

RATIO

70

TARGET To use ratio to solve problems involving the relative sizes of two quantities.

Example 1

A prize of £200 is shared 3 : 2 between Diane and Dave. How much should they receive each?

- 1 Find the number of shares.
 $5 (3 + 2 = 5)$
- 2 Find the value of each share.
 $£40 (£200 \div 5 = £40)$
- 3 Work out how much is received each.
Diane £120 ($£40 \times 3$)
Dave £80 ($£40 \times 2$)

Example 2

The ratio of boys to girls in a school is 6 : 5. There are 168 boys in the school. How many children are there altogether?

- 1 Find the total number of parts.
 $11 (6 + 5 = 11)$
- 2 Find the value of one part.
 $28 (168 \div 6 = 28)$
- 3 Work out the number of children.
 $308 (28 \times 11 = 308)$

Example 3

The ratio of adults to children at a cinema is 3 : 4. There are 111 adults in the cinema. How many children are there?

- 1 Find the number of parts.
 $7 (3 + 4 = 7)$
- 2 Find the value of each part.
 $37 (111 \div 3 = 37)$
- 3 Work out the number of children.
 $148 (37 \times 4 = 148)$

A

A row of tiles is laid with this repeating pattern.



- 1 How many blue tiles are there if there are:
a) 12 red tiles b) 30 red tiles?
- 2 How many red tiles are there if there are:
a) 12 blue tiles b) 40 blue tiles?

In a raffle there is one prize for every 20 tickets.

- 3 How many prizes are there if:
a) 120 tickets are sold
b) 500 tickets are sold?
- 4 How many tickets have been sold if there are:
a) 9 prizes b) 17 prizes?
- 5 In Year 6 the ratio of dinners to packed lunches is 2 : 1. Forty children have a dinner. How many have a packed lunch?
- 6 In a class the ratio of boys to girls is 3 : 4. There are 16 girls. How many boys are there?
- 7 The ratio of red to green apples in a bowl is 3 : 1. If there are 15 red apples, how many apples are green?
- 8 At a market the ratio of blue jeans sold to black jeans sold is 7 : 2. If 6 black jeans are sold, how many blue jeans are sold?



B

- 1 In one season the ratio of goals for to goals against in Chelsea's matches was $5:3$. If Chelsea scored 80 goals, how many did they let in?
- 2 In November the ratio of wet days to dry days was $4:1$. How many days were wet?



- 3 In a survey of trees in a wood the ratio of beech trees to other trees was $2:5$. If there were 14 beeches, how many other types of tree were there?
- 4 In a supermarket the ratio of male to female employees is $2:3$. If there are 36 female employees, how many men work there?
- 5 During a lesson lasting one hour the ratio of the time Aidan spends working to the time he spends day-dreaming is $3:7$. How long does he actually work?
- 6 In a hospital ward the ratio of nurses to patients is $2:9$. If there are 63 patients, how many nurses are there?
- 7 A cashier in a bank counts £1300 in £10 and £20 notes only. The ratio £10 notes : £20 notes is $3:5$. How many are there of each note?
- 8 Share :
 - a) 21 sweets in the ratio $3:4$
 - b) £1.20 in the ratio $2:1$
 - c) 1 litre of drink in the ratio $2:3$
 - d) 36 strawberries in the ratio $4:5$
 - e) £90 in the ratio $3:15$
 - f) 480 g of nuts in the ratio $5:3$.

C

- 1 A photocopier enlarges in a ratio of $5:7$. If the original document was 30 cm long and 20 cm wide, what are the dimensions of the photocopy?
- 2 In a bakery the ratio of large loaves to small loaves is $8:3$. If there are 96 large loaves, how many small loaves are there?
- 3 On a plane the ratio of adult to child passengers is $15:2$. If there are 300 adult passengers, how many children are there on the plane?
- 4 In a necklace the ratio of black to red to green beads is $1:2:4$. If there are 32 red beads, how many beads are :
 - a) black
 - b) green?
- 5 In an English exam the ratio of marks given for spelling to writing to reading is $2:8:5$. If there are 48 marks for writing, how many are there for :
 - a) spelling
 - b) reading?
- 6 In a sports shop the ratio of large to medium to small running vests sold is $3:5:4$. If 15 medium vests are sold, how many large vests and how many small vests are sold?
- 7 Three afternoon lessons last for 2 hours altogether. The lengths of the lessons are in the ratio $2:3:3$. How long is each lesson?
- 8 Split :
 - a) 1.32 m in the ratio $6:5$
 - b) £65 in the ratio $4:9$
 - c) 6 hours in the ratio $7:2$
 - d) 2 kg in the ratio $1:3:4$
 - e) £5.40 in the ratio $3:2:5$
 - f) 750 ml in the ratio $5:1:9$.

