

out of
50

Y9 Maths

Unit 5 Test – Calculator allowed

Multiplicative reasoning

Name: _____

Teacher: _____

- 1 a Which of these two situations demonstrates direct proportion? Is it i, ii, both or neither?
- i) the cost of tomatoes at £1.25 per kilogram
 - ii) the cost of hiring a cement mixer costing £18.15 for the first day and £9.10 per day after that.

i (AI)

- b A machine takes 20 seconds to stick labels onto 125 cans.
How many cans will the machine label in 1 hour?

$$125 \times 3 \times 60$$

22500 (1)
(2 marks)

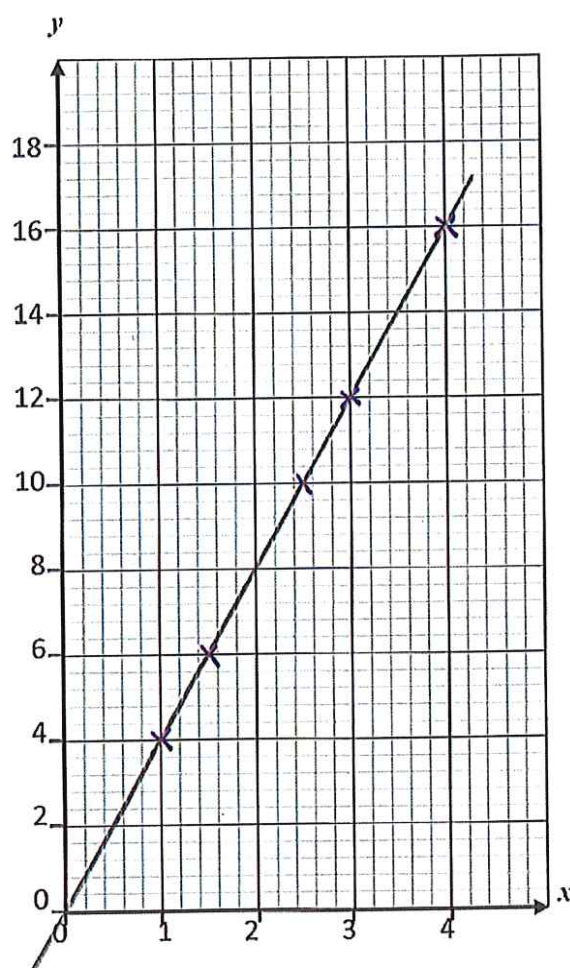
2

2 a Plot this data on the grid provided.

x	1	1.5	4	3	2.5
y	4	6	16	12	10

(A2) All points correct

(A1) for 4 correct.



b Are x and y in direct proportion?

yes (A1).

c Explain how you know from the graph.

need to say both. { Points lie on a straight line, and through (0,0). (A1)

(4 marks)

- 3 a For each table write down the equation connecting the variables.

x	0	2	4	11
y	0	10	20	55

(1)

$y = 5x$ (A1)

x	2	4	6	10
y	4	16	36	100

(1)

$y = x^2$ (A1)

- b Complete the tables.

- c What type of proportionality does the first table show?

Direct proportion (1)

- d For the second table, complete the relationship between x and y .

$y \propto x^2$ (1)

(6 marks)

- 4 p is directly proportional to q .

When $p = 30$, $q = 4$

- a Find the equation connecting p and q .

$$\begin{array}{l} p \propto q \\ p = kq \\ 30 = 4k \end{array} \left. \begin{array}{l} \text{or} \\ \text{seen.} \end{array} \right\} \text{so } k = 7.5 \text{ (1)}$$

$p = 7.5q$ (1)

- b Find p when $q = 10$

$p = 7.5 \times 10$

$p = 75$ (A1)

(4 marks)



- 5 A library has been given a specific amount of money and can buy 350 hardback books costing £15.75 each.

a How many books costing £10.50 could be bought instead?

$$\frac{350 \times 15.75}{10.50}$$

b What type of proportion does this represent?

