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[Home](#) [Gameboard](#) [Maths](#) [Straight Lines: Coordinates and Lengths 1ii](#)

# 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  $q$  below.

Enter the value of  $m$ :

The following symbols may be useful:  $m$

Enter the value of  $q$ :

The following symbols may be useful:  $q$

## 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  $p$ . Enter the smallest possible value of  $p$ .

The following symbols may be useful:  $p$

## 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.

Enter the  $x$  coordinate:

The following symbols may be useful:  $x$

Enter the  $y$  coordinate:

The following symbols may be useful:  $y$

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# Straight lines: gradients and normals 4ii

A Level



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

## Part A Length of $AB$

Find the length of  $AB$ .

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## Part B Gradient of $AB$

Find the gradient of the line  $AB$ .

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## 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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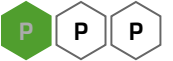


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# Straight lines: gradients and normals 2i

A Level



$A$  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:  $x$ ,  $y$

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## Part B Length of $AB$

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

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## 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  $ax + by + c = 0$ .

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.

Enter the  $x$  coordinate:

The following symbols may be useful:  $x$

---

Enter the  $y$  coordinate:

The following symbols may be useful:  $y$

---



## Part C Length of line

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

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

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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

A Level



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  $C$ .

☐  $A$

☐  $C$

☐  $B$

## Part B Triangle in circle

The points  $A$ ,  $B$  and  $C$  lie on the circumference of a circle.

Find the  $x$  coordinate of the centre of the circle.

The following symbols may be useful:  $x$

Find the  $y$  coordinate of the centre of the circle.

The following symbols may be useful:  $y$

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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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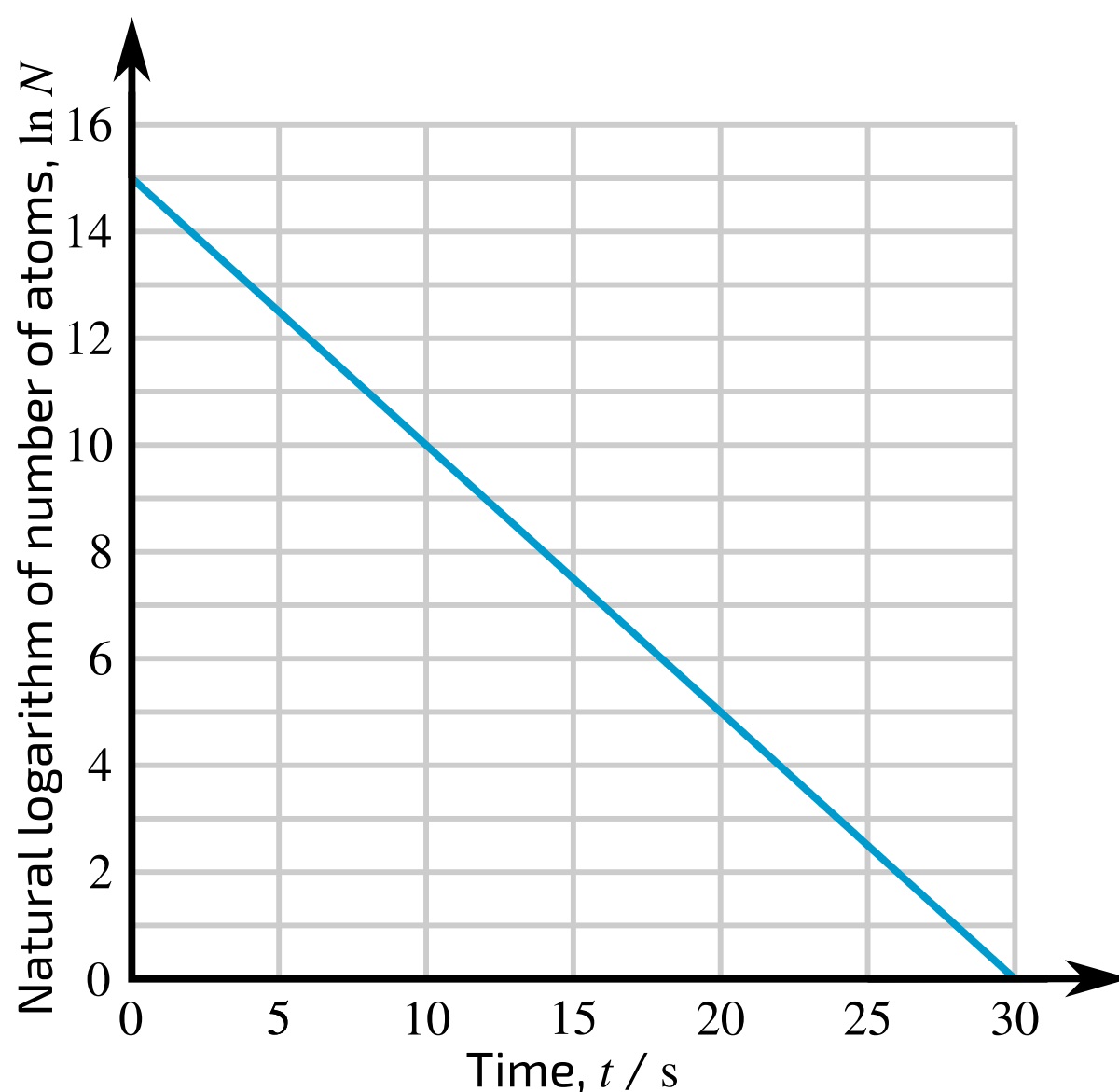
# Logarithmic Plots 2

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  $\lambda$  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 $\lambda$

Use this plot to determine  $\lambda$  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.

