Straight Lines: Coordinates and Lengths 1ii

A Level

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

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 Multi value coordinate

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

The following symbols may be useful: d

Straight Lines: Coordinates and Lengths 2i

A Level

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

Used with permission from UCLES, A Level, January 2006, Paper 4721, Question 9.

Gameboard:

Pure Maths Practice: Straight Lines - Coordinates and Lengths

Straight lines: gradients and normals 4ii

A Level

P P P

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

Gameboard:

Pure Maths Practice: Straight Lines - Gradients and Normals

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`

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`

Gameboard:

Pure Maths Practice: Straight Lines - Gradients and Normals

Straight lines: gradients and normals 4i

A Level

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.

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

The lines are not perpendicular

The lines are perpendicular

Straight lines: gradients and normals 1ii

A Level

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`

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.

- C
- B
- A

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

Gameboard:

Pure Maths Practice: Straight Lines - Gradients and Normals

Physics. You work it out.

Logarithmic Plots 1

A Level

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

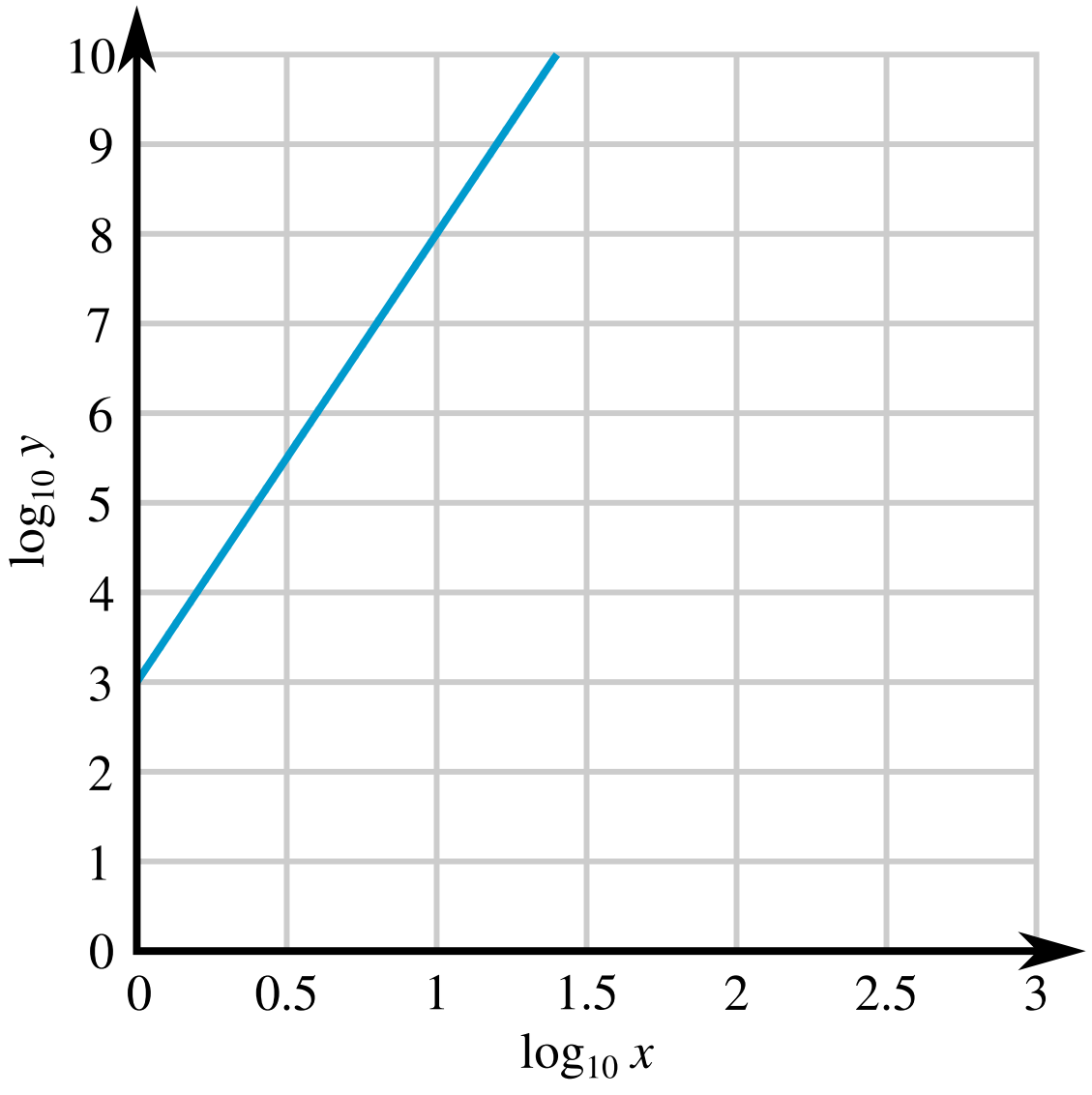

Figure 1: A plot of $\log_{10} y$ against $\log_{10} x$.

