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Straight Lines: Coordinates and Lengths 1ii



Part A Find coordinate

The line segment joining the points $(-2, 7)$ and $(-4, p)$ has gradient 4. Find the value of p .

The following symbols may be useful: p

Part B Find coordinates and midpoint

The line segment joining the points $(-2, 7)$ and $(6, q)$ has midpoint $(m, 5)$. Find m and q .

Enter the values of m and q . If a value is not a whole number, enter the value as a decimal.

$m =$

$q =$

Part C Find coordinate from length

The line segment joining the points $(-2, 7)$ and $(d, 3)$ has length $2\sqrt{13}$. Find the two possible values of d .
Enter the greatest possible value of d .

The following symbols may be useful: d

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Straight Lines: Coordinates and Lengths 2i



The points A, B, and C have coordinates $(5, 1)$, $(p, 7)$, and $(8, 2)$ respectively.

Part A Possible values of p

Given that the distance between the points A and B is twice the distance between points A and C, calculate the possible values of p .

Hence, state the possible coordinates of B.

(,)

Part B Midpoint of AB

Given also that the line passing through A and B has equation $y = 3x - 14$, find the coordinates of the midpoint of AB.

Enter the x and y coordinates below. If a value is not a whole number, enter the value as a decimal.

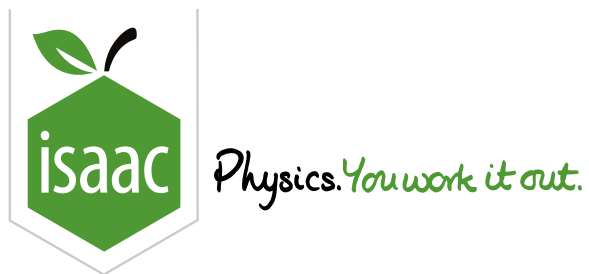
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Straight lines: gradients and normals 4ii



The points A and B have coordinates $(6, 1)$ and $(-2, 7)$ respectively.

Part A Length of AB

Find the length of AB .

Part B Gradient of AB

Find the gradient of the line AB .

Part C Compare gradients

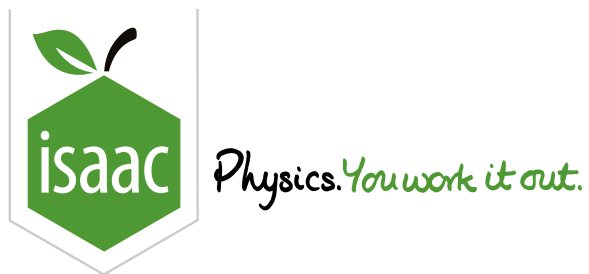
Determine whether the line $4x - 3y - 10 = 0$ is perpendicular to AB .

- ☐ The lines are perpendicular
- ☐ The lines are not perpendicular

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Straight lines: gradients and normals 2i



A is the point $(2, 7)$ and B is the point $(-1, -2)$.

Part A Equation of line

Find the equation of the line through A parallel to the line $y = 4x - 5$, giving your answer in the form $y = mx + c$.

The following symbols may be useful: x , y

Part B Length of AB

Calculate the length of AB, giving your answer in simplified surd form.

Part C Find equation of line

Find the equation of the line which passes through the midpoint of AB, and which is perpendicular to AB. Give your answer in the form $ax + by + c = 0$, where a , b , and c are integers.

The following symbols may be useful: x , y

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Straight lines: gradients and normals 4i



The points A and B have coordinates $(-5, -2)$ and $(3, 1)$ respectively.

Part A Equation of line

Find the equation of the line AB, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

The following symbols may be useful: x , y

Part B Find coordinate

Find the coordinates of the midpoint of AB.

Enter the x and y coordinates below. If a value is not a whole number, enter the value as a decimal.

(,)

Part C Length of line

The point C has coordinates $(-3, 4)$.

Calculate the length of AC, giving your answer in simplified surd form.

Part D Perpendicular lines?

