

SHARING IN A RATIO

1) Share 60 in the ratio 2 : 1.

$$\begin{array}{rcl}
 2 + 1 & = & 3 \\
 60 \div 3 & = & 20 \\
 & & 2 : 1 \\
 \times 20 & & \times 20 \\
 \hline
 40 & : & 20
 \end{array}$$

7) Share 180 in the ratio 5 : 4 : 1.

$$\begin{array}{rcl}
 5 + 4 + 1 & = & 10 \\
 180 \div 10 & = & 18 \\
 & & 5 : 4 : 1 \\
 \times 18 & & \times 18 \\
 \hline
 90 & : & 72 : 18
 \end{array}$$

2) Share 48 in the ratio 3 : 1.

$$\begin{array}{rcl}
 3 + 1 & = & 4 \\
 48 \div 4 & = & 12 \\
 & & 3 : 1 \\
 \times 12 & & \times 12 \\
 \hline
 36 & : & 12
 \end{array}$$

8) Share 240 in the ratio 3 : 5 : 2.

$$\begin{array}{rcl}
 3 + 5 + 2 & = & 10 \\
 240 \div 10 & = & 24 \\
 & & 3 : 5 : 2 \\
 \times 24 & & \times 24 \\
 \hline
 72 & : & 120 : 48
 \end{array}$$

3) Share 84 in the ratio 5 : 2.

$$\begin{array}{rcl}
 5 + 2 & = & 7 \\
 84 \div 7 & = & 12 \\
 & & 5 : 2 \\
 \times 12 & & \times 12 \\
 \hline
 60 & : & 24
 \end{array}$$

9) Share 300 in the ratio 5 : 6 : 4.

$$\begin{array}{rcl}
 5 + 6 + 4 & = & 15 \\
 300 \div 15 & = & 20 \\
 & & 5 : 6 : 4 \\
 \times 20 & & \times 20 \\
 \hline
 100 & : & 120 : 80
 \end{array}$$

4) Share 120 in the ratio 7 : 3.

$$\begin{array}{rcl}
 7 + 3 & = & 10 \\
 120 \div 10 & = & 12 \\
 & & 7 : 3 \\
 \times 12 & & \times 12 \\
 \hline
 84 & : & 36
 \end{array}$$

10) £60 is shared between Alice and Bob in the ratio 2 : 1. How much does each person receive?

$$\begin{array}{rcl}
 A : B & & \\
 2 + 1 & = & 3 \\
 60 \div 3 & = & 20 \\
 & & 2 : 1 \\
 \times 20 & & \times 20 \\
 \hline
 \pounds 40 & : & \pounds 20
 \end{array}$$

Alice: £40, Bob: £20

5) Share 96 in the ratio 5 : 7.

$$\begin{array}{rcl}
 5 + 7 & = & 12 \\
 96 \div 12 & = & 8 \\
 & & 5 : 7 \\
 \times 8 & & \times 8 \\
 \hline
 40 & : & 56
 \end{array}$$

11) A prize of £90 is shared between three friends in the ratio 3 : 2 : 1. How much does each friend receive?

$$\begin{array}{rcl}
 3 + 2 + 1 & = & 6 \\
 90 \div 6 & = & 15 \\
 & & 3 : 2 : 1 \\
 \times 15 & & \times 15 \\
 \hline
 \pounds 45 & : & \pounds 30 : \pounds 15
 \end{array}$$

6) Share 72 in the ratio 2 : 4 : 3.

$$\begin{array}{rcl}
 2 + 4 + 3 & = & 9 \\
 72 \div 9 & = & 8 \\
 & & 2 : 4 : 3 \\
 \times 8 & & \times 8 \\
 \hline
 16 & : & 32 : 24
 \end{array}$$

12) A £200 bonus is split between Isabella and Serina in the ratio 1 : 3. Isabella gives half of her share to Charlie and Serina gives one third of her share to Charlie. How much does Charlie receive?

$$\begin{aligned}
 & I : S \\
 & 1 + 3 = 4 \\
 & 200 \div 4 = 50 \\
 & 1 : 3 \\
 & \times 50 \quad \times 50 \\
 & \text{£}50 : \text{£}150
 \end{aligned}$$

$$\begin{aligned}
 & \text{£}50 \div 2 = \text{£}25 \\
 & \text{£}150 \div 3 = \text{£}50
 \end{aligned}$$

$$\begin{aligned}
 & \text{£}25 + \text{£}50 = \text{£}75 \\
 & \text{Charlie receives £}75
 \end{aligned}$$

13) A £180 bill is split between two people in the ratio 3 : 2. The person who pays the larger portion leaves a 12% tip and the person who pays the smaller portion leaves a 5% tip. What is the total tip given?

