# Answers - Ratio and proportion

Year: Year 7

## Answer to Question 1

To simplify a ratio, divide every part by the highest common factor. If there are decimals, multiply first to make whole numbers, and if there are units, make them the same before simplifying.

a. **2 : 3**
b. **3 : 4 : 5**
c. **1 : 4**
d. 1 kg = 1000 g. 150 : 1000 = **3 : 20**.
e. 1.2 m = 120 cm. 40 : 120 = **1 : 3**.

## Answer to Question 2

In each case add the parts of the ratio, divide the amount by this total to find one part, then multiply by each number in the ratio. The shares must add up to the original amount.

a. 3 parts, £20 per part: **£20 and £40**.
b. 9 parts, £10 per part: **£20, £30, £40**.
c. 12 parts, £7 per part: **£35 and £49**.
d. 4 parts, 18 per part: **54 and 18 sweets**.

## Answer to Question 3

Equivalent ratios are made by multiplying (or dividing) every part by the same number, just like equivalent fractions.

a. Multiply by 4: **20**.
b. Multiply by 4: **16**.
c. Multiply by 3: **9 : 15**.
d. 5 parts = 30, so 1 part = 6 and blue = $2 \times 6 =$**12**.

## Answer to Question 4

a. 1 pen = 70p. 8 pens = **£5.60**.
b. 1 apple = 0.15 kg. 20 apples = **3 kg**.
c. 1 litre = 12 km. 10 litres = **120 km**.
d. 1 hour = £7.80. 15 hours = **£117**.

The unitary method always works in two steps: divide to find the value for one, then

multiply to find the value for the number you need.

## Answer to Question 5

a. Small: $120 \div 500 = 0.24$p per gram. Large:$440 \div 2000 = 0.22$p per gram. The **2 kg pack** is better value.
b. Small: $150 \div 250 = 0.6$p per ml. Large: $420 \div 750 = 0.56$p per ml. The **750 ml bottle** is better value.
c. 1.5 litres: $210 \div 1.5 = 140$p per litre. 2 litres: $260 \div 2 = 130$p per litre. The **2 litre bottle** is better value.

## Answer to Question 6

a. 1 cm on the map is 50 000 cm on the ground. Divide by 100 to change to metres: **500 m**.
b. $6 \times 50000 = 300000$ cm. Divide by 100 to get 3 000 m, then by 1 000: **3 km**.
c. Change 2.5 km into centimetres: $2.5 \times 100000 = 250000$ cm. Divide by the scale: $250000 \div 50000 =$**5 cm**.

## Answer to Question 7

a. 10 parts = 5 litres, so 1 part = 0.5 litres: orange **1.5 litres**, pineapple **1 litre**, lemonade **2.5 litres**.
b. 2 parts = 1.2 litres, so 1 part = 0.6 litres, and 10 parts = **6 litres**.
c. Orange: $3 \times 0.6 =$**1.8 litres**. Lemonade: $5 \times 0.6 =$**3 litres**.
d. Cost: $1.5 \times 1.5 + 1 \times 2 + 2.5 \times 0.6 = 2.25 + 2 + 1.5 =$**£5.75**.

## Answer to Question 8

a. 2 bags = $2 \times 25 = 50$ kg of cement, which is 1 part. Sand is 2 parts: **100 kg**. Gravel is 4 parts: **200 kg**.
b. Add the three amounts: $50 + 100 + 200 =$**350 kg**.
c. There are $1 + 2 + 4 = 7$ parts and cement is 1 of them: $\frac{1}{7}$.
d. 700 kg is 7 parts, so 1 part (the cement) is $700 \div 7 = 100$ kg. $100 \div 25 =$**4 bags**.

## Answer to Question 9

a. Small: $225 \div 3.75 = 60$p. Medium: $330 \div 6 = 55$p. Large: $600 \div 12 = 50$p.
b. The **large pack** (50p per 100 g).
c. Twice the medium pack costs £6.60 for 1.2 kg. The large pack costs £6.00, so it is

**cheaper** by 60p.
d. $1200 \div 150 =$**8 days**.

Comparing the price for the same mass (100 g) is the fairest way to decide which pack is the best buy.

## Answer to Question 10

a. 9 parts = £45, 1 part = £5: Ali **£20**, Ben **£25**.
b. 12 parts = £72, 1 part = £6: Ali **£24**, Ben **£30**, Cara **£18**.
c. $24 - 20 =$**£4**.
d. Ali $\frac{4}{12} = \frac{1}{3}$, Ben $\frac{5}{12}$, Cara $\frac{3}{12} = \frac{1}{4}$.

