

GCSE MATHS • GRADE 5

MATHS



MODEL ANSWERS

RATIO PROBLEMS (PART 2)

SCORE

/92

PERCENTAGE

%

STEMUP

- 1 Given that $p : q = 3 : 4$ and $q : r = 1 : 7$
Find the ratio $p : q : r$
Give your answer in its simplest form.

make q the same: 4 and 1 both go to 4
 $p : q : r = 3 : 4 : 28$

3 : 4 : 28

/ 1

- 2 The ratio of boys to girls is $1 : 6$
The ratio of teachers to boys is $5 : 2$
Find the ratio of girls to teachers.
Give your answer in its simplest form.

make boys the same: 1 and 2 both go to 2
boys = 2, girls = 12, teachers = 5
girls : teachers = $12 : 5 = 12 : 5$

12 : 5

/ 1

- 3 Given that $a : c = 1 : 6$ and $b : c = 3 : 4$
Find the ratio $a : b : c$
Give your answer in its simplest form.

make c the same: 6 and 4 both go to 12
 $a : b : c = 2 : 9 : 12$

2 : 9 : 12

/ 1

- 4 Given that $a : b = 4 : 3$ and $a : c = 2 : 1$
Find the ratio $a : b : c$
Give your answer in its simplest form.

make a the same: 4 and 2 both go to 4
 $a : b : c = 4 : 3 : 2$

$4 : 3 : 2$

/ 1

- 5 The ratio of red counters to blue counters is $5 : 3$
The ratio of green counters to red counters is $3 : 1$
Find the ratio of green counters to blue counters.
Give your answer in its simplest form.

make red counters the same: 5 and 1 both go to 5
red counters = 5, blue counters = 3, green counters = 15
green counters : blue counters = $15 : 3 = 5 : 1$

$5 : 1$

/ 1

- 6 Given that $p : r = 7 : 4$ and $q : r = 6 : 7$
Find the ratio $p : q : r$
Give your answer in its simplest form.

make r the same: 4 and 7 both go to 28
 $p : q : r = 49 : 24 : 28$

$49 : 24 : 28$

/ 1

- 7 Given that $x : y = 1 : 7$ and $x : z = 8 : 7$
Find the ratio $x : y : z$
Give your answer in its simplest form.

make x the same: 1 and 8 both go to 8
 $x : y : z = 8 : 56 : 7$

$8 : 56 : 7$

/ 1

- 8 The ratio of red counters to blue counters is $1 : 2$
The ratio of green counters to red counters is $3 : 8$
Find the ratio of blue counters to green counters.
Give your answer in its simplest form.

make red counters the same: 1 and 8 both go to 8
red counters = 8, blue counters = 16, green counters = 3
blue counters : green counters = $16 : 3 = 16 : 3$

$16 : 3$

/ 1

- 9 Given that $a : c = 3 : 4$ and $b : c = 1 : 9$
Find the ratio $a : b : c$
Give your answer in its simplest form.

make c the same: 4 and 9 both go to 36
 $a : b : c = 27 : 4 : 36$

$27 : 4 : 36$

/ 1

- 10 Given that $p : q = 1 : 7$ and $p : r = 8 : 3$

Find the ratio $p : q : r$

Give your answer in its simplest form.

make p the same: 1 and 8 both go to 8

$$p : q : r = 8 : 56 : 3$$

$$8 : 56 : 3$$

/ 1

- 11 The ratio of boys to girls is $3 : 1$

The ratio of teachers to boys is $8 : 5$

Find the ratio of teachers to girls.

Give your answer in its simplest form.

make boys the same: 3 and 5 both go to 15

boys = 15, girls = 5, teachers = 24

$$\text{teachers} : \text{girls} = 24 : 5 = 24 : 5$$

$$24 : 5$$

/ 1

- 12 The ratio of cats to dogs is $7 : 9$

The ratio of dogs to rabbits is $1 : 3$

There are 54 rabbits.

