

3 The variables x and y satisfy the relation $2^y = 3^{1-2x}$.

- (a) By taking logarithms, show that the graph of y against x is a straight line. State the exact value of the gradient of this line. [3]

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- (b) Find the exact x -coordinate of the point of intersection of this line with the line $y = 3x$. Give your answer in the form $\frac{\ln a}{\ln b}$, where a and b are integers. [2]

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3 The variables x and y satisfy the equation $x = A(3^{-y})$, where A is a constant.

- (a)** Explain why the graph of y against $\ln x$ is a straight line and state the exact value of the gradient of the line. [3]

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It is given that the line intersects the y -axis at the point where $y = 1.3$.

- (b)** Calculate the value of A , giving your answer correct to 2 decimal places. [2]

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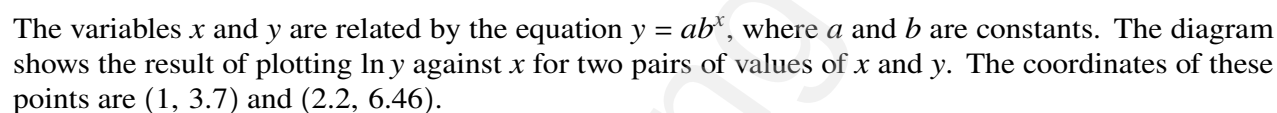
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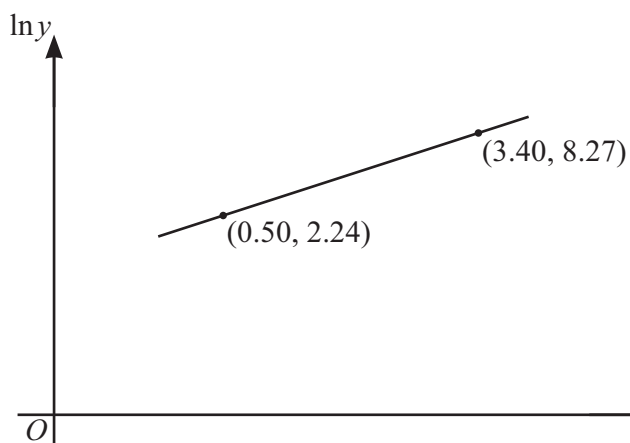
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[4]

[illegible]

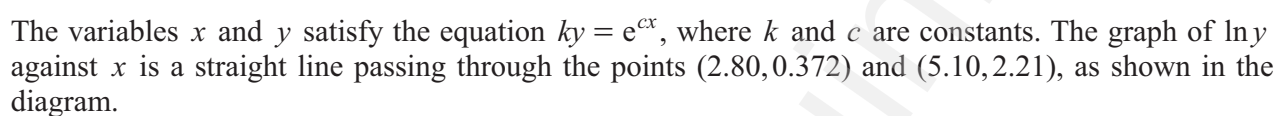
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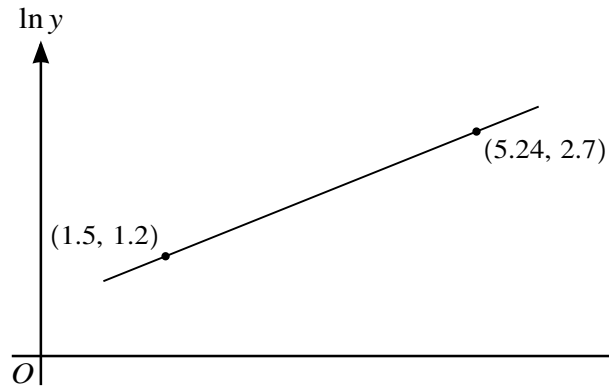


The variables x and y satisfy the equation $ay = b^x$, where a and b are constants. The graph of $\ln y$ against x is a straight line passing through the points $(0.50, 2.24)$ and $(3.40, 8.27)$, as shown in the diagram.

Find the values of a and b . Give each value correct to 1 significant figure. [4]

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[illegible]



The variables x and y satisfy the equation $y^2 = Ae^{kx}$, where A and k are constants. The graph of $\ln y$ against x is a straight line passing through the points (1.5, 1.2) and (5.24, 2.7) as shown in the diagram.

