

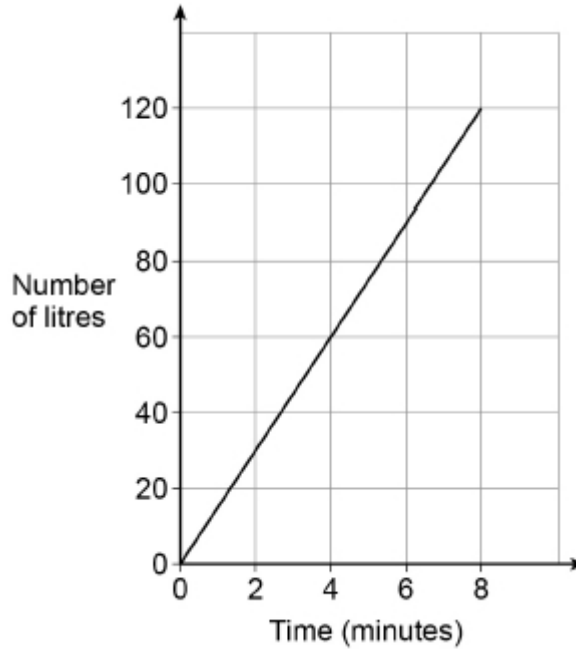
GCSE
MATHEMATICS (8300)
COMMON GRADES 4 & 5
Ratio, proportion and rates of change

Total number of marks: 34 per optional item

Q16

Water is poured into a tank.

The graph shows the number of litres of water in the tank.



$$8 = 120L$$

$$1 = 15L$$

How much water is poured into the tank each minute?

Circle your answer.

1.5 litres

15 litres

30 litres

120 litres

(Total 1 mark)

Q14

In this question, use

1 kilogram = 2.2 pounds

1 stone = 14 pounds

$$1 \text{ kg} = 2.2 \text{ pounds}$$

$$70 \text{ kg} = 154 \text{ pounds}$$

$$1 \text{ st} = 14 \text{ pounds}$$

$$\frac{1}{14} \text{ st} = 1 \text{ pound}$$

$$11 \text{ st} = 154 \text{ pounds}$$

Change 70 kilograms into stones.

Answer 11 stones

(Total 3 marks)

3

$$\begin{aligned}
 x &= 80\% \\
 3 &= 20\% \\
 0.15 &= 1\%
 \end{aligned}
 \quad \rightarrow \quad
 \begin{aligned}
 &0.15 \times 100 \\
 &= 150 \text{ people}
 \end{aligned}$$

Q7

Three friends arrive at a party.

Their arrival increases the number of people at the party by 20%

In total, how many people are now at the party?

Answer 150 people

(Total 2 marks)

Q9a

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{M}{V}$$

The mass of solid A is 6 times the mass of solid B.

The volume of solid A is 3 times the volume of solid B.

Complete the sentence.

The density of solid A is 2 times the density of solid B.

(Total 1 mark)

Q9b

$$\text{Average speed} = \frac{\text{distance}}{\text{time}}$$

$$\frac{0.5}{2}$$

If the distance is halved and the time is doubled, what happens to the average speed?

Circle your answer.

$\times 2$

$\times 4$

no change

$\div 2$

$\div 4$

(Total 1 mark)

Q23a

(a) Tom is tiling a wall.

He needs to buy **at least 100 tiles**.

The tiles are sold in large packs and small packs.

Large pack	40 tiles	£18
Small pack	28 tiles	£14
<i>Special offer</i>		
25% reduction when you buy 3 or more large packs		

Work out the cheapest cost for Tom to buy the packs of tiles he needs.

Answer £ 40.5

3 large packs

$$3 \times 40 = 120 \text{ tiles}$$

$$3 \times £18 = £54$$

$$0.25 \times 54 = £13.5 \text{ reduction}$$

$$\Rightarrow 54 - 13.5 = \boxed{£40.5}$$

2 large packs + 1 small pack

(Total 3 marks)

$$\left. \begin{array}{l} 2 \times 40 = 80 \text{ tiles} \\ 1 \times 28 = 28 \end{array} \right\} 80 + 28 = 108 \text{ tiles}$$

$$£18 + £18 + £14 = \boxed{£50}$$

Q7

hence the cheapest cost for Tom would be to buy 3 large packs \rightarrow £40.5

Investment A Save £150 per month for 2 years.

2.5% interest is added to the total amount saved.

Investment B Invest £3500

Compound interest is added at 3% per year.

After 2 years, how much **more** is investment B worth than investment A?

Answer £ 23.15

A

$$(150 \times 12) \times 2 = 3600$$

$$1.025 \times 3600 = £3690$$

B

$$3500 \times 1.03^2$$

$$\Rightarrow £3713.15$$

(Total 4 marks)

$$3713.15 - 3690$$

$$= \boxed{£23.15}$$

Q13

$$e:f = 2:3 \quad \text{and} \quad f:g = 5:4$$

Work out $e:g$

Give your answer in its simplest form.

$$\begin{array}{cc} e:f & f:g \\ 2:3 & 5:4 \\ \downarrow \times 5 & \downarrow \times 3 \\ 10:15 & 15:12 \end{array}$$

$$\Rightarrow e:g = 10:12 = \textcircled{5:6}$$

(Total 3 marks)

Q11

Joe and Kyle share an amount of money in the ratio $7:n$

Joe gets 35% of the money.

Work out the value of n .