Ratio race

A person to play with, a dice, coins (10p and 5p), paper and pencils



Ratio/proportion N38

Each throw the dice and write the two numbers as a ratio.

You take 10p coins to match the first number in the ratio and your partner takes 5p coins to match the second number.

Each work out your amounts and score the total.

Repeat ten times.
Who has collected the most money?

3:5

$$3 \times 10p = 30p$$

$$5 \times 5p = 25p$$



Tuesday 12th May – see separate PDF on Class 6 page.

Wednesday 13th May – see separate PDF on Class 6 page.

PROPORTION

72

TARGET To solve problems involving proportion.

A proportion is a quantity that is part of a whole. In everyday life we often have to solve problems of proportion when dealing with recipes.

Example 1

A cake recipe requires 50 g of butter to be used for every cake. The amount of butter needed will increase in proportion to the number of cakes.

Cakes	Butter
1	50 g
2	100 g
3	150 g
⋮	⋮
7	350 g
8	400 g
and so on.	

Example 2

A recipe for 8 people requires 1000 g of fruit. How much fruit is needed for 5 people?

Step 1 Find how much fruit is needed for 1 person.

$$125 \text{ g } (1000 \text{ g} \div 8 = 125 \text{ g})$$

Step 2 Find how much fruit is needed for 5.

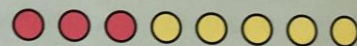
$$625 \text{ g } (125 \text{ g} \times 5 = 625 \text{ g})$$



A

- In an art lesson lasting one and a half hours Keeley spends 15 minutes drawing and the rest of the time painting. Write as a fraction in its lowest terms the proportion of the lesson. Keeley is:
a) drawing b) painting.
- One litre of orange paint is made by mixing 200 ml of red paint with 800 ml of yellow. Write as a percentage the proportion of the mixture which is:
a) red b) yellow.
- Rex and Rover share a 600 g can of dog food. Rex eats 250 g. Rover eats 350 g. Write the proportion eaten by each dog as a fraction in its lowest terms.
- There are 60 passengers on a bus. 45 are children. 15 are adults. Write as a percentage the proportion of passengers who are:
a) children b) adults.

A necklace is made using this pattern of beads.



- How many beads are there altogether if there are:
a) 36 red beads b) 40 yellow beads?
- How many red beads are there if there are 40 beads altogether?
- How many yellow beads are there if there are 72 beads altogether?

8 NUT BROWNIES

100 g butter 2 eggs
120 g chocolate 80 g sugar
60 g flour 160 g nuts

Makes 8 brownies

Rewrite the above ingredients for:

- a) 4 brownies b) 24 brownies.

B

- 1 In a cafe three cups of tea cost £1.80 altogether. What would be the cost of:
a) 2 cups b) 40 cups?
- 2 Four rolls cost £1.00. Find the cost of:
a) 3 rolls b) 10 rolls.
- 3 £8 is worth 9.6 euros. How many euros will I be given in exchange for:
a) £5 b) £200?
- 4 A machine can make 300 pins in six minutes. How many pins can it make in:
a) 5 minutes b) 14 minutes?
- 5 Five bricks weigh 4 kg altogether. What is the weight of:
a) 3 bricks b) 16 bricks?
- 6 A plane travels 300 km in 15 minutes. How far does it travel in:
a) 8 minutes b) 45 minutes?



- 7 Shaun uses 400 ml of squash to make ten glasses of drink. How much squash would he need to make:
a) 6 glasses b) 38 glasses?
- 8 Twelve eggs cost £2.40. Find the cost of:
a) 7 eggs b) 20 eggs.
- 9 Fish costs £7 for 1 kg. Find the cost of:
a) 600 g b) 350 g.

