

Ratio – Level Two

How to Guide - ANSWERS

Question 1 – write the following as ratios in their simplest form

a) To make a cleaning solution you must mix 5ml of bleach to 100ml of water.

1 : 20

Write in the correct order 5 : 100 simplify by dividing each part by 5 = 1 : 20

b) Mix a fruit cocktail by adding 200ml orange juice, 150ml pineapple juice and 100ml of mango juice. **4 : 3 : 2**

Write in the correct order 200 : 150 : 100 simplify by dividing each part by 50

4 : 3 : 2

OR

Divide each part by 10 by removing a 0 to give 20 : 15 : 10 then divide again by 5

c) A builder uses 14kg of sand and 3.5kg of cement to make a concrete mixture. What is the ratio of cement to sand? **1 : 4**

Write in the correct order of cement to sand 3.5 : 14 (that's the way it is asked in the question)

You could simplify by dividing both parts by 3.5 to give 1 : 4

OR

You could multiply to get rid of the decimal

We can double each part to give 7 : 28 and then use division to simplify by dividing each part by 7 to give 1 : 4

Question 2

a) To mix concrete a builder uses a base mix of 1 part cement, 5 parts sand and 3 parts aggregate. For one job she knows she needs to use 20kg of sand. How much of the other materials should she use? **4kg cement and 12kg aggregate**

Write in a ratio with headings

cement : sand : aggregate

1: 5 : 3

?: 20 : ?

Compare the relationship of sand $20 \div 5 = 4$ so the top row is multiplied by 4 to create the bottom row

cement : sand : aggregate $1 \times 4 = 4$ and $3 \times 4 = 12$

1: 5 : 3

4: 20 : 12

b) On Monday at a theme park there are 850 visitors and they travelled in 150 cars. The manager wants to predict how many visitors there will be if 120 cars arrive on Tuesday and the visitors and cars remain in the same ratio. **680**

Write the numbers clearly in a ratio

visitors : cars

850 : 150

? : 120

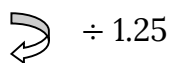
Find the relationship between the parts you know 150 and 120. In this case it is not obvious what 120 has been multiplied by to make 150. To find out divide 150 by 120. This gives 1.25. This means 150 has been divided by 1.25 to make 120.

Remember do the same thing to both sides.

visitors : cars

850 : 150



? : 120

 $\div 1.25$

visitors : cars

850 : 150

680 : 120

$\div 1.25$   $\div 1.25$

The manager could predict there will be 680 visitors.

c) In a nursery, the ratio of staff to children is a minimum of one staff member to five children. If they are expecting 36 children on Wednesday, how many staff members must they have on duty? **8**

Write the ratio out with headings

staff : children

$$1 : 5$$

$$? : 36$$

We find out the relationship between 5 and 36 by doing $36 \div 5 = 7.2$

This means the staff needs to be multiplied by 7.2

$1 \times 7.2 = 7.2$ staff but this doesn't work in real life as you can't have part of a staff member. In normal maths you would round this down to 7 but that would mean that you don't have enough staff to achieve the ratio of 1 to 5 so we round up to 8 staff members

Question 3

a) Juprit and Sara invest money in a business in the ratio of 5 to 1. The profit is split between them in the same ratio. In year one the business makes £12000 profit. How much do they each get? **Juprit gets £10,000 and Sara gets £2000**

Write out the information you know.

$$\text{Juprit} : \text{Sara} = \text{total}$$

$$5 : 1 = 6$$

$$? : ? = 12000$$

Find the relationship between 6 and 12000 through division

$$12000 \div 6 = 2000$$

$$\text{Juprit} : \text{Sara} = \text{total}$$

$$\begin{array}{rcc} \times 2000 & \curvearrowright & 5 : 1 = 6 \\ & & 10000 : 2000 = 12000 \end{array} \quad \curvearrowleft \quad \times 2000$$

Check that $10000 + 2000 = 12000$

b) To mix concrete a builder uses a base mix of 1 part cement, 3 parts sand and 3 parts aggregate. For one job she knows she needs 28kg of concrete. How much of each material should she use? **4kg cement, 12kg sand, 12kg aggregate**

Write out the information you know adding in a total column

cement : sand : aggregate = total/concrete

$$1 \quad : \quad 3 \quad : \quad 3 \quad = \quad ?$$

$$? \quad : \quad ? \quad : \quad ? \quad = \quad 28$$

Add up the total for the parts you are given

cement : sand : aggregate = total/concrete

$$1 \quad : \quad 3 \quad : \quad 3 \quad = \quad 7$$

$$? \quad : \quad ? \quad : \quad ? \quad = \quad 28$$

Find the relationship between the totals. $28 \div 7 = 4$

The first row is multiplied by 4 to create the second row

cement : sand : aggregate = total/concrete

$$1 \quad : \quad 3 \quad : \quad 3 \quad = \quad 7$$

$$4 \quad : \quad 12 \quad : \quad 12 \quad = \quad 28$$

Check that the total is 28 by adding up $4 + 12 + 12 = 28$

c) A hotel makes up a mixed fruit juice for breakfast. They make 3 litres of juice by mixing orange, mango and pineapple juice in the ratio of 3 : 1 : 4. How much of each ingredient do they use? **1125ml orange, 375ml mango and 1500ml pineapple OR 1.125L orange, 0.375L mango and 1.5L pineapple.**