How many cats are there?

$$\text{cats} : \text{dogs} : \text{rabbits} = 7 : 9 : 27$$

$$27 \text{ parts} = 54$$

$$1 \text{ part} = 2$$

$$\text{cats} = 7 \times 2 = 14$$

$$14$$

/ 1

- 13 Given that $x : z = 1 : 5$ and $y : z = 7 : 2$

Find the ratio $x : y : z$

Give your answer in its simplest form.

make z the same: 5 and 2 both go to 10

$$x : y : z = 2 : 35 : 10$$

$$2 : 35 : 10$$

/ 1

- 14 Michael, Samir and Omar share £160.

The amounts Michael and Samir get are in the ratio 9 : 8

The amounts Samir and Omar get are in the ratio 8 : 3

How much does Samir get?

$$\text{Michael : Samir : Omar} = 9 : 8 : 3$$

20 parts

$$160 \div 20 = 8 \text{ per part}$$

$$8 \times 8 = £64$$

$$£64$$

/ 1

- 15 The ratio of boys to girls is 7 : 4

The ratio of girls to teachers is 3 : 4

There are 64 teachers.

How many boys are there?

$$\text{boys : girls : teachers} = 21 : 12 : 16$$

$$16 \text{ parts} = 64$$

$$1 \text{ part} = 4$$

$$\text{boys} = 21 \times 4 = 84$$

$$84$$

/ 1

- 16 Given that $p : r = 5 : 2$ and $q : r = 3 : 5$

Find the ratio $p : q : r$

Give your answer in its simplest form.

make r the same: 2 and 5 both go to 10

$$p : q : r = 25 : 6 : 10$$

$$25 : 6 : 10$$

/ 1

- 17 Mason, Priya and Samir share £110.

The amounts Mason and Priya get are in the ratio 3 : 2

The amounts Priya and Samir get are in the ratio 6 : 7

How much does Mason get?

$$\text{Mason : Priya : Samir} = 9 : 6 : 7$$

22 parts

$$110 \div 22 = 5 \text{ per part}$$

$$9 \times 5 = \text{£}45$$

$$\text{£}45$$

/ 1

- 18 The points P, Q, R and S lie in order on a straight line.

$$PQ : QS = 5 : 7 \quad \text{and} \quad PR : RS = 5 : 4$$

Find $PQ : QR : RS$

$$\text{let } PS = 36: PQ = 15, PR = 20$$

$$QR = 20 - 15 = 5$$

$$RS = 36 - 20 = 16$$

$$\text{ratio } 15 : 5 : 16$$

$$15 : 5 : 16$$

/ 1

- 19 Given that $a : b = 3 : 5$ and $a : c = 7 : 6$

Find the ratio $a : b : c$

Give your answer in its simplest form.

make a the same: 3 and 7 both go to 21

$$a : b : c = 21 : 35 : 18$$

$$21 : 35 : 18$$

/ 1

- 20 Ella and Finn share some marbles in the ratio 5 : 3.

Ella gets E marbles

Finn gets F marbles

Gus and Hana share the same amount of marbles as Ella and Finn.

They share their marbles in the ratio 5 : 2.

Gus gets G marbles

Hana gets H marbles

Find $E : F : G : H$

$$5 + 3 = 8 \text{ and } 5 + 2 = 7$$

common total 56

$$E : F = 35 : 21, G : H = 40 : 16$$

$$35 : 21 : 40 : 16$$

/ 1

- 21 The points P, Q, R and S lie in order on a straight line.

$$PQ : QS = 1 : 1 \text{ and } PR : RS = 5 : 2$$

Find $PQ : QR : RS$

$$\text{let } PS = 14: PQ = 7, PR = 10$$

$$QR = 10 - 7 = 3$$

$$RS = 14 - 10 = 4$$

$$\text{ratio } 7 : 3 : 4$$

$$7 : 3 : 4$$

/ 2

- 22 Given that $a : b = 7 : 1$ and $a : c = 5 : 8$

Find the ratio $a : b : c$

Give your answer in its simplest form.

make a the same: 7 and 5 both go to 35

$$a : b : c = 35 : 5 : 56$$

$$35 : 5 : 56$$

2 / 2

- 23 Glen and Harper share some money in the ratio 9 : 4.

Glen gets £G

Harper gets £H

India and Jade share the same amount of money as Glen and Harper.

They share their money in the ratio 3 : 4.