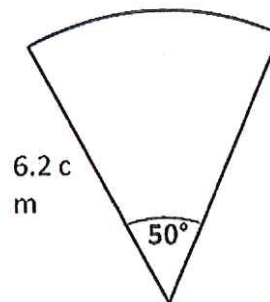
525 (A1)
inverse proportion (A1)
(2 marks)



- 6 Find the length of the arc of a sector of 50° cut from a circle of radius 6.2 cm.

$$\text{Length of arc} = \frac{50}{360} \times \pi \times 2 \times 6.2$$

(1) (1)



5.41 (A1)
..... cm
(3 marks)

- 7 $y \propto \frac{1}{x}$ and $y = 4$ when $x = 3$

a Write a formula connecting x and y .

$$y = \frac{k}{x} \quad 4 = \frac{k}{3} \quad k = 12$$

(1) or (1) for attempting to find k.

$$y = \frac{12}{x} \quad (1)$$

b Find y when $x = 10$

$$y = \frac{12}{10}$$

$y = 1.2$ (A1)
(4 marks)

8 For this set of data, is q inversely proportional to p ? Yes or No?

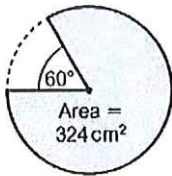
p	0.8	1.9	2.6
q	4.8	6.9	8.6

No

(AI)

(1 mark)

9 Work out the radius of the shaded sector



$$\frac{300}{360} \times \pi r^2 = 324 \quad (M1)$$

$$\pi r^2 = 324 \times \frac{360}{300}$$

$$r^2 = \frac{388.8}{\pi} \quad (M1) \text{ for either line seen.}$$

$$r^2 = 123.76$$

$$\text{Radius} = 11.12 \text{ cm} \quad (A1)$$

(3 marks)

10 y is inversely proportional to x .

When $x = 5.4$, $y = 0.6$

a) Work out the value of x when $y = 1.62$

$$(1) \quad y = \frac{k}{x}$$

$$(M1) \quad 0.6 = \frac{k}{5.4}$$

$$k = 3.24 \quad (1)$$

$$\frac{3.24}{1.62} = x \quad (M1)$$

$$x = 2 \quad (A1)$$

(5 marks)

for attempting to find k .

b) Work out the value of y when $x = 4$

$$y = \frac{3.24}{x}$$

$$y = \frac{3.24}{4} = 0.81$$

$$y = 0.81$$

(1 mark)

11 The value of s is proportional to the value of r^2 . When $s = 44.1$ and $r = 3$

a Write a formula connecting s and r $S = Kr^2$ (1)

$$44.1 = K \times 3^2$$

(1)

$$K = 4.9$$

(M1) for attempting to find K.

$$S = 4.9r^2$$

$$s = 4.9r^2$$
 (A1)

b What is the value of s when r is 5?

$$S = 4.9 \times 25$$

$$s = 122.5$$
 (1)

(5 marks)

12 y is inversely proportional to x . When $y = 14.4$ $x = 2.5$

a) Copy and complete:

$$xy = K$$

(A1)

b) What is the value of y when x is 20

$$y = \frac{K}{x}$$

$$y = 1.8$$
 (A1)

$$14.4 \times 2.5 = K$$

$$K = 36$$
 (M1) for trying to find K.

$$y = \frac{36}{x}$$

$$y = \frac{36}{20}$$
 (M1) or (ft 1)

(4 marks)

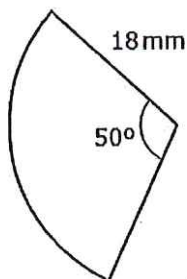
- 13 x is proportional to the square of y . When $y=6$, $x=468$. Write a formula to connect x and y .

$$x = ky^2$$
$$\frac{468}{36} = k$$

$$x = 13y^2$$

(3 marks)

14. Work out the area of the sector below:



$$\pi r^2 \times \frac{50}{360} \quad \text{mi}$$

$$\frac{\pi \times 18 \times 18 \times 50}{360}$$

mi

$$\text{Area} = 141.37 \quad \text{AI}$$

(3 marks)

[END of TEST]

If you have finished your test and checked your answers, try the puzzle below.

THIS IS OPTIONAL. YOU WILL NOT BE MARKED FOR THIS SECTION.

This logo is made up of 8 sectors.

The blue sectors each have angle 20° and the orange sectors each have angle 30° . All the sectors have radius 1.5 cm.

The red circle has diameter 0.5 cm.

- a Work out the areas of blue, orange and red in the logo.
- b Make up your own logo that combines shapes, including sectors of circles. Calculate the area of your logo.

