

# Combining Ratios

## Example 1

The ratio of men to women members of a gym is  $8:5$ . The ratio of women to children is  $7:3$ . Find a ratio relating men, women, children. What is the minimum number of members?

Men		Women		Children
8	:	5		
56	:	35		
		7	:	3
		35	:	15
M : W : C				
56 : 35 : 15				

$$\text{Minimum membership} = 56 + 35 + 15 = 106 \text{ people}$$

Ex 2

$$A : B = 2 : 3$$

$$B : D = 5 : 2$$

$$C : D = 3 : 1$$

Find  $A : B : C : D$  in its simplest form.

A		B		C		D
2	:	3				
10	:	15				
		5				2
		15				6
				3	:	1
				18	:	6
10	:	15	:	18	:	6
A	:	B	:	C	:	D

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Examples



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Workout

Question 1: In a bag there are blue, green and yellow counters.

The ratio of blue counters to green counters is 3:2

The ratio of green counters to yellow counters is 2:5

$$3 : 2 : 5$$

(a) Write down the ratio of blue to green to yellow counters in the bag.

(b) What percentage of the beads are green?  $\frac{2}{10} \times 100 = 20\%$

Question 2: Archie made some cupcakes for a charity coffee morning.

$$C : S : L$$

$$3 : 1$$

$$6 : 2$$

$$2 : 3$$

$$6 : 2 : 3$$

The ratio of chocolate cupcakes to strawberry cupcakes was 3:1

The ratio of strawberry cupcakes to lemon cupcakes was 2:3

(a) Write down the ratio of chocolate to strawberry to lemon cupcakes.

(b) Work out the smallest possible number of cupcakes that Archie could have made.  $6 + 2 + 3 = 11$

Question 3: At a safari park, the ratio of lions to tigers is 7:4.

The ratio of elephants to tigers is 1:2

$$L : T : E$$

$$7 : 4$$

$$2 : 1$$

$$4 : 2$$

Write down the ratio of lions to tigers to elephants in the safari park.

$$7 : 4 : 2$$

Question 4: A bag contains three different shaped pieces of card.

$$C : T : R$$

$$2 : 3$$

$$4 : 6$$

$$2 : 5$$

$$6 : 15$$

$$4 : 6 : 15$$

The ratio of circles to triangles is 2:3

The ratio of triangles to rectangles is 2:5

Find the ratio of circles to triangles to rectangles.

Question 5: In a school, all students are taught either French, German or Spanish.

$$F : G : S$$

$$3 : 4$$

$$12 : 16$$

$$12 : 16$$

$$12 : 16 : 11$$

The ratio of the number of students taught French to those taught German is 3:4

The ratio of the number of students taught French to taught Spanish is 12:11

Find the ratio of the number of students taught Spanish to taught German.

$$5 : 6$$

$$11 : 16$$

Question 6: In a box there are white chocolates, milk chocolates and dark chocolates.

$$W : M : D$$

$$3 : 5$$

The ratio of white chocolates to milk chocolates is 3:5

The ratio of milk chocolates to dark chocolates is 8:1

What fraction of the chocolates are white chocolate?

$$\text{fraction of white} = \frac{24}{24+40+5}$$

$$= \frac{24}{69}$$

Apply

Question 1: In a drawer, there are white, black and grey socks.  
The ratio of white socks to black socks is 3:2  
The ratio of white socks to grey socks is 9:4

$$\begin{array}{ccc} W & B & G \\ 3 & : & 2 \\ 9 & : & 6 \\ 9 & & : & 4 \\ \hline 9 & : & 6 & : & 4 \end{array}$$

(a) Write down the ratio of white socks to black socks to grey socks.

Elsie says there is an odd white sock.

could be 18 + 12 + 8  
Socks

(b) Explain why Elsie might be wrong.

Question 2: The ratio of red pens to black pens is 2:9  
The ratio of black pens to blue pens is 5:4

$$\begin{array}{ccc} R & Bk & Blue \\ 2 & : & 9 \\ 10 & : & 45 \\ & 5 & : & 4 \\ & 45 & : & 36 \\ 10 & : & 45 & : & 36 \end{array}$$

Show less than 50% of the pens are black.

$$\begin{array}{l} \text{Black} \\ \frac{45}{91} < \frac{1}{2} \end{array}$$

Question 3: A quadrilateral, ABCD, is drawn.

See  
Below

The ratio of the size of angle A to angle B is 1:3  
The ratio of the size of angle B to angle D is 5:3  
The ratio of the size of angle C to angle A is 7:5

Find the difference in size between the largest and smallest angles in quadrilateral ABCD.

Question 4: The ratio of Scott's age to Georgia's age to Fiona's age is 11:6:7  
The ratio of Oscar's age to Georgia's age is 3:4

$$\begin{array}{ccc} O : S & : & G : F \\ 11 & : & 6 : 7 \\ 22 & : & 12 : 14 \end{array}$$

Find the ratio of Fiona's age to Oscar's age.

Question 5: Given  $4x = 3y$  and  $y : z = 1 : 2$

Find x in terms of z

See  
Below

$$\begin{array}{ccc} 3 & : & 4 \\ 9 & : & 12 \\ 9 : 22 & : & 12 : 14 \end{array}$$

Question 6: w is 15% of x

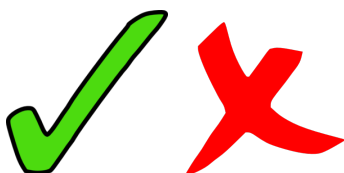
y is  $\frac{3}{5}$  of x

See Below

$$\begin{array}{l} F : O \\ = 14 : 9 \end{array}$$

Find the ratio w:x:y

Answers



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Question 3: A quadrilateral, ABCD, is drawn.

The ratio of the size of angle A to angle B is 1:3

The ratio of the size of angle B to angle D is 5:3

The ratio of the size of angle C to angle A is 7:5

Find the difference in size between the largest and smallest angles in quadrilateral ABCD.

A                  B                  C                  D

1 : 3  
5 : 15

5 : 3  
15 : 9

5 : 7

5 : 15 : 7 : 9 = 36 parts

36 parts =  $360^\circ$       1 part =  $10^\circ$

Largest angle =  $15 \times 10 = 150^\circ$

Smallest angle =  $5 \times 10 = 50^\circ$

Difference =  $100^\circ$

Question 5: Given  $4x = 3y$  and  $y : z = 1 : 2$

Find x in terms of z

$$\frac{y}{z} = \frac{1}{2} \Rightarrow \begin{aligned} 2y &= z \\ y &= \frac{z}{2} \end{aligned}$$

$$4x = 3y$$

$$4x = 3 \frac{z}{2}$$

$$8x = 3z$$

$$x = \frac{3z}{8}$$

Question 6: w is 15% of x

y is  $\frac{3}{5}$  of x

Find the ratio w:x:y

$$w = 0.15x$$

$$100w = 15x$$

$$\frac{100}{15} = \frac{x}{w}$$

$$w : x : y$$

$$15 : 100$$

$$5 : 3$$

$$100 : 60$$

$$15 : 100 : 60$$

$$= 3 : 20 : 12$$

$$y = \frac{3}{5}x$$

$$\frac{y}{x} = \frac{3}{5}$$