Division in a given ratio

Starter

1. **(Review of last lesson)** There are 18 girls in a class of 34 class. Find the ratio of girls to boys in its simplest form.

2. **(Review of last lesson)** Mo, Liz and Dee's heights are in the ratio $32 : 33 : 37$. Mo is 144 cm tall. What is the combined height of the people?

3. **(Review of previous material)** A work bonus is shared between the part-time and full-time staff according to the number of hours they work. Part-time staff work 20 hours a week and full-time staff work 35 hours a week. Calculate the bonus of both groups given that the difference between them was £405.

4. Divide £51 in the ratio $7 : 10$.

Notes

When dividing in a given ratio it is important to work out how much each part is worth.

Success criteria — division in a given ratio
1. Sum the numbers in the ratio to find the number of parts.
2. Divide the quantity by the number of parts to find how much each part is worth.
3. Multiply how much each part is worth by each number in the ratio.

An alternative method can be used where, if the ratio is $3 : 2$, then the number of items are $3x$ and $2x$ (see below).

E.g. 1 Tangerine paint is made from yellow and red paint in the ratio $4 : 3$. How much of each colour is needed to make 161 litres of tangerine paint?

> ***Working:***   ***Sum the numbers in the ratio:***   Number of parts $= 4 + 3 = 7$
>
> 1 part is worth $\dfrac{161}{7} = 23$
>
> Yellow paint $= 4 \times 23 = 92$ litres
> Red paint $= 3 \times 23 = 69$ litres
>
> ***Alternatively***
> The ratio is $4 : 3$ so the quantities could be $4x$ and $3x$
>
> $$7x + 4x = 161,$$
> $$7x = 161$$
> $$x = 23$$
>
> Yellow paint $= 4x = 4 \times 23 = 92$ litres
> Red paint $= 3x = 3 \times 23 = 69$ litres

E.g. 2 The length and width of a rectangle are in the ratio $8 : 5$. If the perimeter of the rectangle is 11.18 m, calculate the length and width of the rectangle.

The same method works when there are three numbers in the ratio.

E.g. 3 Divide £684 in the ratio $5 : 3 : 4$.

Repeated division by parts

E.g. 4 A man and woman share a bingo prize of £750 between them in the ratio of $1 : 4$. The woman shares her part between herself, her mother and her daughter in the ratio $5 : 2 : 1$. How much does her mother receive?

    Working: Number of parts $= 1 + 4 = 5$

                       Each part is worth $\dfrac{750}{5} = 150$

                       Woman gets $4 \times 150 = 600$

                       Number of parts $= 5 + 2 + 1 = 8$

                       Each part is worth $\dfrac{750}{8} = 93.75$

                       Mother receives $2 \times 93.75 = £187.50$

E.g. 5 Lucy and Sarah share their stamp collection of 1560 stamps in the ratio $5 : 3$. Lucy then shares her stamps with two other friends in the ratio $7 : 4 : 4$, keeping more for herself. How many stamps do each of her friends receive?

Algebra

Some problems are best be solved using algebra.

E.g. 6 In a herd of x cattle, the ratio of the number of bulls to cows is $2 : 7$. Find the number of bulls in the herd in terms of x.

E.g. 7* £345 is to be shared between John and Peter in the ratio of $x : 11$. If John is to receive £92, find x.

                                    Video: **Division in a given ratio**

                                    Video: **Ratio - given one quantity**

                                    Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p37 M2.5 Qu 2, 5, 7, 8, 11, 13, 14
A*-G class textbook:	p37 M2.5 Qu 6-8, 14-16
9-1 homework book:	p11 M2.5 Qu 2, 4, 9-11
A*-G homework book:	p8 M2.5 Qu 4-5, 7, 9

Summary

When dividing in a given ratio it is important to work out how much each part is worth.

Success criteria — division in a given ratio:
    1.   Sum the numbers in the ratio to find the number of parts.
    2.   Divide the quantity by the number of parts to find how much each part is worth.
    3.   Multiply how much each part is worth by each number in the ratio.

An alternative method can be used where, if the ratio is $3 : 2$, then the number of items are $3x$ and $2x$.