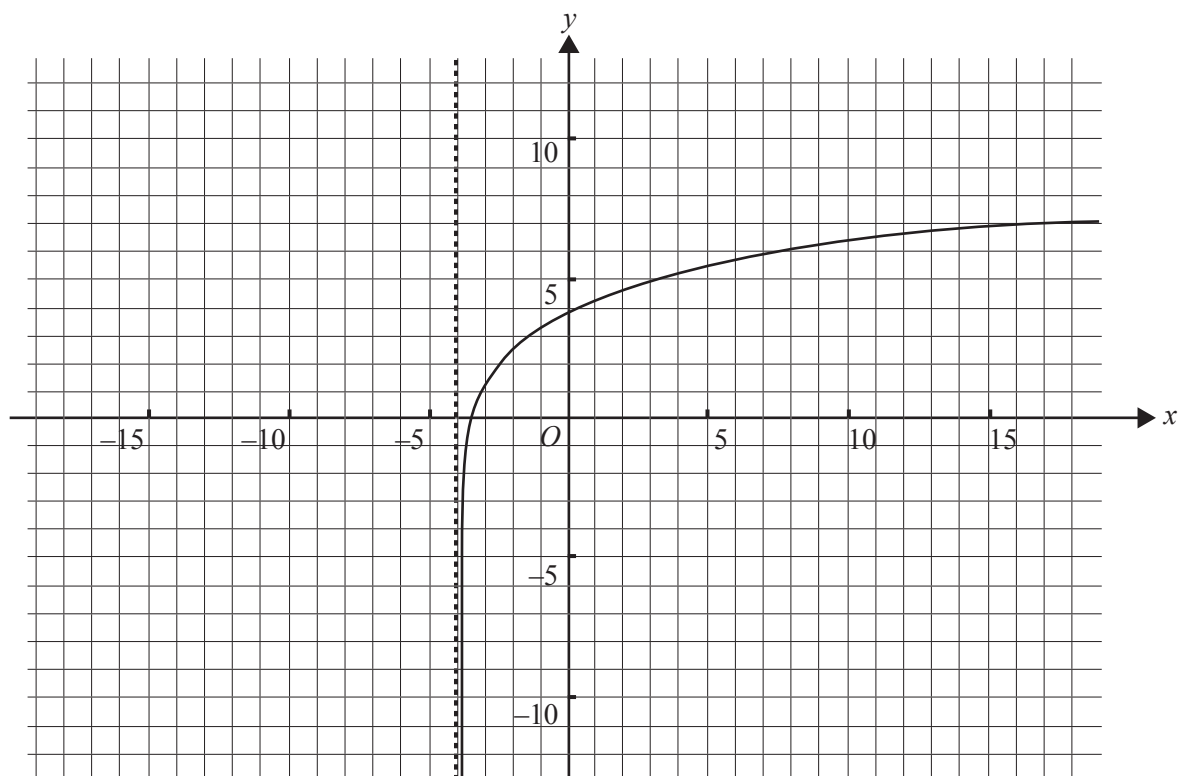
In all questions where a numerical answer is required an exact value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

- a. Part of the graph of the function $g: (-4, \infty) \rightarrow \mathbb{R}$, $g(x) = 2 \log_e(x + 4) + 1$ is shown on the axes below.



- i. Find the rule and domain of g^{-1} , the inverse function of g .

- ii. On the set of axes above sketch the graph of g^{-1} . Label the axes intercepts with their exact values.

- iii. Find the values of x , correct to three decimal places, for which $g^{-1}(x) = g(x)$.

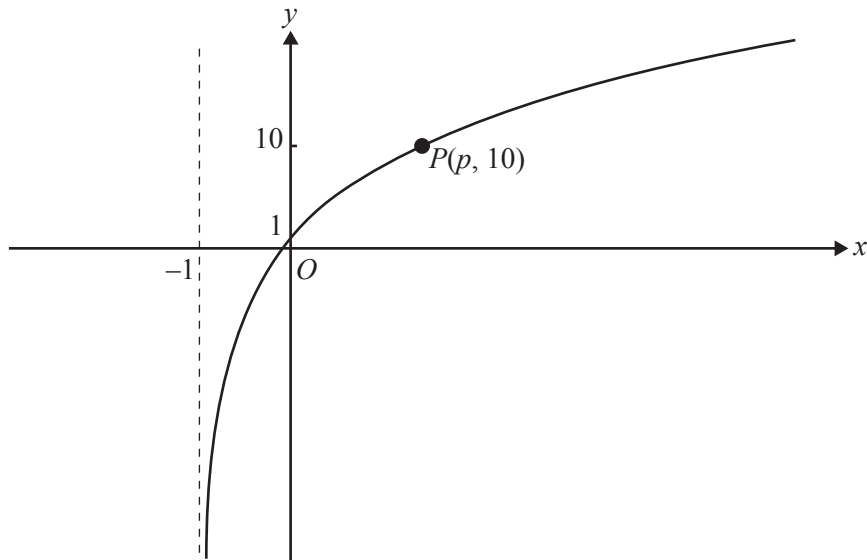
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3 + 3 + 2 + 2 = 10 marks

- b.** The diagram below shows part of the graph of the function with rule

$$f(x) = k \log_e(x + a) + c, \text{ where } k, a \text{ and } c \text{ are real constants.}$$

- The graph has a vertical asymptote with equation $x = -1$.
- The graph has a y -axis intercept at 1.
- The point P on the graph has coordinates $(p, 10)$, where p is another real constant.



- i.** State the value of a .

- ii.** Find the value of c .

- iii.** Show that $k = \frac{9}{\log_e(p+1)}$.

- iv. Show that the gradient of the tangent to the graph of f at the point P is $\frac{9}{(p+1)\log_e(p+1)}$.

- v. If the point $(-1, 0)$ lies on the tangent referred to in **part b.iv.**, find the exact value of p .

1 + 1 + 2 + 1 + 2 = 7 marks

Total 17 marks