Check: $24 + 30 + 18 = 72$, so the three shares make the whole prize.

## Answer to Question 11

a. Divide distance by time: $195 \div 3 =$**65 km** in one hour.
b. Multiply by 5: $65 \times 5 =$**325 km**.
c. Each hour covers 65 km, and $130 \div 65 =$**2 hours**.
d. The second coach covers $280 \div 4 = 70$ km each hour, more than 65 km, so the **second coach** is faster.

## Answer to Question 12

a. 6 people: 300 g, 3 eggs, 450 ml. 10 people: 500 g, 5 eggs, 750 ml. 15 people: 750 g, 7.5 eggs, 1 125 ml.
b. 5 eggs feed 10 people, with 500 g flour and 750 ml milk.
c. Flour 0.5 kg = 60p. Eggs 5 × 25p = £1.25. Milk 0.75 litre = 60p. Total: $60 + 125 + 60 = 245$p = **£2.45**.

## Answer to Question 13

a. $330 \div 200 =$**1.65 m**
b. $0.6 \times 200 =$**120 m**.
c. No. When lengths are scaled by 1 : 200, volume (and weight) is scaled by $1 : 200^3$, which is 1 : 8 000 000. So the model weighs far less than the ratio of heights suggests.

A scale of 1 : 200 means every real length is 200 times the matching model length, so we divide to go from real to model and multiply to go from model to real.

## Answer to Question 14

a. 9 parts = 135, 1 part = 15: **75 boys** and **60 girls**.
b. Girls: 70. Ratio $75 : 70 =$**15 : 14**.
c. $\frac{60}{135} \times 100 = 44.4$, so about **44%**.
d. $135 \times 2.50 \times 4 =$**£1 350**.

Check: $75 + 60 = 135$ members, and after ten girls join the club has 145 members.

## Answer to Question 15

a. $2 : 3 : 5$ is already in its simplest form (the total is 10 parts).
b. 1 part = £40: Amy **£80**, Ben **£120**, Cara **£200**.
c. $400 \div 4 = 100$, so they have **£300** left.
d. 1 part = £30: Amy £60, Cara £150. Difference **£90**.

Check: $80 + 120 + 200 = 400$ and $60 + 90 + 150 = 300$.

## Answer to Question 16

a. 8 parts = 1600 g, 1 part = 200 g: flour **1000 g**, water **600 g**.
b. Water is 700 g. Ratio $1000 : 700 =$**10 : 7**.
c. For 700 g of water the flour should be $700 \div 3 \times 5 = 1166.67$ g, so add about **167 g** of flour.
d. Flour 1167 g plus water 700 g = about **1 867 g**.

## Answer to Question 17

a. 5 parts, 2 litres per part: yellow **6 litres**, blue **4 litres**.
b. Yellow **4 litres**, blue **6 litres**.
c. Yellow $6 + 4 = 10$ litres, blue $4 + 6 = 10$ litres.
d. Yellow: 2 tins = £25. Blue: 4 tins = £28. Total **£53**.

Buying exactly enough would need 2 tins of yellow (10 litres) and 4 tins of blue (10 litres), so there is no cheaper combination.

## Answer to Question 18

a. Each part is $50 \div 5 = 10$, so the shares are **£20 and £30**.
b. The last number is wrong: $24 \div 6 = 4$, so the answer is **2 : 3 : 4**.
c. Carl added 6 pens at the wrong price. One pen costs 75p, so 10 pens cost **£7.50**.
d. Ratio 3 : 1 has 4 parts, so sugar is **one quarter**, not a third.

## Answer to Question 19

a. 5 packs of 500 sheets make 2 500 sheets: $5 \times 3.50 =$**£17.50**.
b. 10% off leaves 90%: $17.50 \times 0.9 =$**£15.75**.
c. Shop A costs £15.75 and shop B costs £16.00, so **shop A** is cheaper by $16 - 15.75 =$**25p**.
d. 10 000 sheets is 4 lots of 2 500, so the saving is $4 \times 25$p = **£1.00**.

## Answer to Question 20

a. 7 parts = 42, 1 part = 6, so the daughter is $2 \times 6 =$**12**.
b. Mother 47, daughter 17.
c. $47 : 17$ cannot be simplified, so the ratio is **47 : 17**.
d. Let t be years: $42 + t = 2(12 + t)$, $42 + t = 24 + 2t$, $t =$**18**. In 18 years: mother 60, daughter 30.