Write out the information you know adding in a total column

orange : mango : pineapple = total/fruit juice

$$3 : 1 : 4 = ?$$

$$? : ? : ? = 3 \text{ litres}$$

Add up the total for the parts you are given

orange : mango : pineapple = total/fruit juice

$$3 : 1 : 4 = 8$$

$$? : ? : ? = 3 \text{ litres}$$

Find the relationship between the totals. $3 \div 8 = 0.375$

The first row is multiplied by 0.375 to create the second row

orange : mango : pineapple = total/fruit juice

$$3 : 1 : 4 = 8$$

$$1.125 : 0.375 : 1.5 = 3 \text{ litres}$$

Check the amounts add up to 3 by doing $1.125 + 0.375 + 1.5 = 3$

Remember these amounts are in litres.

OR Convert the 3 litres to ml first

orange : mango : pineapple = total/fruit juice

$$3 : 1 : 4 = 8$$

$$? : ? : ? = 3000\text{ml}$$

Find the relationship between the totals. $3000 \div 8 = 375$

The first row is multiplied by 375 to create the second row

orange : mango : pineapple = total/fruit juice

$$3 : 1 : 4 = 8$$

$$1125 : 375 : 1500 = 3000\text{ml}$$

Mixed Questions

a) Find the ratio of 60 days to 1 year in its simplest form. (Assume the year is a non-leap year.) **12 : 73**

1 year = 365 days

Write in the correct order 60 : 365 and then simplify using division by dividing by 5

12 : 73

b) Jo, Tony and Mike invest in a business in the ratio of 1:4:5. They divide the profits up according to the number of shares. If the profit is £54,000, how much money do they get each?

Write the amounts using headings

Jo : Tony : Mike = Total

1 : 4 : 5 = ?

? : ? : ? = 54000

Fill in the total for the parts

Jo : Tony : Mike = Total

1 : 4 : 5 = 10

? : ? : ? = 54000

Find the relationship between the two totals by doing $54000 \div 10 = 5400$

This means each part on the top row is multiplied by 5400 to give the second row

Jo : Tony : Mike = Total

1 : 4 : 5 = 10

5400 : 21600 : 27000 = 54000

Check the amounts add up to the total of 54000 $5400 + 21600 + 27000 = 54000$

c) At a conference, there are going to be 50 delegates. Each delegate will be allowed 2 glasses of juice. Each glass holds 200ml. A bottle of juice holds 1 litre. How many bottles should they buy? **20 bottles**

Each delegate has two glasses so $2 \times 50 = 100$ glasses

Each glass is 200ml so $100 \times 200\text{ml} = 20000\text{ml}$ OR 20L of juice in total

Each bottle is 1 litre so we need 20 bottles

OR

One person has two glasses so $2 \times 200\text{ml} = 400\text{ml}$ per person

There are 50 delegates so $400 \times 50 = 20000\text{ml} = 20\text{L}$

d) Sam works in a hospital and has to change the beds and restock. For each patient he allocates 2 pillowcases, 3 sheets, and 1 blanket.

i) If there are 30 patients on the ward how many pillowcases, sheets and blankets will he need? **60 pillowcases, 90 sheets and 30 blankets**

pillowcases : sheets : blankets

$$2 \quad : \quad 3 \quad : \quad 1 \quad = \text{1 patient}$$

$$? \quad : \quad ? \quad : \quad ? \quad = \text{30 patients}$$

The number of patients is 30 times greater, so each item needs to get 30 times bigger $2 \times 30 = 60$, $3 \times 30 = 90$ and $1 \times 30 = 30$

ii) If Sam fills his trolley with 72 sheets, how many pillowcases and blankets should he take with him to make sure he returns with an empty trolley? **48 pillowcases and 24 blankets**

Fill in what we know

pillowcases : sheets : blankets

$$2 \quad : \quad 3 \quad : \quad 1$$

$$? \quad : \quad 72 \quad : \quad ?$$

Find the relationship between 3 and 72 by calculating $72 \div 3 = 24$

The top row is multiplied by 24 to create the bottom row

pillowcases : sheets : blankets

$$2 \quad : \quad 3 \quad : \quad 1$$

$$48 \quad : \quad 72 \quad : \quad 24$$