→ therefore Kyle gets 65%

(Total 2 marks)

$$\begin{array}{l} J : K \\ 7 : n \end{array}$$

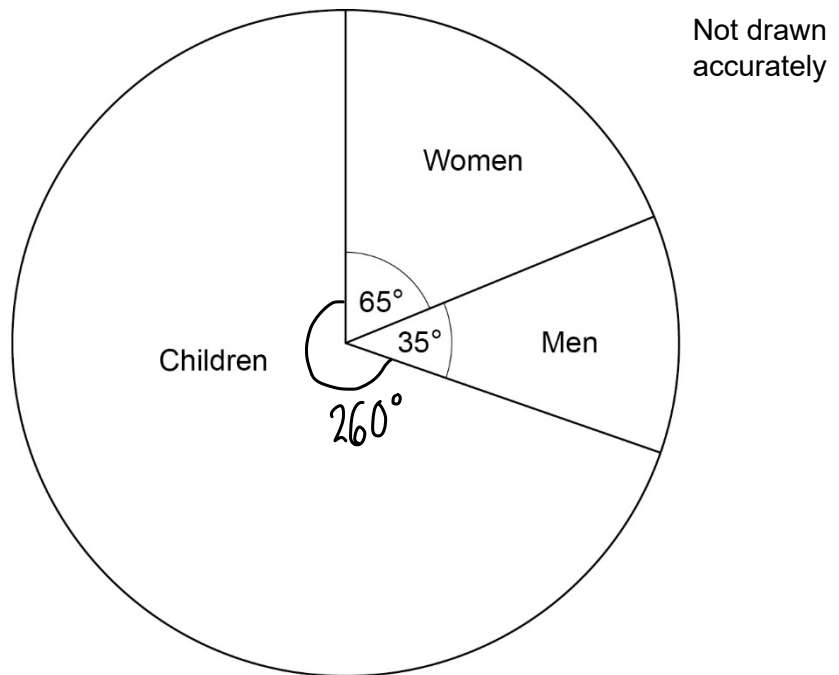
$$7 \text{ units} = 35\%$$

$$1 \text{ unit} = 5\%$$

$$13 \text{ units} = 65\% \rightarrow \textcircled{n = 13}$$

Q9

The pie chart shows information about people at a theme park.



There were 450 **more** women than men.

Work out the number of children.

(Total 3 marks)

$$n = 35\%$$

$$n + 450 = 65\%$$

$$\frac{n}{35} = 1\%$$

$$\frac{13}{7}n = 65\%$$

$$n + 450 = \frac{13}{7}n$$

$$\Rightarrow 450 = \frac{6}{7}n$$

$$\Rightarrow n = 525 \text{ men}$$

$$\Rightarrow \text{number of women} = 975$$

$$525 = 35\%$$

$$15 = 1\%$$

$$\Rightarrow 3900 = 260\%$$

there were
3900 children

7

Q19a

$$\frac{120}{4} = 30 \quad 30 : 120$$

$$\Rightarrow 3 : 12$$

$$\Rightarrow 1 : 4$$

(a) Divide 120 in the ratio 1 : 4

Answer 30 : 120

(Total 2 marks)

Q19b

$$7 : 4$$

$$\Rightarrow \frac{7}{4} : 1 = 1.75 : 1$$

(b) Write the ratio 7 : 4 in the form $n : 1$

Answer 1.75 : 1

(Total 1 mark)

Q20

In 2015, Han was paid £1350 per month.

In 2016, he

had a 2% increase in his monthly pay.

worked 37.5 hours per week.

worked for 47 weeks.

$$\frac{2016}{1350 \times 1.02 = 1377 \text{ per month}}$$

$$37.5 \times 47 = 1762.5 \text{ hours in 2016}$$

$$1377 \times 12 = 16524 \text{ (total pay in 2016)}$$

$$\text{average pay per hour} = \frac{16524}{1762.5} = 9.375 = 9.38$$

Work out Han's average pay **per hour** for 2016

Answer £ 9.38

(Total 5 marks)

Q25

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$F = p \times \text{area}$$

$$F = 24 \times 3 = 72$$

Work out the **force** when the pressure is 24 N/m^2 and the area is 3 m^2

Circle your answer.

0.125 N

8 N

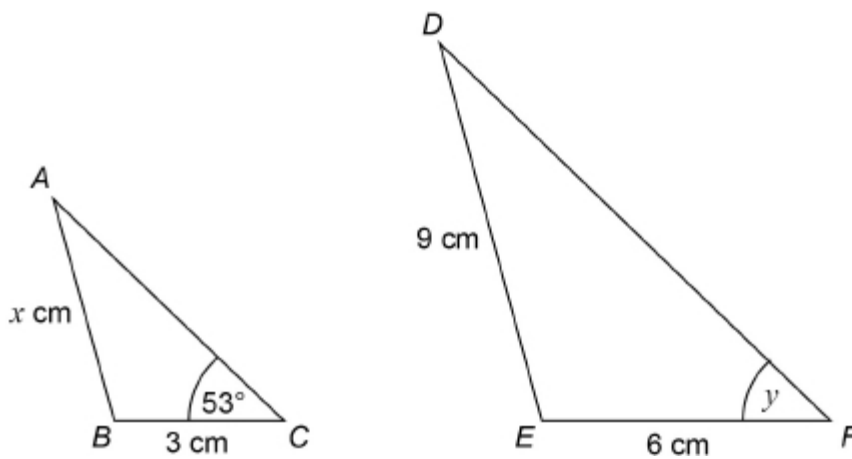
27 N

72 N

(Total 1 mark)

Q16a

Triangles ABC and DEF are similar.



(a) Work out the value of x .

$$x = 4.5$$

(Total 2 marks)