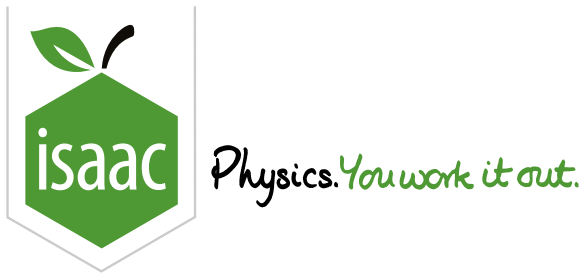


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# Logarithmic Plots 1

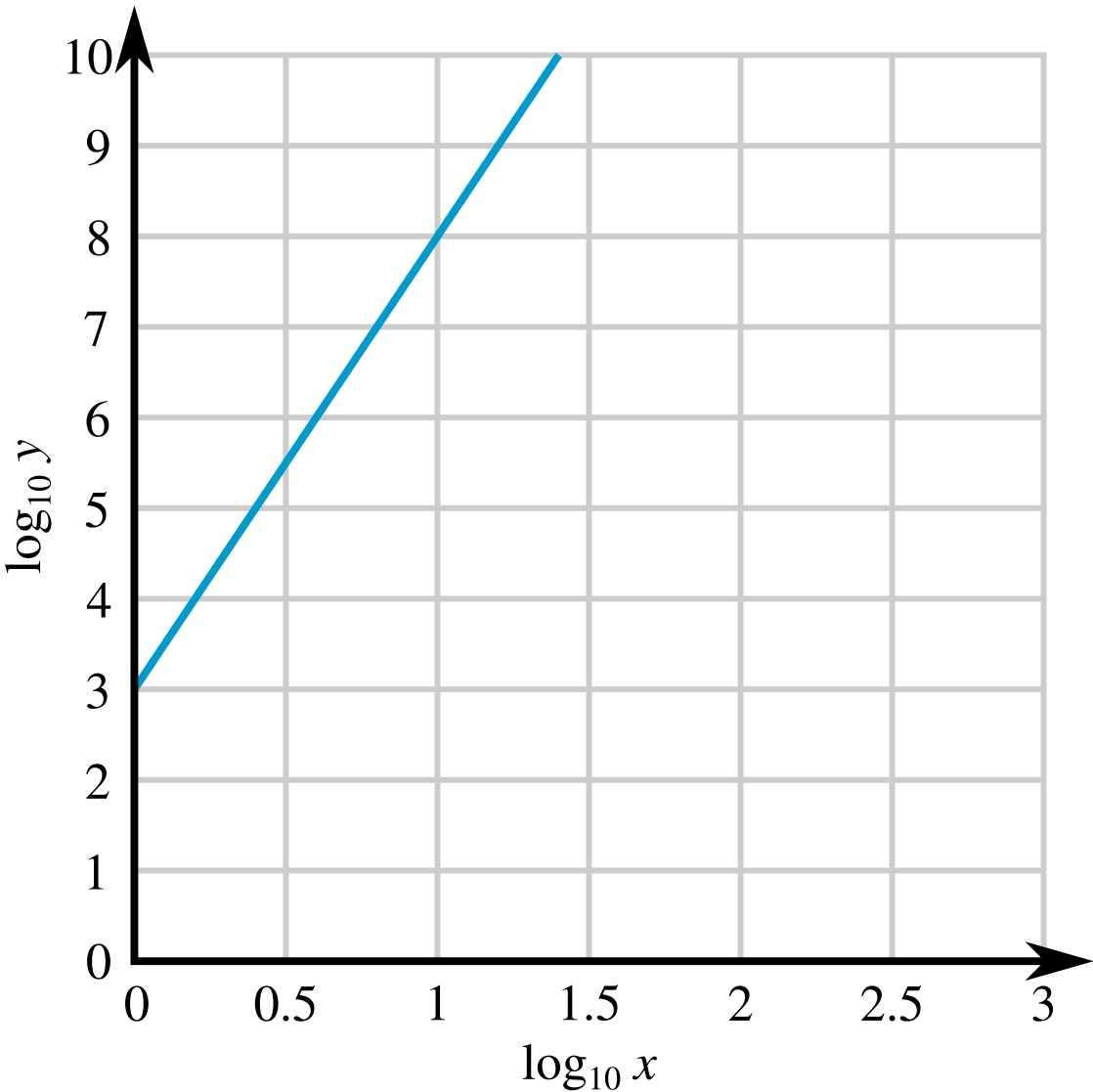
A Level

P

P

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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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