


- 1** Solve the equation $\sec \theta = 5 \operatorname{cosec} \theta$ for $0^\circ < \theta < 360^\circ$. [4]

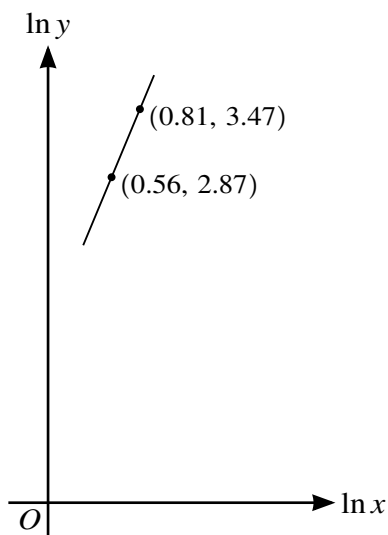
A series of horizontal dotted lines for writing practice.

A circular logo located at the bottom right corner of the page. The word "AHEAD" is written in a bold, sans-serif font, following the curve of the top half of the circle. The background of the circle is a light blue or grey color.

- 2** The solutions of the equation $|4x - 1| = |x + 3|$ are $x = p$ and $x = q$, where $p < q$.

Find the exact values of p and q , and hence determine the exact value of $|p - 2| - |q - 1|$. [5]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. In the bottom right corner, there is a small, partially visible circular logo with the word "AHEAD" written inside it. The rest of the page is empty.



The variables x and y satisfy the equation $y = Ax^k$, where A and k are constants. The graph of $\ln y$ against $\ln x$ is a straight line passing through the points $(0.56, 2.87)$ and $(0.81, 3.47)$, as shown in the diagram.

Find the value of k , and the value of A correct to 2 significant figures.

[5]

[illegible]

- 4 The polynomial $p(x)$ is defined by

$$p(x) = ax^3 + 23x^2 - ax - 8,$$

where a is a constant. It is given that $(2x + 1)$ is a factor of $p(x)$.

- (a) Find the value of a and hence factorise $p(x)$ completely. [5]

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- (b) Hence solve the equation $p(e^{4y}) = 0$, giving your answer correct to 3 significant figures. [2]

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- 5** The curve with equation $y = x \ln(4x + 1) - 3x$ has one stationary point P .

(a) Show that the x -coordinate of P satisfies the equation

$$x = \frac{2x + 0.75}{\ln(4x + 1)} - 0.25. \quad [4]$$

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- (b) Show by calculation that the x -coordinate of P lies between 1.8 and 1.9. [2]

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- (c) Use an iterative formula, based on the equation in part (a), to find the x -coordinate of P correct to 3 significant figures. Give the result of each iteration to 5 significant figures. [3]

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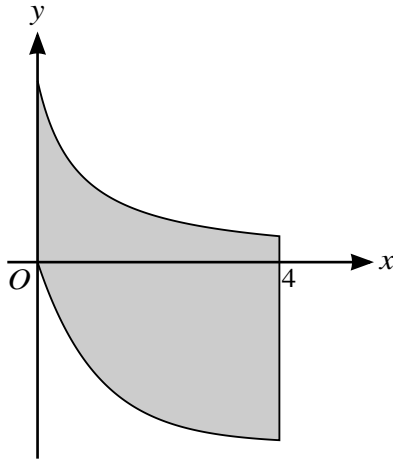
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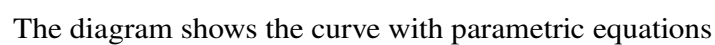


The diagram shows the curves $y = \frac{6}{3x+2}$ and $y = 3e^{-x} - 3$ for values of x between 0 and 4. The shaded region is bounded by the two curves and the lines $x = 0$ and $x = 4$.

Find the exact area of the shaded region, giving your answer in the form $\ln a + b + ce^d$. [9]

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for $\pi \leq \theta \leq \frac{3}{2}\pi$. Points P and Q lie on the curve. The gradient of the curve at P is 2. The straight line $3x + y = 0$ meets the curve at Q .

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- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom right corner, there is a small, dark gray circular logo with the word "AHEAD" written in white capital letters. The rest of the page is empty.

The logo for Stay Ahead .ME is a circular emblem. The outer ring is dark blue with the text "STAY AHEAD" in white at the top and ".ME" in white at the bottom. The inner circle is white and features a stylized red and yellow graphic that resembles a lowercase "s" or a pair of interlocking shapes. Below the graphic, the website address "WWW.STAYAHEAD.ME" is written in a smaller, dark blue font.

[illegible]

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