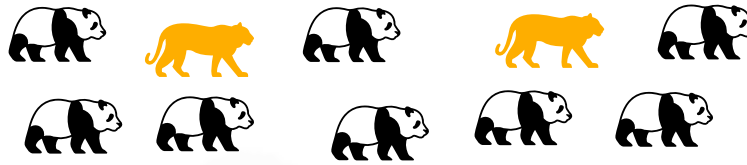


Describing Ratios

Starter

1. Consider the picture of pandas and tigers



- (a) What fraction of the mammals are:
 (i) pandas (ii) tigers
- (b) Write down the ratio of number of pandas : tigers. Simplify your ratio.
- (c) How many:
 (i) pandas are there per tiger
 (ii) tigers are there per panda
- (d) (i) Write down the ratio of tigers to pandas in the form $1 : p$ where p is a number to be found.
 (ii) Write down the ratio of pandas to tigers in the form $1 : t$ where t is a number to be found.
- (e) How many:
 (i) pandas would there be if there were 100 tigers?
 (ii) tigers would there be if there were 600 pandas?
- (f) Let p = number of pandas and t = number of tigers. Write down an equation for p in terms t .

Working: (a) (i) Fraction of pandas $\frac{8}{10} = \frac{4}{5}$
 (ii) Fraction of tigers $\frac{2}{10} = \frac{1}{5}$

(b) (i) Pandas : Tigers $8 : 2$ simplifies to $4 : 1$
 (ii) Tigers : Pandas $2 : 8$ simplifies to $1 : 4$

(c) (i) There are 4 tigers per panda.
 (ii) There is $\frac{1}{4}$ of a panda per tiger.

(d) (i) Tigers : Pandas is $1 : 4$
 (ii) Pandas : Tigers is $4 : 1$
 Dividing by 4 gives $1 : \frac{1}{4}$

(e) (i) Pandas : Tigers is $4 : 1$
 100 tigers $p : 100$
 To go from 1 to 100 we multiplied by 100 so we can multiply the 4 by 100
 There will be $4 \times 100 = 400$ pandas

- (ii) Tigers : Pandas is 1 : 4
 600 pandas $t : 600$
 To go from 4 to 600 we multiplied by 125 so we can multiply the 1 by 125.
 There will be $1 \times 125 = 125$ tigers

(f) $\left. \begin{array}{l} p : t \\ 4 : 1 \end{array} \right\} \text{These are equivalent ratios so can be written as}$ $\frac{p}{4} = \frac{t}{1}$

Getting p on it own: $p = 4t$

- E.g. 1** (a) In a room of just cats and dogs, $\frac{2}{7}$ of the animals are cats. Find the ratio of cats to dogs in its simplest form.
- (b) In a match, the proportion of shots on goal was 0.42. Find the ratio for shots on goal : shots off target. Write the ratio in its simplest form.
- (c) 84% of people are right-handed. Write down the ratio of right-handed : left-handed people.
- (d) In a massive fruit salad made up of apples, bananas and oranges, the fraction of apples is $\frac{2}{5}$ and the fraction of bananas is $\frac{3}{8}$.
 Calculate the ratio of apples : bananas : oranges.

Working:

(a) Fraction of dogs = $1 - \frac{2}{7} = \frac{5}{7}$
 Cats : Dogs $\equiv \frac{2}{7} : \frac{5}{7}$
Multiplying by 7 gives: 2 : 5

(b) Proportion of shots off target = $1 - 0.42 = 0.58$
 Shots on goal : Shots off target $\equiv 0.42 : 0.58$
Multiplying by 100 $\equiv 42 : 58$
Dividing by 2 $\equiv 21 : 29$

(c) Percentage of left-handed people = $100\% - 84\% = 16\%$
 Right-handed : Left-handed $\equiv 84\% : 16\%$
Losing the % symbol $\equiv 84 : 16$
Dividing by 4 $\equiv 21 : 4$

(d) Fraction of oranges = $1 - \frac{2}{5} - \frac{3}{8} = 1 - \frac{16}{40} - \frac{15}{40} = \frac{9}{40}$
 Apples : Bananas : Oranges $\equiv \frac{16}{40} : \frac{15}{40} : \frac{9}{40}$
Multiplying by 40 gives: 16 : 15 : 9

- E.g. 2** (a) The ratio of $a : b$ is $1 : 5$, write down an equation for b in terms of a .
(b) The ratio of $p : q$ is $3 : 7$, write down an equation for q in terms of p .
(c) The ratio of $x : y$ is equivalent to $a : b$, write down an equation for x in terms of y .

Working:

(a) $\left. \begin{array}{l} a : b \\ 1 : 5 \end{array} \right\} \text{ These are equivalent ratios } \frac{a}{1} = \frac{b}{5}$
so can be written as
Getting b on its own:
So $b = 5a$

(b) $\left. \begin{array}{l} p : q \\ 3 : 7 \end{array} \right\} \text{ These are equivalent ratios } \frac{p}{3} = \frac{q}{7}$
so can be written as
Getting q on its own:
So $q = \frac{7}{3}p$

(c) $\left. \begin{array}{l} x : y \\ a : b \end{array} \right\} \text{ These are equivalent ratios } \frac{x}{a} = \frac{y}{b}$
so can be written as
Getting q on its own:
So $y = \frac{b}{a}x$

- E.g. 3** (a) Given that $3y = 5x$, write down the ratio of $x : y$.
(b) Given that $y = 4x$, write down the ratio of $x : y$.
(c) Given that $y = \frac{2}{9}x$, write down the ratio of $x : y$ using integers.
(d) Given that $y = 0.6x$, write down the ratio of $x : y$ using integers.

Working: (a) $3y = 5x$

Forming two fractions: $3y = 5x$

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

So $y : x$ is equivalent to $5 : 3$

Swapping around: $x : y$ is equivalent to $3 : 5$

(b) $y = 4x$ is the same as $1y = 4x$

Forming two fractions: $1y = 4x$

$$\frac{y}{4} = \frac{x}{1}$$

So $y : x$ is equivalent to $4 : 1$

Swapping around: $x : y$ is equivalent to $1 : 4$

(c) $y = \frac{2}{9}x$

Forming two fractions: $y = \frac{2}{9}x$

$$\frac{y}{2} = \frac{x}{9}$$

So $y : x$ is equivalent to $2 : 9$

Swapping around: $x : y$ is equivalent to $9 : 2$

(d) $y = 0.4x$ is the same as $y = \frac{2}{5}x$

Forming two fractions: $\frac{y}{2} = \frac{x}{5}$

So $y : x$ is equivalent to $2 : 5$

Swapping around: $x : y$ equal to $5 : 2$

Video: [Ratios and equations](#)

[Solutions to Starter and E.g.s](#)

Exercise

Worksheet: Exploring ratios

Worksheet: Ratio to proportion

Worksheet: Ratio to proportion graphs