Similar shapes

Scale factor

Scale factor from a 3 cm side to a 12 cm side

Finding a missing length in similar shapes

Why is stretching in one direction not a copy?

Ratio

Ratio and proportion compared

Total number of parts

new length ÷ old length

same shape, different size: matching angles equal and matching lengths in the same ratio

multiply by the scale factor to go bigger; divide to go smaller

$12 \div 3 = 4$

a comparison of two quantities, written like 3 : 2

the lengths are not in the same ratio, so the shape is distorted

add the numbers in the ratio

ratio compares part with part (3 : 2); proportion compares part with whole ($\frac{3}{5}$)

Share 40 in the ratio 3 : 2

Simplify a ratio

Ratios with different units

Equivalent ratios

The form 1 : n

The form n : 1

Why use 1 : n?

Ratio 3 : 2 as fractions of the whole

divide both parts by their highest common factor: 18 : 24 = 3 : 4

5 parts; 1 part = 8; so 24 and 16

multiply or divide both parts by the same number

change to the same unit first: 2 m : 50 cm = 200 : 50 = 4 : 1

divide both parts by the second

divide both parts by the first: 4 : 10 = 1 : 2.5

$\frac{3}{5}$ and $\frac{2}{5}$

the unit ratio makes two ratios easy to compare

$\frac{1}{4}$ of the class are girls. Ratio of girls to others?

$\frac{3}{5}$ of 40

Direct proportion

Unit value

Constant of proportionality k

The rule for direct proportion

y = 15 when x = 5. Find k and the rule.

How to test a table for proportion

24

1 : 3

the value of one item: 5 pens cost 15 francs, so one pen costs 3 francs

when one quantity doubles the other doubles; the graph is a straight line through the origin

$y = kx$

$k = y \div x$, the same for every pair in a proportional table

find $y \div x$ for each pair; it must be the same every time

$k = 3$ and $y = 3x$

Taxi: 4 francs fixed plus 2 francs per km. Proportional?

Conversion graph

Reading a conversion graph

Drawing a conversion graph

Scale 1 : 50

Real length from a drawing

Drawing length from a real length

Map scale 1 : 25 000: 4 cm on the map

a straight line through the origin used to change one unit into another

no: the graph does not go through the origin

plot the origin and one known pair, then join them with a straight line

go across from one axis to the line, then down (or across) to the other

drawing length × scale

1 cm on the drawing is 50 cm in real life

4 × 25 000 = 100 000 cm = 1 km

real length ÷ scale

Converting cm

Y8 · Unit 8.2
Ratio and Proportion

mathscafe
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100 cm = 1 m; 100 000 cm = 1 km