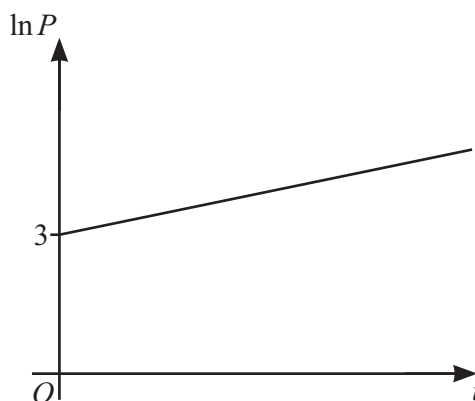
Find the values of A and k correct to 2 decimal places.

[5]

[illegible]



3



The number of bacteria in a population, P , at time t hours is modelled by the equation $P = ae^{kt}$, where a and k are constants. The graph of $\ln P$ against t , shown in the diagram, has gradient $\frac{1}{20}$ and intersects the vertical axis at $(0, 3)$.

- (a) State the value of k and find the value of a correct to 2 significant figures. [3]

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- (b) Find the time taken for P to double. Give your answer correct to the nearest hour. [2]

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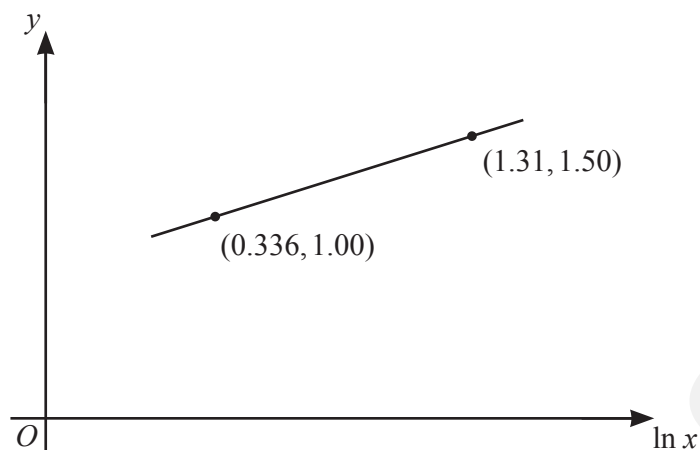
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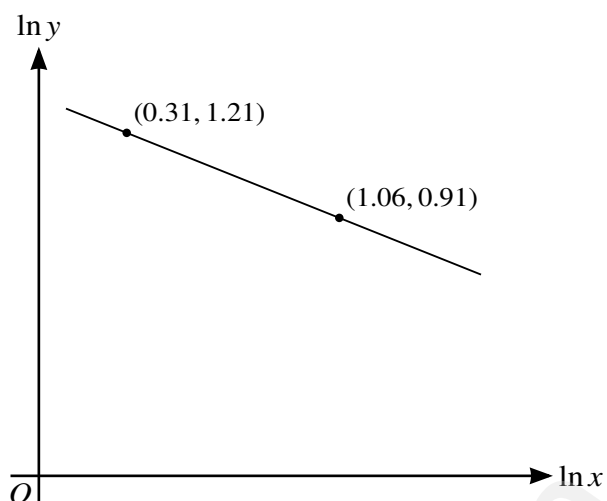
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Find the values of a and b . Give each value correct to the nearest integer. [4]

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The variables x and y satisfy the equation $x^n y^2 = C$, where n and C are constants. The graph of $\ln y$ against $\ln x$ is a straight line passing through the points $(0.31, 1.21)$ and $(1.06, 0.91)$, as shown in the diagram.

Find the value of n and find the value of C correct to 2 decimal places.

[5]

[illegible]

3 The variables x and y satisfy the equation $a^{2y-1} = b^{x-y}$, where a and b are constants.

(a) Show that the graph of y against x is a straight line. [3]

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(b) Given that $a = b^3$, state the equation of the straight line in the form $y = px + q$, where p and q are rational numbers in their simplest form. [2]

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