

1 $V = \frac{k}{H}$ where k is a constant.

Which **two** statements are correct?

Tick **two** boxes.

[1 mark]

☐

V is directly proportional to H

☒

V is inversely proportional to H

☒

V is directly proportional to $\frac{1}{H}$

☐

V is inversely proportional to $\frac{1}{H}$

2

 P , Q and R have positive values. P is directly proportional to the square of Q .When $P = 1.25$, $Q = 0.5$ Q is inversely proportional to R .When $Q = 0.5$, $R = 6$ Work out the value of R when $P = 0.8$ **[5 marks]**

$$P = kQ^2$$

$$1.25 = k(0.5)^2$$

$$k = \frac{1.25}{0.5^2} = 5$$

$$Q = \frac{m}{R}$$

$$0.5 = \frac{m}{6}$$

$$m = 3$$

$$P = 5Q^2, \quad Q = \frac{3}{R}$$

$$P = 5\left(\frac{3}{R}\right)^2$$

$$P = 5\left(\frac{9}{R^2}\right) = \frac{45}{R^2}$$

$$0.8 = \frac{45}{R^2}, \quad R^2 = \frac{45}{0.8} = 56.25$$

Answer

$$R = 7.5$$

3 L is directly proportional to D^2

$L = 85$ when $D = 10$

3 (a) Work out an equation connecting L and D .

[3 marks]

$$L = k D^2 \quad (1)$$

$$85 = k (10)^2$$

$$k = \frac{85}{100} = 0.85 \quad (1)$$

$$L = 0.85 D^2 \quad (1)$$

Answer $L = 0.85 D^2$

3 (b) Work out the value of L when $D = 5$

[2 marks]

$$L = 0.85 (5)^2 \quad (1)$$

$$= 0.85 \times 25$$

$$= 21.25 \quad (1)$$

Answer 21.25

- 4 (a) G is directly proportional to the square root of H .

$$G : H = 3 : 2 \text{ when } H = 16$$

Work out $G : H$ when $H = 100$

[4 marks]

$$G = k H^{\frac{1}{2}} \quad (1)$$

$$\text{when } H = 16, \quad G = \frac{16}{2} \times 3 = 24$$

$$24 = k (16)^{\frac{1}{2}}$$

$$k = \frac{24}{4} = 6 \quad (1)$$

$$G = 6 H^{\frac{1}{2}}$$

$$\text{when } H = 100, \quad G = 6 (100)^{\frac{1}{2}}$$

$$= 6 \times 10 = 60 \quad (1)$$

$$\begin{aligned} G : H &= 60 : 100 \\ &= 3 : 5 \end{aligned} \quad \begin{array}{l} \downarrow \div 20 \\ (1) \end{array}$$

Answer 3 : 5

5 H is inversely proportional to the cube root of L .

$$H = 7 \quad \text{when} \quad L = 64$$

5 (a) Work out an equation connecting H and L .

[3 marks]

$$H = \frac{k}{\sqrt[3]{L}} \quad (1)$$

$$7 = \frac{k}{\sqrt[3]{64}}$$

$$7 = \frac{k}{4}$$

$$k = 28 \quad (1)$$

Answer $H = \frac{28}{\sqrt[3]{L}} \quad (1)$

5 (b) Work out the value of H when $L = 2744$

[2 marks]

$$H = \frac{28}{\sqrt[3]{2744}} \quad (1)$$

$$H = \frac{28}{14} = 2 \quad (1)$$

$H = 2$

6

A chef has a tub of blueberries.

She wants to

use all the blueberries

put the same number of blueberries on each dessert.

$$D = \frac{k}{b}$$

 D is the number of desserts. b is the number of blueberries on each dessert.

6 (a) Complete the table.

[2 marks]

b	2	6	8
D	120	40	30

$$120 = \frac{k}{2}$$

$$k = 240$$

$$D = \frac{240}{6}$$

$$= 40$$

$$30 = \frac{240}{b}$$

$$b = 8$$

7

 P , Q , and R have positive values. P is directly proportional to Q When $P = 8$, $Q = 2$ R is inversely proportional to Q^2 When $R = 10$, $Q = 3$ Work out the value of R when $P = 0.5$ **[5 marks]**

$$P = kQ$$

$$8 = k(2)$$

$$k = 4, P = 4Q$$

$$R = \frac{m}{Q^2}$$

$$10 = \frac{m}{3^2}$$

$$m = 90, R = \frac{90}{Q^2}$$

$$\text{when } P = 0.5, 0.5 = 4Q$$

$$Q = 0.125$$

$$R = \frac{90}{0.125^2} = 5760$$

$$R = 5760$$