India gets £I

Jade gets £J

Find $G : H : I : J$

$$9 + 4 = 13 \text{ and } 3 + 4 = 7$$

common total 91

$$G : H = 63 : 28, I : J = 39 : 52$$

$$63 : 28 : 39 : 52$$

2 / 2

- 24 The points P, Q, R and S lie in order on a straight line.

$$PQ : QS = 2 : 1 \text{ and } PR : RS = 8 : 1$$

Find $PQ : QR : RS$

$$\text{let } PS = 9; PQ = 6, PR = 8$$

$$QR = 8 - 6 = 2$$

$$RS = 9 - 8 = 1$$

$$\text{ratio } 6 : 2 : 1$$

$$6 : 2 : 1$$

2 / 2

- 25 Samir, Michael and Ava share 520 sweets.
 The amounts Samir and Michael get are in the ratio 1 : 7
 The amounts Michael and Ava get are in the ratio 3 : 4
 How many sweets does Michael get?
 You must show your working.

$$\text{Samir : Michael : Ava} = 3 : 21 : 28$$

52 parts

$$520 \div 52 = 10 \text{ per part}$$

$$21 \times 10 = 210$$

210

2 / 2

- 26 Glen and Harper share some money in the ratio 9 : 4.
 Glen gets £G
 Harper gets £H
 India and Jade share the same amount of money as Glen and Harper.
 They share their money in the ratio 2 : 5.
 India gets £I
 Jade gets £J
 Find G : H : I : J

$$9 + 4 = 13 \text{ and } 2 + 5 = 7$$

common total 91

$$G : H = 63 : 28, I : J = 26 : 65$$

63 : 28 : 26 : 65

2 / 2

- 27 The points A, B, C and D lie in order on a straight line.
 $AB : BD = 2 : 7$ and $AC : CD = 9 : 4$
 Find $AB : BC : CD$

$$\text{let } AD = 117; AB = 26, AC = 81$$

$$BC = 81 - 26 = 55$$

$$CD = 117 - 81 = 36$$

ratio 26 : 55 : 36

26 : 55 : 36

2 / 2

- 28 Eli, Kofi and Fabian share some sweets.

The number of sweets Eli gets to the number of sweets Kofi gets is in the ratio 8 : 1

The number of sweets Eli gets to the number of sweets Fabian gets is in the ratio 6 : 7

Fabian gets 8 more sweets than Eli.

Work out how many sweets Kofi gets.

You must show your working.

$$\text{Eli : Kofi : Fabian} = 24 : 3 : 28$$

$$28 - 24 = 4 \text{ parts} = 8$$

$$1 \text{ part} = 2$$

$$\text{Kofi gets } 3 \times 2 = 6$$

6

2 / 2

- 29 There are red marbles, yellow marbles and green marbles in a bag.

The ratio of red marbles to marbles that are not red is 1 : 4

The ratio of green marbles to marbles that are not green is 3 : 17

Work out the ratio of red marbles to yellow marbles to green marbles.

You must show your working.

red are $\frac{1}{5}$ of the total

green are $\frac{3}{20}$

total = 20

red = 4, green = 3, yellow = $20 - 4 - 3 = 13$

ratio 4 : 13 : 3

4 : 13 : 3

2 / 2

- 30 The points W, X, Y and Z lie in order on a straight line.

WX : XZ = 1 : 1 and WY : YZ = 7 : 1

Find WX : XY : YZ

let WZ = 8: WX = 4, WY = 7

XY = 7 - 4 = 3

YZ = 8 - 7 = 1

ratio 4 : 3 : 1

4 : 3 : 1

2 / 2

- 31 Kofi, Dylan and Fabian share some sweets.

The number of sweets Kofi gets to the number of sweets Dylan gets is in the ratio 4 : 7

The number of sweets Kofi gets to the number of sweets Fabian gets is in the ratio 3 : 2

Kofi gets 20 more sweets than Fabian.

Work out how many sweets Dylan gets.

You must show your working.

$$\text{Kofi : Dylan : Fabian} = 12 : 21 : 8$$

$$12 - 8 = 4 \text{ parts} = 20$$

$$1 \text{ part} = 5$$

$$\text{Dylan gets } 21 \times 5 = 105$$

105

2 / 2

- 32 There are red marbles, blue marbles and green marbles in a bag.