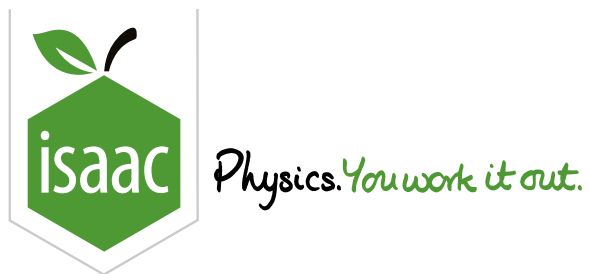
Determine whether the line AC is perpendicular to the line BC.

- ☐ The lines are perpendicular
- ☐ The lines are not perpendicular

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Straight lines: gradients and normals 1ii



A is the point $(-2, 6)$ and B is the point $(3, -8)$. The line l is perpendicular to the line $x - 3y + 15 = 0$, and passes through the midpoint of AB . Find the equation of l , giving your answer in the form $ax + by + c = 0$ where a , b , and c are integers.

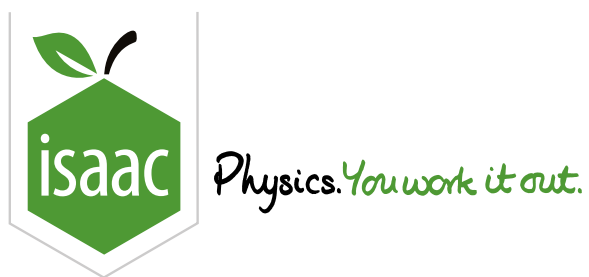
The following symbols may be useful: x , y

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Straight lines: gradients and normals 3ii



The points $A(1, 3)$, $B(7, 1)$, and $C(-3, -9)$ are joined to form a triangle.

Part A Show right angle

Show that this triangle is right angled, and determine whether the right angle is located at A, B, or C.

- ☐ A
- ☐ B
- ☐ C

Part B Triangle in circle

The points A, B and C lie on the circumference of a circle. Find the x and y coordinates of the centre of the circle.

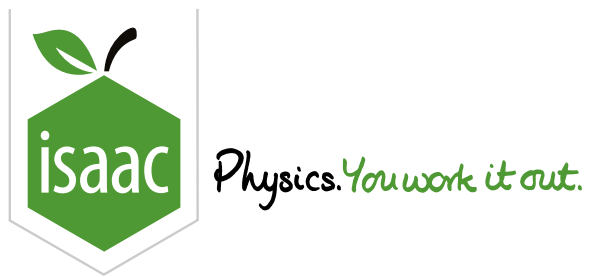
Enter the x and y coordinates below. If a value is not a whole number, enter the value as a decimal.

(,)

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Logarithmic Plots 3

A Level



By plotting a graph of $\ln F$ against $\ln r$, a student finds that the relationship between the gravitational force, F , on a pair of objects with fixed masses is given by

$$F = \frac{10^8}{r^2}$$

where r is the separation between them.

Part A Find the gradient

What was the gradient of the graph?

Part B Find the intercept

What was the intercept of the graph? Give your answer to 2 significant figures.

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Physics. *You work it out.*

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Logarithmic Plots 2

A Level



The equation representing the radioactive decay of the number of atoms in a sample, N , with time, t , is $N = N_0 e^{-\lambda t}$ where λ is the decay constant.

Below is a graph of $\ln N$ against t for a particular radioactive substance.

