eClassroom

GCSE Mathematics

Proportion

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

y is directly proportional to x. When x=4, y=20. Find y when x=7.

$y=kx \rightarrow k=20/4=5$

$y=5x \rightarrow y=5\times7=$**35**

[Reasoning]

8 workers take 6 days to build a wall. How long for 12 workers? (assume inverse proportion)

Constant: $8\times6=48$. Time=48/12=**4 days**

[Problem Solving]

The cost C of printing is proportional to the number of pages n^2. When n=5, C=£50. How much for n=10?

$k=50/25=2$. $C=2n^2$. $C(10)=2\times100=$**£200**

[Fluency]

1. y is directly proportional to x. When x=5, y=15. Find y when x=8.

(2 marks)

[Fluency]

2. y is directly proportional to x. When x=6, y=24. Find x when y=36.

(2 marks)

[Fluency]

3. The table shows values of x and y where $y \propto x$. Complete the missing values.

x = 2, y = 14 x = 5, y = ? x = ?, y = 42

(3 marks)

[Fluency]

4. y is inversely proportional to x. When x=4, y=6. Find y when x=8.

(2 marks)

[Fluency]

5. y is inversely proportional to x. When x=3, y=12. Find x when y=4.

(2 marks)

[Reasoning]

6. A car travels at constant speed. It takes 40 minutes to travel 60 km.
How far does it travel in 1 hour 15 minutes?

(2 marks)

[Reasoning]

7. 8 workers take 6 days to build a wall. All workers work at the same rate.
How many days would it take 12 workers?

(2 marks)

[Reasoning]

8. Petrol costs £1.60 per litre. A car uses petrol at a constant rate.

(a) Complete the table:

5 litres: £___ 8 litres: £___ 12 litres: £___

(b) Is the relationship direct proportion? Explain.

(3 marks)

[Problem Solving]

9. y is directly proportional to x. When x=3, y=7.5.

(a) Find the equation connecting y and x. (1)

(b) Is the point (8, 20) on the graph? Show your working. (2)

(c) Find y when x=10. (1)

(4 marks)

[Problem Solving]

10. The cost C (in £) of printing n pages satisfies $C \propto n^2$.
When n=5, C=50.

(a) Find the equation connecting C and n. (2)

(b) Find C when n=10. (1)

(c) Find n when C=32. (2)

(5 marks)

Section B — Higher

Worked Examples

[Fluency]

$y \propto x^2$. When x=3, y=36. Find y when x=5.

k=36/9=4. $y=4x^2$. $y(5)=4\times25=$**100**

[Reasoning]

When x doubles, what happens to y if $y \propto x^2$?

$y=kx^2$. When x becomes 2x: $y=k(2x)^2=4kx^2=4y$

y is multiplied by **4** (quadruples).

[Problem Solving]

$T \propto \sqrt{L}$. When L=0.25, T=2. Find T when L=1.

$k=T/\sqrt{L}=2/0.5=4$. $T=4\sqrt{L}$.

$T(1)=4\times1=$**4**

[Fluency]

1.

$y \propto x^2$. When x=3, y=36.

(a) Find y when x=5. (2) **(b)** Find x when y=100. (2)

(4 marks)

[Fluency]

2.

$y \propto 1/x$. When x=4, y=6.

(a) Find y when x=3. (2) **(b)** Find x when y=12. (2)

(4 marks)

[Fluency]

3.

y is directly proportional to $\sqrt{x}$. When x=9, y=12.

Find y when x=25.

(2 marks)

[Reasoning]

4.

y is inversely proportional to x^2. When x=2, y=50.

(a) Find y when x=5. (2) **(b)** Find x when y=2. (2)

(4 marks)

[Reasoning]

5.

$p \propto q^3$. When q=2, p=16. Find p when q=3.

(2 marks)

[Reasoning]

6. y is proportional to x^2.

Explain what happens to y when x is doubled. Show your working clearly.

(2 marks)

[Reasoning]

7.

y is inversely proportional to $\sqrt{x}$. When x=4, y=8.

Find y when x=9.

(3 marks)

[Problem Solving]

8.

The time T for a pendulum to swing is proportional to $\sqrt{L}$, where L is the length.

When L=0.25 m, T=2 s.

Find T when L=1 m.

(3 marks)

[Problem Solving]

9.

The gravitational force F between two objects is given by:

$$F \propto \frac{m_1 m_2}{d^2}$$

When m■=2, m■=5 and d=1, F=10.

Find F when m■=3, m■=4 and d=2.

(4 marks)

[Problem Solving]

10. Sketch, on separate axes, graphs of:

(a) y=kx **(b)** y=k/x **(c)** $y=kx^2$

For each, state whether y increases or decreases as x increases, and describe the shape of the graph.

(4 marks)