$$\begin{aligned}
 & 3 + 2 = 5 \\
 & 180 \div 5 = 36 \\
 & 3 : 2 \\
 & \times 36 \quad \times 36 \\
 & \text{£}108 : \text{£}72
 \end{aligned}$$

$$\begin{aligned}
 & \text{£}108 \times 0.12 = \text{£}12.96 \\
 & \text{£}72 \times 0.05 = \text{£}3.60
 \end{aligned}$$

$$\begin{aligned}
 & \text{Total tip:} \\
 & \text{£}12.96 + \text{£}3.60 = \text{£}16.56
 \end{aligned}$$

14) A shade of purple paint requires mixing paint colours red, blue and white in the ratio 5 : 3 : 2. 800 mL of purple paint are needed to paint a room. If a store currently has the following quantities in stock, is there enough to make the purple paint?

400 mL of red paint
350 mL of blue paint
100 mL of white paint

$$\begin{aligned}
 & R : B : W \\
 & 5 + 3 + 2 = 10 \\
 & 800 \div 10 = 80 \\
 & 5 : 3 : 2
 \end{aligned}$$

$$\times 80 \quad \times 80$$

$$400 \text{ mL} : 240 \text{ mL} : 160 \text{ mL}$$

No, there is not enough of the white paint.

15) A flavoured sparkling water recipe calls for 3 parts elderflower syrup to 5 parts sparkling water. A restaurant has 210 mL of elderflower syrup and 500 mL of sparkling water. What is the maximum amount of drink the restaurant can make?

$$\begin{aligned}
 & E : S \\
 & 3 : 5 \\
 & 210 : 500
 \end{aligned}$$

$$\begin{aligned}
 & 210 \div 3 = 70 \\
 & 5 \times 70 = 350
 \end{aligned}$$

$$\begin{aligned}
 & \text{Maximum amount:} \\
 & 210 + 350 = 560 \text{ mL}
 \end{aligned}$$

16) The ratio of apples to oranges is 2 : 3. If there are 20 apples, how many oranges are there?

$$\begin{aligned}
 & A : O \\
 & 2 : 3 \\
 & \times 10 \quad \times 10 \\
 & 20 : 30 \\
 & \text{30 oranges}
 \end{aligned}$$

17) The ratio of cats to dogs in an animal day care centre is 3 : 2. If there are 24 dogs, how many cats are there?

$$\begin{aligned}
 & C : D \\
 & 3 : 2 \\
 & \times 12 \quad \times 12 \\
 & 36 : 24 \\
 & \text{36 cats}
 \end{aligned}$$

18) John and Sarah split a bill in the ratio 5 : 3. John pays £75. How much does Sarah pay?

$$\begin{aligned}
 & J : S \\
 & 5 : 3 \\
 & \times 15 \quad \times 15 \\
 & \text{£}75 : \text{£}45 \\
 & \text{Sarah pays £}45
 \end{aligned}$$

19) A cookie recipe calls for flour, butter and sugar in the ratio 5 : 4 : 1. The recipe calls for 60 grams of butter. How much flour and sugar are needed?

$$\begin{array}{rcl}
 F : B : S \\
 5 : 4 : 1 \\
 \times 15 & & \times 15 \\
 75 : 60 : 15
 \end{array}$$

75 g of flour, 15 g of sugar

20) The ratio of teachers to students is 1 : 20.

There are 100 teachers. Each of the students will be split into groups of 40. How many groups of students will there be?

$$\begin{array}{rcl}
 T : S \\
 1 : 20 \\
 \times 100 & & \times 100 \\
 100 : 2000
 \end{array}$$

$$2000 \div 40 = 50$$

50 groups

21) Bob and Dave share money in the ratio 3 : 1.

Bob has £40 pounds more than Dave. How much does Bob have?

$$\begin{array}{rcl}
 3 - 1 = 2 \\
 40 \div 2 = 20
 \end{array}$$

$$\begin{array}{rcl}
 B : D \\
 3 : 1 \\
 \times 20 & & \times 20 \\
 60 : 20
 \end{array}$$

Bob has £60

22) Sara and Jill share sweets in the ratio 5 : 3.

Sara has 16 more sweets than Jill. How many sweets do they each have?

$$\begin{array}{rcl}
 5 - 3 = 2 \\
 16 \div 2 = 8
 \end{array}$$

$$\begin{array}{rcl}
 S : J \\
 5 : 3 \\
 \times 8 & & \times 8 \\
 40 : 24
 \end{array}$$

Sara has 40 sweets, Jill has 24 sweets

23) Max and Alex share money in the ratio 4 : 1.

Max has £45 more than Alex. How much does Max have?

$$\begin{array}{rcl}
 4 - 1 = 3 \\
 45 \div 3 = 15
 \end{array}$$

$$\begin{array}{rcl}
 M : A \\
 4 : 1 \\
 \times 15 & & \times 15 \\
 60 : 15
 \end{array}$$

Max has £60

24) Mia and Noah share stickers in the ratio 7 : 4.