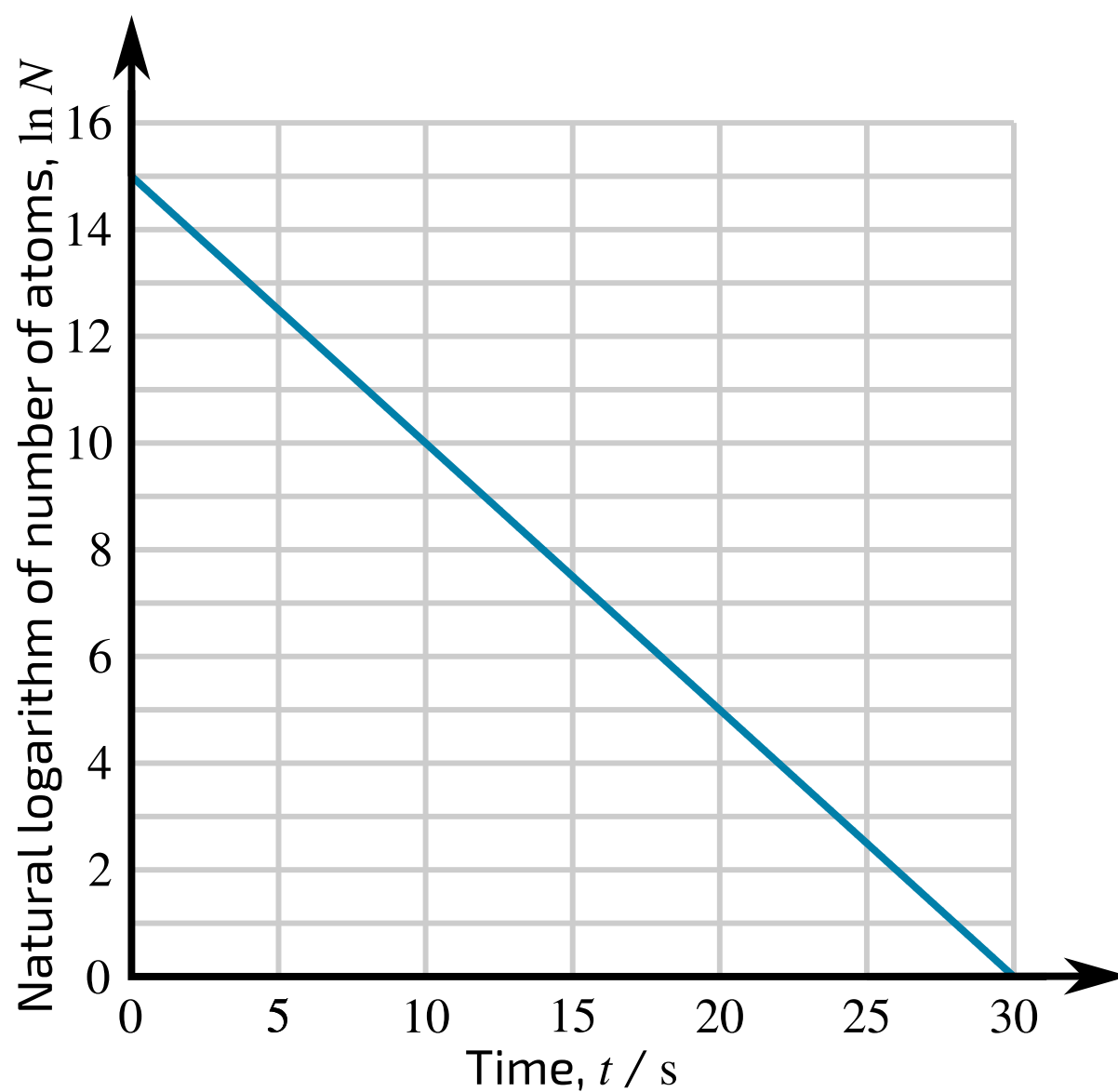


Figure 1: A plot of the natural logarithm of the number of atoms, $\ln N$, against time, t .

Part A Find λ

Use this plot to determine λ for this sample.

Part B Find N_0

Use this plot to determine N_0 for this sample. Give your value for N_0 to 2 significant figures.

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Logarithmic Plots 1

A Level



The logarithms to base 10 of two variables, x and y , are plotted against each other below.