The ratio of red marbles to marbles that are not red is 1 : 4

The ratio of green marbles to marbles that are not green is 4 : 21

Work out the ratio of red marbles to blue marbles to green marbles.

You must show your working.

red are $\frac{1}{5}$ of the total

green are $\frac{4}{25}$

total = 25

red = 5, green = 4, blue = $25 - 5 - 4 = 16$

ratio 5 : 16 : 4

5 : 16 : 4

2 / 2

- 33 The points W, X, Y and Z lie in order on a straight line.

WX : XZ = 1 : 2 and WY : YZ = 2 : 3

Find WX : XY : YZ

let WZ = 15; WX = 5, WY = 6

XY = $6 - 5 = 1$

YZ = $15 - 6 = 9$

ratio 5 : 1 : 9

5 : 1 : 9

2 / 2

- 34 Ines, Kofi and Hugo share some sweets.

The number of sweets Ines gets to the number of sweets Kofi gets is in the ratio 5 : 1

The number of sweets Ines gets to the number of sweets Hugo gets is in the ratio 3 : 7

Hugo gets 60 more sweets than Ines.

Work out how many sweets Kofi gets.

You must show your working.

$$\text{Ines : Kofi : Hugo} = 15 : 3 : 35$$

$$35 - 15 = 20 \text{ parts} = 60$$

$$1 \text{ part} = 3$$

$$\text{Kofi gets } 3 \times 3 = 9$$

9

2 / 2

- 35 Ava, Albert and Isla share 243 sweets.

The amounts Ava and Albert get are in the ratio 1 : 7

The amounts Albert and Isla get are in the ratio 4 : 7

How many sweets does Isla get?

You must show your working.

$$\text{Ava : Albert : Isla} = 4 : 28 : 49$$

$$81 \text{ parts}$$

$$243 \div 81 = 3 \text{ per part}$$

$$49 \times 3 = 147$$

147

2 / 2

- 36 The points A, B, C and D lie in order on a straight line.

$$AB : BD = 1 : 1 \quad \text{and} \quad AC : CD = 7 : 6$$

Find AB : BC : CD

$$\text{let } AD = 26: AB = 13, AC = 14$$

$$BC = 14 - 13 = 1$$

$$CD = 26 - 14 = 12$$

$$\text{ratio } 13 : 1 : 12$$

13 : 1 : 12

2 / 2

- 37 A and B are in the ratio 2 : 1
 C and D are in the ratio 2 : 3
 Given: $A + B = 2(C + D)$
 Find A : B : C : D

$$A = 2x, B = x, C = 2y, D = 3y$$

$$3x = 10y$$

$$A : B : C : D = 20 : 10 : 6 : 9$$

$$20 : 10 : 6 : 9$$

2 / 2

- 38 There are red counters, blue counters and green counters in a bag.
 The ratio of red counters to counters that are not red is 2 : 7
 The ratio of green counters to counters that are not green is 7 : 3
 Work out the ratio of red counters to blue counters to green counters.
 You must show your working.

red are $\frac{2}{9}$ of the total

green are $\frac{7}{10}$

total = 90

red = 20, green = 63, blue = $90 - 20 - 63 = 7$

ratio 20 : 7 : 63

$$20 : 7 : 63$$

2 / 2

- 39 The points A, B, C and D lie in order on a straight line.
 $AB : BD = 2 : 1$ and $AC : CD = 9 : 4$
 Find AB : BC : CD

let $AD = 39$; $AB = 26$, $AC = 27$

$BC = 27 - 26 = 1$

$CD = 39 - 27 = 12$

ratio 26 : 1 : 12

$$26 : 1 : 12$$

3 / 3

- 40 A and B are in the ratio 3 : 2
 C and D are in the ratio 1 : 5
 Given: $3(A + B) = C + D$
 Find A : B : C : D

$$A = 3x, B = 2x, C = y, D = 5y$$

$$15x = 6y$$

$$A : B : C : D = 6 : 4 : 5 : 25$$

$$6 : 4 : 5 : 25$$

3

 / 3

- 41 There are red marbles, yellow marbles and green marbles in a bag.
 The ratio of red marbles to marbles that are not red is 1 : 3
 The ratio of green marbles to marbles that are not green is 7 : 18
 Work out the ratio of red marbles to yellow marbles to green marbles.
 You must show your working.

