GCSE Maths – Ratio, Proportion and Rates of Change

Ratio

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to work out different types of ratio questions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Meringue is made by mixing cups of egg whites and cups of sugar in the ratio 2:5. How many cups of sugar are needed if 6 cups of egg whites are used in the mixture?

Step 1: Scale the ratio.

This question involves scaling a ratio and to do this, we need to multiply by a common factor. We know that $6 = 2 \times 3$, so we need to multiply the ratio by 3.

$$\times 3 \overset{\displaystyle 2 : 5}{\underset{\displaystyle 6 : 15}{}} \times 3$$

Step 2: Identify the required scaled value.

*When 6 cups of egg whites are used, **15 cups of sugar** are needed in the mixture.*

$$6 \quad : \quad \boxed{15}$$

number of cups of sugar

Guided Example

For a cement mixer, cement and sand is mixed in the ratio 1:5. If 30kg of sand is used, how many kilograms of cement is needed?

Step 1: Work out the total number of parts in the ratio.

$$\underline{1 + 5} = 6 \text{ parts}$$
$$1 : 5 \text{ from ratio}$$

Step 2: Calculate the scale required to have sand represented by 30 parts in the ratio.

$$5 \text{ parts sand} : 30 \div 5 = 6$$
$$\text{use a scale factor of } 6$$

Step 3: Identify the required scale value.

$$\begin{matrix} & c & s \\ \times 6 & 1 & : 5 \\ & 6 & : 30 \end{matrix} \times 6 \qquad \text{we need } \boxed{6 \text{ kg}} \text{ of cement.}$$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. If 100 grams of one ingredient is used in a cake recipe, which calls for a ratio of 3: 7 with a second ingredient, how much of the second ingredient is needed?

① ②

3 : 1   find the grams needed for 1 part

$$3 \text{ parts} = 100g$$
$$\div 3 \left(\right) \div 3$$
$$1 \text{ part} = 33.3g$$

we know how many grams are needed for 1 part, so use this to find 7 parts

$$7 \text{ parts} = 33.3 \times 7$$
$$= 233.1g \text{ of ingredient 2.}$$

2. In a class of 21 students, the ratio of male students to female students is 3 : 4. How many female students are there?   (m)   (F)

M : F
= 3 : 4
      3 + 4 = 7 parts

$$7 \text{ parts} = 21 \text{ students}$$
$$\div 7 \left(\right) \div 7$$
$$1 \text{ part} = 3 \text{ students}$$

$$4 \text{ parts} = 4 \times 3 \text{ students}$$
$$= 12 \text{ students (F)}$$

∴ There are 12 female students.

3. A recipe for 10 cupcakes needs 300 g flour. How much flour is needed for 15 cupcakes?   (c)   (f)
(make these into a ratio of cakes to flour.

c : f
10 : 300

$$10 \text{ cakes} = 300g \text{ flour}$$
$$\times 1.5 \left(\right) \times 1.5$$
$$15 \text{ cakes} = 450g \text{ flour}$$

∴ 15 cupcakes requires 450g of flour.

Section B

Worked Example

Laila, John and Emma split £4000 in the ratio 1:3:4. How much money does John receive?

Step 1: Find the total number of parts in the ratio.

$$1 : 3 : 4$$

$$1 + 3 + 4 = \mathbf{8\ parts}$$

Step 2: Find the value of 1 part.

Divide the total amount, which is £4000, by the total number of parts, which is 8. This will give you the value of 1 part.

$$£4000 \div 8 = £500 = \mathbf{1\ part}$$

Step 3: Multiply the value of 1 part by the number of parts John has.

$$£500 \times 3 = \mathbf{£1500}$$

John receives £1500

Guided Example

There is £100 in a pot which is shared out amongst 3 people. Charlotte gets £15, Amy gets £55 and Jack gets £30.

What ratio of the money does each person receive?

Step 1: First write out the three amounts of money as a ratio (Charlotte:Amy:Jack)

(c) (A) (J)

$$C : A : J$$
$$15 : 55 : 30 \leftarrow \text{take these from the question.}$$

Step 2: Simplify the ratio.

To do this, find a common factor.

Common factor of 15, 55 and 30 is 5.

$$\div 5 \left(\begin{array}{c} 15 : 55 : 30 \\ \downarrow \div 5 \\ 3 : 11 : 6 \end{array} \right) \div 5$$

The money is split according to the ratio 3:11:6.

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Now it's your turn!
If you get stuck, look back at the worked and guided examples.

4. Ben, Luke and Jess save their money in a ratio of $1:3:6$. If Luke saves £20 a week, how much do they save in total?

form a ratio:

B : L : J
1 : 3 : 6

3 parts = £20
1 part = £6.67

Ben has 1 part: $1 \times £6.67 = £6.67$

Jess has 6 parts: $6 \times £6.67 = £40$

$£40 + £20 + £6.67 = £66.67$

∴ they save £66.67 total.

or, recognise that there are 10 parts in total and find:

$10 \times £6.67 = £66.67$

5. There is £500 in a prize fund which is shared between 3 people. Daisy gets £150, Carol gets £250 and Joe gets £100. What ratio of the money does each person receive?

D : C : J
150 : 250 : 100
÷50 (↓÷50) ÷50
3 : 5 : 2

find common factor and divide to simplify

Daisy, Carol and Joe receive the money in the ratio 3:5:2.

6. In a classroom, 125 sweets are shared out in a ratio of $13:7:5$ to groups Red, Orange and Blue. How many sweets does each group receive?

R : O : B
13 : 7 : 5

13 + 7 + 5 = 25 parts total

÷25 (25 parts = 125 sweets) ÷25
1 part = 5 sweets

Red gets 13 parts:
$13 \times 5 = 65$ sweets

Orange gets 7 parts:
$7 \times 5 = 35$ sweets

Blue gets 5 parts:
$5 \times 5 = 25$ sweets

Red gets 65 sweets, Orange gets 35 sweets and Blue gets 25 sweets.