C

- 1 Five cinema tickets cost £38. What is the cost of:
a) 4 tickets b) 11 tickets?
- 2 A cyclist rides 6 km in 15 minutes. Travelling at the same speed how long would it take her to cycle:
a) 5 km b) 19 km?
- 3 A farmer uses 96 m of wire to fence a 20 m length of field. How much wire will he need to fence a further:
a) 7 m b) 150 m?
- 4 Nine biscuits cost £1.08. Find the cost of:
a) 4 biscuits b) 30 biscuits.
- 5 Six litres of water runs from a tap in 30 seconds. At the same rate of flow how much water will run from the tap in:
a) 18 seconds b) 1 minute 20 seconds?
- 6 Sixteen bags of flour weigh 44 kg. Find the weight of:
a) 2 bags b) 50 bags.
- 7 £400 is worth 580 US dollars. At this exchange rate what is the value in dollars of:
a) £10 b) £30 000?
- 8 In 40 minutes Martin walks 3.6 km. Walking at the same speed how far would he walk in:
a) 2 minutes b) 1 hour 25 minutes?



proportion

Write these ratios and proportions.

Crumble topping

(serves 6)

225 g flour
150 g brown sugar
75 g butter

Oat crunchies

(makes 12)

50 g whole oats
75 g porridge oats
100 g margarine
75 g brown sugar

Baked apple pudding

(serves 4)

450 g apples
50 g brown sugar
100 g butter
100 g caster sugar

Ratio and proportion

N19

Proportion of total weight which is:

Ratio of:

- 1 butter
- 2 brown sugar
- 3 flour

- 4 butter to sugar
- 5 flour to butter
- 6 sugar to flour
- 7 butter to flour

- 8 whole oats
- 9 porridge oats
- 10 margarine
- 11 brown sugar

- 12 sugar to margarine
- 13 whole oats to porridge oats
- 14 porridge oats to margarine
- 15 sugar to porridge oats

- 16 apples
- 17 butter
- 18 caster sugar
- 19 brown sugar

- 20 butter to apples
- 21 brown sugar to caster sugar
- 22 caster sugar to apples
- 23 apples to brown sugar

Write how much you will need to make these recipes:

24

butter for crumble topping to serve 12

25

brown sugar to make 8 oat crunchies

26

butter to make baked apple pudding for 6

Split these amounts in the given ratios.

27 500 g in the ratio of 2:3

29 640 g in the ratio of 7:9

31 1200 g in the ratio of 1:4:7

28 400 g in the ratio of 3:5

30 480 g in the ratio of 2:3:7

32 3.2 kg in the ratio of 3:5:8

RATIO AND PROPORTION

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TARGET To solve problems involving ratio and proportion.

Ratio compares part to part.
Proportion compares part to whole.

Example 1

A necklace is made using this pattern of beads.



Ratios of blue to red beads $2 : 3$
Proportion of blue beads $\frac{2}{5}$
Proportion of red beads $\frac{3}{5}$

Example 2

In a supermarket 2 large packets of cereal are put on the shelves for every 5 small packets. 40 small packets are put out. How many large packets are put on the shelves?

Find ratio of small to large packets.

$5 : 2$

Find value of one part.

$8 (40 \div 5 = 8)$

Work out the number of large packets put out on shelves.

$16 (8 \times 2 = 16)$

Example 3

At a swimming gala 3 in every 8 swimmers receive a medal. How many medals are awarded if there are 72 swimmers altogether?

Find proportion of swimmers receiving a medal.

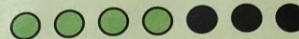
$\frac{3}{8}$ (3 in every 8)

Find the number of medals awarded.

$27 (72 \div 8 = 9 \quad 9 \times 3 = 27)$

A

A necklace is made using this pattern of beads.



- 1 Write the ratio of green beads to black beads.
- 2 Write the proportion of the beads which is green.
- 3 If there are 20 green beads, how many black beads are there?
- 4 If there are 56 beads altogether, how many beads are:
a) black b) green?
- 5 A map has a scale of 1 cm to 2 km. Two castles are 23 cm apart on the map. What is the actual distance between the castles?
- 6 Lavinia makes jam. One jar in every 4 is plum jam. She makes 56 jars altogether. How many jars of plum jam does she make?
- 7 A shop sells 5 ice creams to every 2 lollies it sells. 35 ice creams are sold. How many lollies are sold?
- 8 Two in every three members of the audience at a concert are children. There are 1200 children at the concert. How many adults are in the audience?
- 9 In Year 4 the ratio of children with a pet to those with no pet is 5 : 4. If 36 children do not have a pet, how many do?