red are $\frac{1}{4}$ of the total

green are $\frac{7}{25}$

total = 100

red = 25, green = 28, yellow = $100 - 25 - 28$
 = 47

ratio 25 : 47 : 28

$$25 : 47 : 28$$

3

 / 3

- 42 A football team plays some games in a season. Each game was a win, a draw or a loss.
 The ratio of the games they won to the games they did not win was 4 : 5
 The ratio of the games they lost to the games they did not lose was 1 : 5.
 Given the team played fewer than 80 games, work out the highest number of games they could have won.

won is $\frac{4}{9}$ of the games so the total is a

multiple of 9

lost is $\frac{1}{6}$ so a multiple of 6

total is a multiple of 18

highest below 80 is 72

won = $4 \times 72 \div 9 = 32$

$$32$$

3

 / 3

- 43 A and B are in the ratio 5 : 1
 C and D are in the ratio 3 : 2
 Given: $A + B = 4(C + D)$
 Find A : B : C : D

$$A = 5x, B = x, C = 3y, D = 2y$$

$$6x = 20y$$

$$A : B : C : D = 50 : 10 : 9 : 6$$

$$50 : 10 : 9 : 6$$

3 / 3

- 44 A and B are in the ratio 1 : 4
 C and D are in the ratio 3 : 2
 Given: $4(A + B) = C + D$
 Find A : B : C : D

$$A = x, B = 4x, C = 3y, D = 2y$$

$$20x = 5y$$

$$A : B : C : D = 1 : 4 : 12 : 8$$

$$1 : 4 : 12 : 8$$

3 / 3

- 45 A chess club plays some games in a season. Each game was a win, a draw or a loss.
 The ratio of the games they won to the games they did not win was 7 : 9
 The ratio of the games they lost to the games they did not lose was 1 : 7.
 Given the team played fewer than 100 games, work out the highest number of games they could have won.

won is $\frac{7}{16}$ of the games so the total is a

multiple of 16

lost is $\frac{1}{8}$ so a multiple of 8

total is a multiple of 16

highest below 100 is 96

$$\text{won} = 7 \times 96 \div 16 = 42$$

$$42$$

3 / 3

- 46 A and B are in the ratio 3 : 1
 C and D are in the ratio 2 : 3
 Given: $A + B = 4(C + D)$
 Find A : B : C : D

$$A = 3x, B = x, C = 2y, D = 3y$$

$$4x = 20y$$

$$A : B : C : D = 15 : 5 : 2 : 3$$

$$15 : 5 : 2 : 3$$

3 / 3

- 47 A and B are in the ratio 5 : 1
 C and D are in the ratio 3 : 2
 Given: $2(A + B) = C + D$
 Find A : B : C : D

$$A = 5x, B = x, C = 3y, D = 2y$$

$$12x = 5y$$

$$A : B : C : D = 25 : 5 : 36 : 24$$

$$25 : 5 : 36 : 24$$

3 / 3

- 48 A and B are in the ratio 1 : 4
 C and D are in the ratio 2 : 3
 Given: $4(A + B) = C + D$
 Find A : B : C : D

$$A = x, B = 4x, C = 2y, D = 3y$$

$$20x = 5y$$

$$A : B : C : D = 1 : 4 : 8 : 12$$

$$1 : 4 : 8 : 12$$

3 / 3

49 A and B are in the ratio 3 : 4

C and D are in the ratio 3 : 2

Given: $2(A + B) = C + D$

Find A : B : C : D

$$A = 3x, B = 4x, C = 3y, D = 2y$$

$$14x = 5y$$

$$A : B : C : D = 15 : 20 : 42 : 28$$

$$15 : 20 : 42 : 28$$

3 / 3

50 A and B are in the ratio 3 : 1

C and D are in the ratio 1 : 4

Given: $4(A + B) = C + D$

Find A : B : C : D

$$A = 3x, B = x, C = y, D = 4y$$

$$16x = 5y$$

$$A : B : C : D = 15 : 5 : 16 : 64$$

$$15 : 5 : 16 : 64$$

3 / 3