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`

Adapted for Isaac Physics from NST IA Biology preparation work

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.

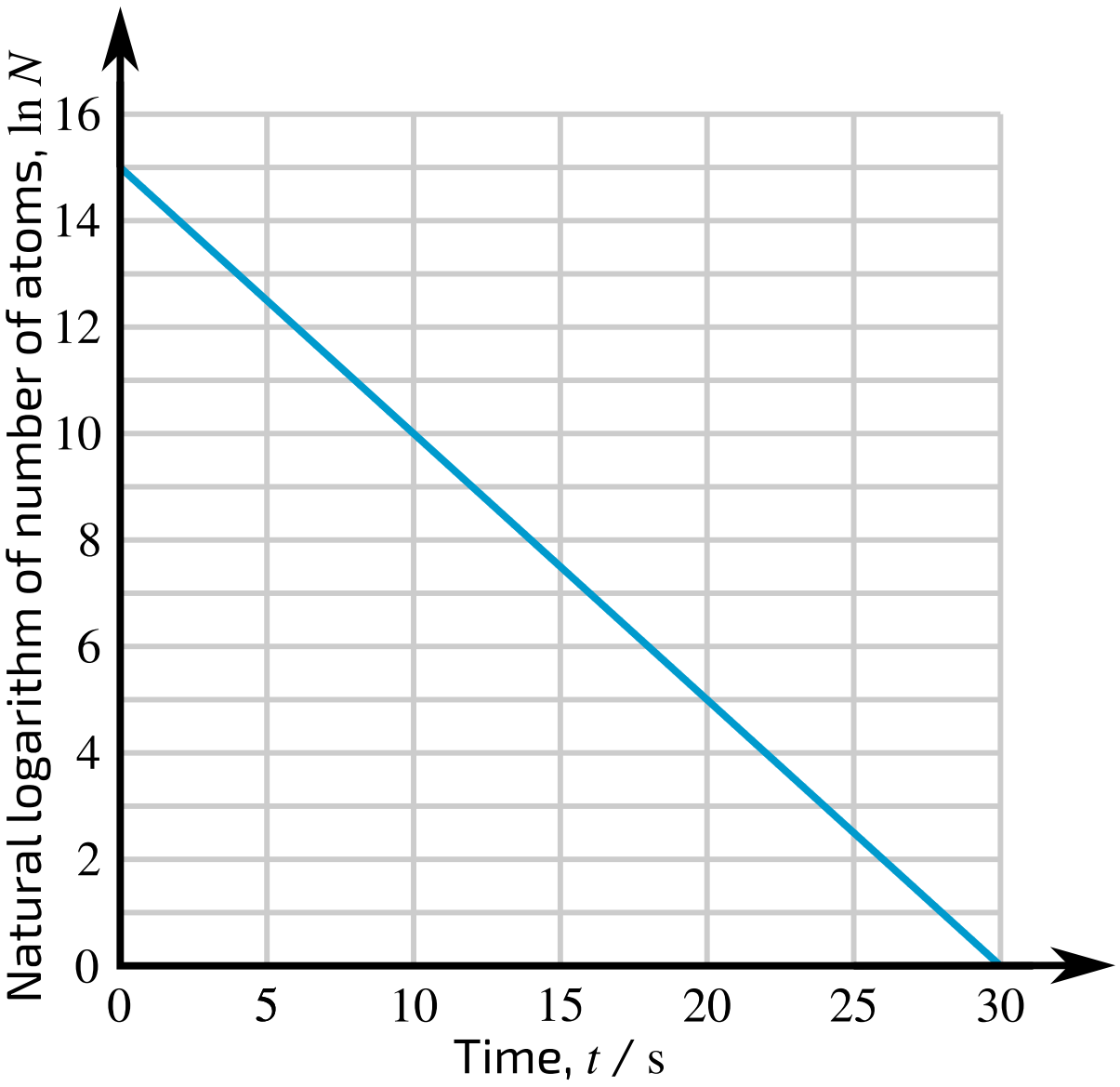

Figure 1: A plot of the natural logarithm of the number of atoms, $\ln N$, against time, t.

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.

Adapted for Isaac Physics from NST IA Biology preparation work

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.

Adapted for Isaac Physics from NST IA Biology preparation work