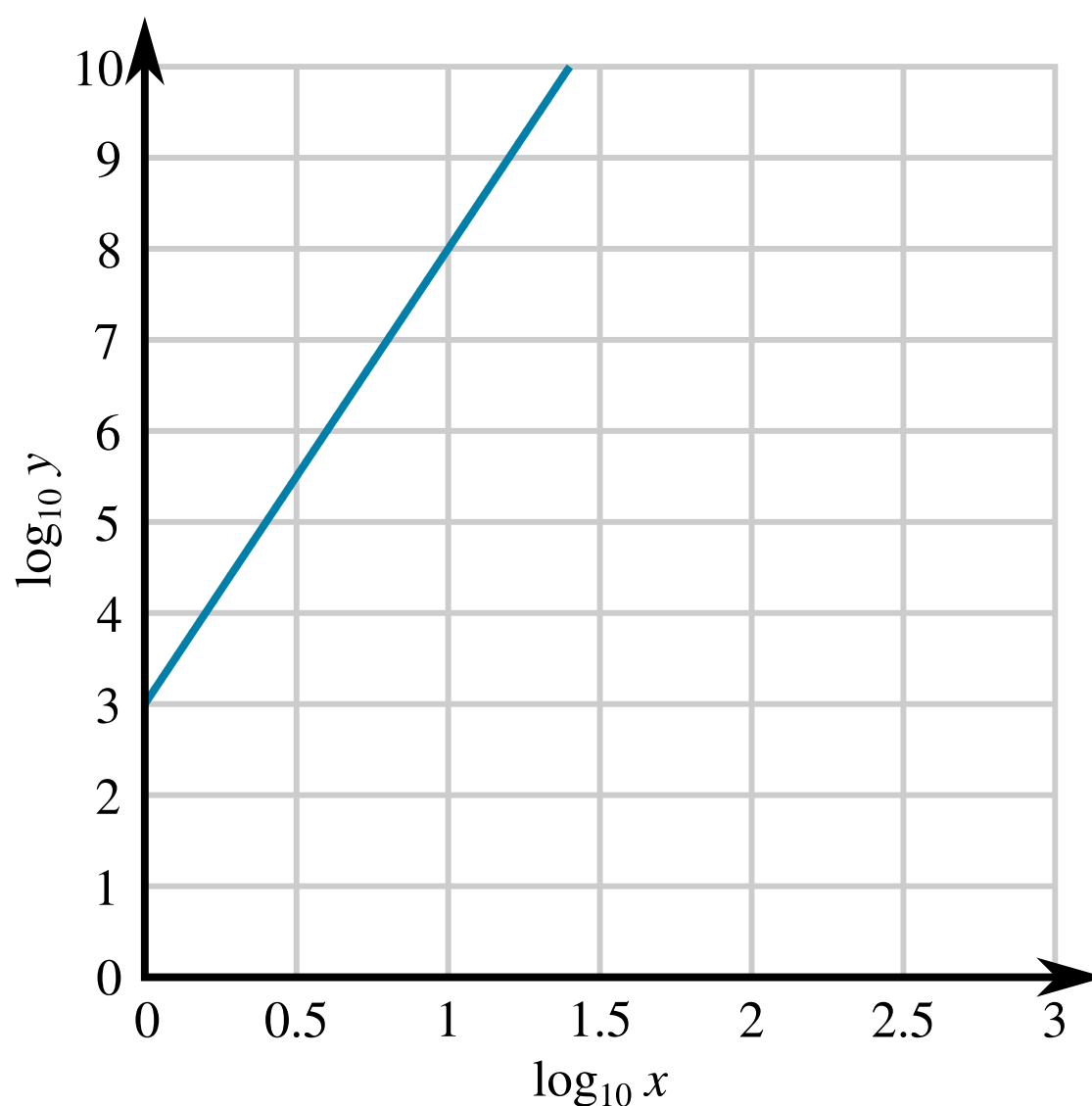


Figure 1: A plot of $\log_{10} y$ against $\log_{10} x$.

Use this plot to determine the relationship between x and y . Give your answer in the form $y = ax^b$, where a and b are constants.

The following symbols may be useful: x , y

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