

Ratios

- 1 A rowing boat travelled 18 km in 2 hours 15 minutes.
A canoe travelled 15 miles in 1 hour 30 minutes.



What is the approximate ratio of the speed of the rowing boat to the speed of the canoe?
Give your answer in its simplest form.

.....
[Total 4 marks]

- 2 Abbey draws two triangles, A and B .
The height of triangle B is 1 cm more than the height of triangle A .
The bases of triangle A and triangle B are in the ratio 1 : 3.
The areas of triangle A and triangle B are in the ratio 2 : 9. Triangle B has an area of 45 cm^2 .



What is the ratio of the vertical height of triangle A to the vertical height of triangle B ?

.....
[Total 5 marks]

- 3 Jenna and Harvey both play a computer game.
The percentages of the game Jenna and Harvey have completed are in the ratio 3 : 4.
If they were both to complete another 7% of the game, the ratio would become 7 : 9.

What percentage of the game has Jenna completed?

..... %
[Total 4 marks]

- 4
- At a school there are x Year 8 pupils and y Year 9 pupils.
If 10 pupils from each year group left the school, the ratio of pupils in Year 8 to Year 9 would be 2 : 5. If 8 pupils were added to each year group, the ratio would be 1 : 2.

Express x as a percentage of y .

..... %
[Total 5 marks]

- 5
- A bag contains sweets that are either red, yellow or green.
The bag contains equal numbers of red and green sweets.

Luke eats 5 red, 15 yellow and 25 green sweets from the bag.
The ratio of red to yellow sweets remaining in the bag is 2 : 3
The ratio of yellow to green sweets remaining in the bag is 3 : 1
What fraction of the sweets originally in the bag were yellow?
Give your answer in its simplest form.

.....
[Total 6 marks]
Score:

24

Direct and Inverse Proportion

- 1 If you hang an object on the end of a spring, the amount that the spring stretches by, x cm, is directly proportional to the mass of the object, M g. When $M = 40$, $x = 2$.

a) Write an equation connecting x and M .

.....
[3]

- b) How much would the spring stretch if an object with a mass of 55 g was hung on the end of it?

..... cm
[1]

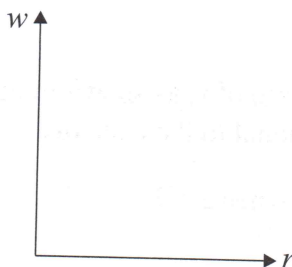
[Total 4 marks]

- 2 The weight, w g, of a sphere is directly proportional to the cube of its radius, r cm.

- a) When the radius is 6 cm, the sphere weighs 1080 g.
What is the radius of a sphere weighing 8.64 kg?

..... cm
[4]

- b) Sketch the graph of w against r on the axes on the right.



[1]

[Total 5 marks]

- 3 p is directly proportional to q and q is inversely proportional to r .

When $p = 8$, $q = 25$ and $r = 16$. Find the value of p when $r = 2$.

$p =$
[Total 5 marks]

- 4 a is inversely proportional to b .
 a is inversely proportional to c^2 .



Show that b is directly proportional to c^2 .

[Total 3 marks]

- 5 The density of an object, $d \text{ g/cm}^3$, is inversely proportional to its volume, $v \text{ cm}^3$.

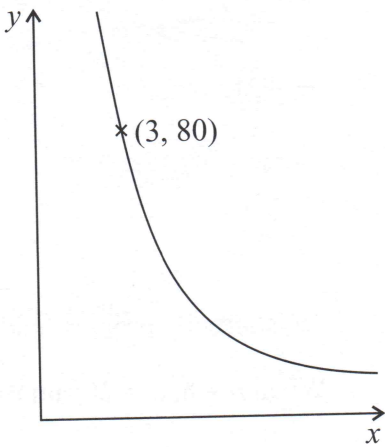
If the volume of the object is increased by 40%, what is the percentage decrease in its density?
Give your answer to 1 decimal place.

Start by setting up equations for the densities of the object before and after the increase in volume.

- 6 y varies inversely with the square of x , as shown in the diagram on the right. y is also proportional to the cube of z .

When $x = 2, z = 5$. Calculate y when $z = 15$.

..... %
[Total 4 marks]



.....
[Total 5 marks]

Score:
26



Percentages

- 1
- In the first quarter of the year a company’s sales were £12 million. In each of the next three quarters, sales were 10% higher than the previous quarter. 28% of the company’s sales are profit. At the end of the year 30% of the company profits are given to the employees as a bonus.

How much was given to the employees as a bonus?
Give your answer to 2 significant figures.

There are 4 quarters in a year.

£
[Total 4 marks]

- 2
- Simone took 3 maths exams. She scored 85% on exam A, which was out of 120 marks and 50% on exam B, which was out of 80 marks. On exam C she scored 95%.

She scored 75% of the total marks across the 3 exams. How many marks was exam C out of?

..... marks
[Total 4 marks]

- 3
- Two cubes, *A* and *B*, have the same weight. Both are resting on horizontal ground. The side length of cube *B* is 20% longer than the side length of cube *A*.

Give the pressure that cube *A* exerts as a percentage of the pressure that cube *B* exerts.

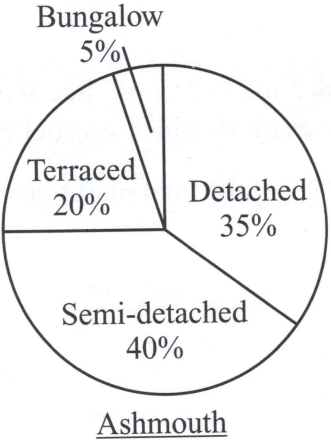
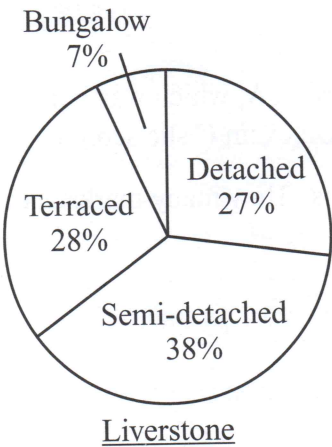
..... %
[Total 4 marks]

- 4
- An investment company guarantees 10% interest on a customer’s investment per annum. At the end of each year the company takes any money above the 10% interest as a payment and reinvests the rest of the customer’s money.

One customer’s 3-year investment of £100 000 makes 12% interest per annum.
How much does the company make over the 3 years from this customer’s investment?

£
[Total 5 marks]

- 5
- The pie charts show the types of houses in two villages.



There are 480 more terraced houses in Ashmouth than in Liverstone.
Ashmouth has 70% more houses in total than Liverstone.
Calculate how many more semi-detached houses there are in Ashmouth than in Liverstone.

Start by writing the number of houses in Ashmouth in terms of the number of houses in Liverstone (L).

.....
[Total 5 marks]

Score:
22