Mia has 27 more stickers than Noah. How many stickers do they each have?

$$\begin{array}{rcl}
 7 - 4 = 3 \\
 27 \div 3 = 9
 \end{array}$$

$$\begin{array}{rcl}
 M : N \\
 7 : 4 \\
 \times 9 & & \times 9 \\
 63 : 36
 \end{array}$$

Mia has 63 stickers, Noah has 36 stickers

25) Ava, Ben and Peggy share pens in the ratio 6 : 5 : 1.

Ava has 22 more pens than Ben. After they distribute the pens, Ava gives 12 pens to Peggy. How many pens do they each have?

$$\begin{array}{rcl}
 6 - 5 = 1 \\
 22 \div 1 = 22
 \end{array}$$

$$\begin{array}{rcl}
 A : B : P \\
 6 : 5 : 1 \\
 \times 22 & & \times 22 \\
 132 : 110 : 22
 \end{array}$$

Ava gives 12 pens to Peggy:

$$\begin{array}{rcl}
 132 - 12 = 120 \\
 22 + 12 = 34
 \end{array}$$

Ava has 120 pens, Ben has 110 pens, Peggy has 34 pens

26) Oliver and Grace share marbles in the ratio 7 : 9. Oliver has 32 less marbles than Grace. After they receive their shares, Grace gives 10 marbles to Oliver. How many marbles does each end up with?

$$\begin{array}{r} 9 - 7 = 2 \\ 32 \div 2 = 16 \end{array}$$

$$\begin{array}{r} O : G \\ 7 : 9 \\ \times 16 \quad \times 16 \\ 112 : 144 \end{array}$$

Grace gives 10 marbles to Oliver

$$\begin{array}{r} 144 - 10 = 134 \\ 112 + 10 = 122 \end{array}$$

Grace has 134 marbles, Oliver has 122 marbles

27) Angles in a triangle are in the ratio 3 : 4 : 5. Work out the size of the smallest angle.

$$\begin{array}{r} 3 + 4 + 5 = 12 \\ 180 \div 12 = 15 \\ 3 : 4 : 5 \\ \times 15 \quad \times 15 \\ 45 : 60 : 75 \\ 45^\circ \end{array}$$

28) Ethan has 270 sweets. He has only strawberry sweets, mint sweets, orange sweets and cola sweets.

20% of the sweets are strawberry sweets. $\frac{1}{3}$ of the sweets are mint sweets. The ratio of orange sweets to cola sweets is 2 : 7.

Work out the number of cola sweets Ethan has.

Strawberry sweets:

$$270 \times 0.2 = 54$$

Mint sweets:

$$270 \div 3 = 90$$

$$270 - 54 - 90 = 126$$

126 left for orange and cola sweets

$$\begin{array}{r} O : C \\ 2 + 7 = 9 \\ 126 \div 9 = 14 \\ 2 : 7 \\ \times 14 \quad \times 14 \\ 28 : 98 \end{array}$$

Ethan has 98 cola sweets

29) Liam reads 256 pages each week. He spends 25% of his reading time on science books and the rest on novels. The ratio of pages he reads in mystery novels to fantasy novels is 3 : 5. Work out how many pages Liam reads in fantasy novels.

Science book pages:

$$256 \times 0.25 = 64$$

Novel pages:

$$256 - 64 = 192$$

$$\begin{array}{r} M : F \\ 3 + 5 = 8 \\ 192 \div 8 = 24 \\ 3 : 5 \\ \times 24 \quad \times 24 \\ 72 : 120 \end{array}$$

Liam reads 120 fantasy novel pages

30) Marcus earns £4000 each month after tax. He saves 28% of his salary and spends the rest. The ratio of the amount he spends on rent to the amount he spends on other expenses is 11 : 9.

$\frac{3}{8}$ of the other expenses are utilities.

Marcus splits what is left equally into an emergency fund and entertainment.

Work out the difference between how much Marcus spends on utilities and how much goes into his emergency fund.

Saved:

$$\text{£}4000 \times 0.28 = \text{£}1120$$

Remaining for rent and other expenses:

$$\text{£}4000 - \text{£}1120 = \text{£}2880$$

Rent : Other

$$11 + 9 = 20$$

$$2880 \div 20 = 144$$

$$\begin{array}{r} 11 : 9 \\ \times 144 \quad \times 144 \\ \hline \end{array}$$

£1584 : £1296

Utilities:

$$\frac{3}{8} \text{ of £1296} = \text{£486}$$

Left for entertainment and emergencies:

$$\text{£1296} - \text{£486} = \text{£810}$$

Emergency fund:

$$\text{£810} \div 2 = \text{£405}$$

Difference:

$$\text{£486} - \text{£405} = \text{£81}$$