

RATIO

Note Title

05/08/2013

Ratios are similar to fractions
- they can be 'cancelled down' in the same way.

$$\text{e.g. } 16 : 24 = 2 : 3$$

(divide both by 8)

We need to make sure we are using the same units

$$\begin{aligned} \text{e.g. } 40 \text{ cm to } 3 \text{ m} &= 40 \cancel{\text{cm}} : 300 \cancel{\text{cm}} \\ &= 4 : 30 \\ &= 2 : 15 \end{aligned}$$

Ratios are often used as a SCALE on a map or diagram.

e.g. 1 : 50000 means that 1 cm on the map represents 50000 cm on the ground.

Example

(a) On a 1 : 50000 map my house is 12 cm from the school. How many km from school do I live?

On the ground the distance is

$$\begin{aligned} &12 \text{ cm} \times 50000 \\ &= 600000 \text{ cm} \\ &= 6000 \text{ m} \\ &= \underline{\underline{6 \text{ km}}} \end{aligned}$$

(b) My friend lives 14.5 km from the school. How far is this on the map?

$$\begin{aligned} 14.5 \text{ km} &= 14500 \text{ m} \\ &= 1450000 \text{ cm on the ground} \\ &= \frac{1450000}{50000} \text{ cm on the map} \\ &= \underline{\underline{29 \text{ cm}}} \text{ on the map} \end{aligned}$$

RATIO AND PROPORTION

Note Title

27/11/2008

Scale on Maps

The scale of a map tells us how many times bigger a distance is on the ground compared to the map.

Examples

① A map has a scale of $1:25000$. On the map it is 16cm from A to B. How many kilometres is it from A to B on the ground?

$$\begin{aligned}16 \times 25000 &= 400000 \text{ cm} \\ &= 4000 \text{ m} \\ &= 4 \text{ km}\end{aligned}$$

(Remember: $100 \text{ cm} = 1 \text{ m}$
 $1000 \text{ m} = 1 \text{ km}$)

② A map has a scale of $1:200000$. From Oxford to London is 85 km . How many cm will this be on the map?

$$\begin{aligned}85 \text{ km} &= 85000 \text{ m} \\ &= 8500000 \text{ cm}\end{aligned}$$

On the map this will be

$$8500000 \div 200000 = 42.5 \text{ cm}$$

Dividing into parts in a given ratio

Example A certain metal contains copper and zinc in the ratio 5:3.

(a) How much zinc is there in 2kg of this metal?

$$5 + 3 = 8 \text{ parts}$$

$$\text{Each part is } \frac{2000 \text{ g}}{8} = 250 \text{ g}$$

$$\begin{aligned} \text{So there are } 250 \text{ g} \times 5 &= 1250 \text{ g of copper} \\ \text{and } 250 \text{ g} \times 3 &= \underline{\underline{750 \text{ g}}} \text{ of zinc} \end{aligned}$$

(b) A ^{different} lump of this metal contains 45g of copper. How much zinc does it contain?

$$5 \text{ parts} = 45 \text{ g}$$

$$1 \text{ part} = \frac{45}{5} = 9 \text{ g}$$

$$\text{zinc} = 3 \text{ parts} = 9 \times 3 = \underline{\underline{27 \text{ g}}}$$

(c) A third lump of this metal contains 45g of zinc. How much copper does it contain?

$$3 \text{ parts} = 45 \text{ g}$$

$$1 \text{ part} = \frac{45}{3} = 15 \text{ g}$$

$$\text{copper} = 5 \text{ parts} = 15 \times 5 = \underline{\underline{75 \text{ g}}}$$

Example The number of pages in a newspaper increases from 36 to 54. The price increases in the same ratio. If the old price is 28p what is the new price?

$$36 : 54 \quad \text{can be simplified (cancelled)}$$

$$(\div 6)$$

$$6 : 9$$

$$(\div 3)$$

$$2 : 3$$

$$\text{Old price is } 2 \text{ parts} = 28\text{p}$$

$$1 \text{ part} = 14\text{p}$$

$$\text{New price is } 3 \text{ parts} = 14 \times 3$$

$$= \underline{\underline{42\text{p}}}$$