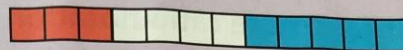


B

- 1 A bridge is 48 m tall. A scale model of the bridge is 37 cm long and 12 cm tall. How long is the actual bridge?
- 2 In a cake recipe the ratio of dried fruit to nuts is 3 : 2. What quantity of dried fruit is required if 90 g of nuts is used?
- 3 a) Five bars of chocolate cost £8.75. What do three bars cost?
b) The cost of all the bars in a box is £35.
How many bars are in a box?
- 4 The ratio of the weight of a large bag of potatoes to that of a small bag is 11 : 5. If a large bag weighs 5.5 kg, how much does a small bag weigh?
- 5 There are 360 passengers on a flight to Singapore from London. Five in every eight of the passengers are flying on to Sydney. How many of the passengers are bound for Sydney?
- 6 A factory makes 7 single beds to every 4 double beds.
a) How many double beds does it produce if it makes 91 single beds?
b) How many single beds does it produce if it makes 96 double beds?
- 7 A car uses £8 worth of petrol for every 100 km it travels. What is the cost of the petrol used to travel:
a) 70 km b) 240 km?
- 8 The profits made by a shop are shared between the owner and her assistant in a ratio of 5 : 3, the owner receiving the larger share. How much does the assistant receive if:
a) total profit is £20 000
b) the owner receives £17 435?

C

A row of tiles has this repeating pattern.



- 1 How many tiles are blue if:
a) 15 are red
b) 36 are white
c) there are 72 tiles altogether?
- 2 How many tiles are there altogether if there are:
a) 48 white tiles
b) 75 blue tiles
c) 24 red tiles?
- 3 In a vote in the House of Commons 7 in 12 votes cast are for the proposed change in law. Altogether 564 MPs vote. How many vote for the proposal?
- 4 The ratio of actors to audience in a theatre is 2 : 17. There are 391 people in the audience. How many actors are there?
- 5 In a library the ratio of fiction to non-fiction books is 6 : 5. The library has 2750 books. How many are fiction?
- 6 One kilogram of steak costs £9.60. What is the cost of:
a) 800 g b) 275 g?
- 7 The scale of a map is 1 : 250 000. What is the actual distance between:
a) two mountain summits which are 12 cm apart on the map
b) two villages which are 5 cm apart on the map?
- 8 A chemist mixes two powders. He uses 40 g of Powder A to every 25 g of Powder B.
a) How much of Powder B does he need if he uses 100 g of Powder A?
b) How much of the mixture does he make if he uses 375 g of Powder B?

proportion of vowels

Ratio/proportion N37

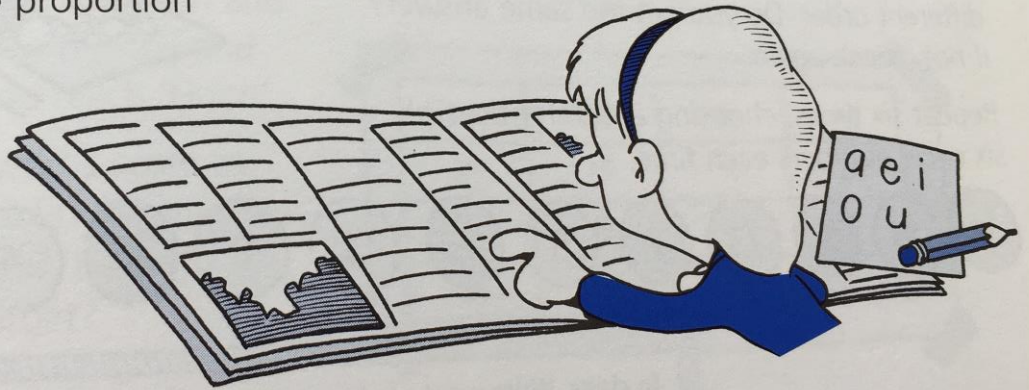
A newspaper or magazine, paper and pencil



Look at a newspaper or magazine and choose ten words to underline.

Count the total number of letters in the words. Count the total number of vowels. Work out the proportion of vowels.

Repeat ten times.
Compare the proportions. Do they differ much?



In class Discuss whether the proportion of vowels is roughly constant. What is the proportion of consonants?