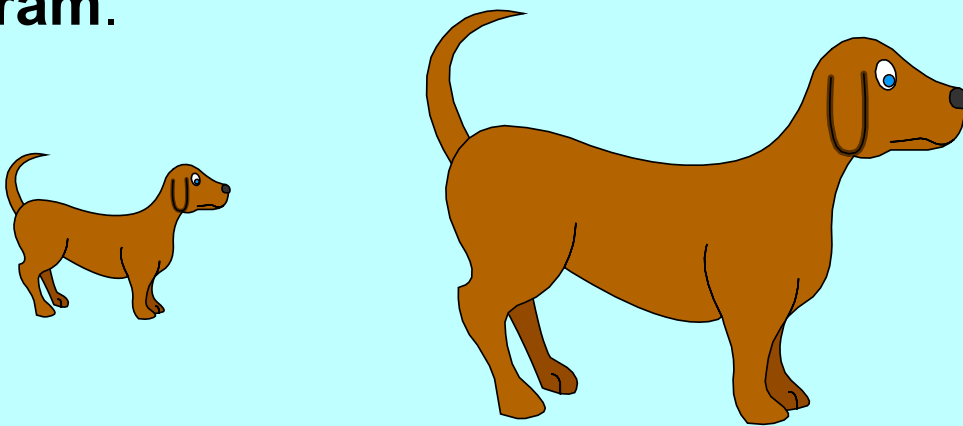


Section 7.1 Scale Diagrams and Enlargements

A diagram that is an **enlargement** or a **reduction** of another diagram is called a **scale diagram**.

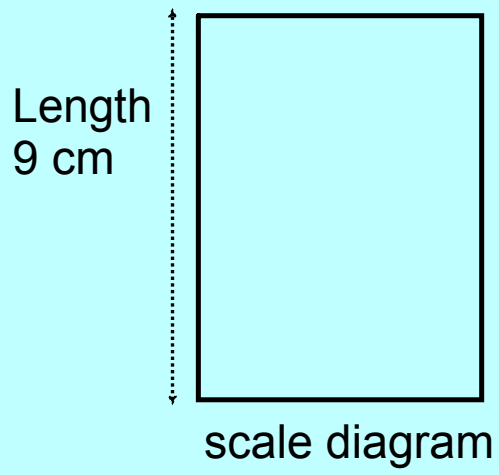
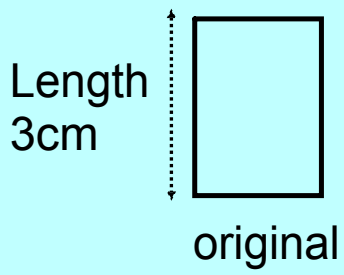


The **scale factor** is the relationship between the matching lengths on the two diagrams.

To find the scale factor of a scale diagram, we divide:

$$\frac{\text{length on the scale diagram}}{\text{length on original diagram}}$$

Example # 1



$$\text{Scale factor} = \frac{\text{length on scale diagram}}{\text{length on original diagram}}$$

$$= \frac{9 \text{ cm}}{3 \text{ cm}}$$

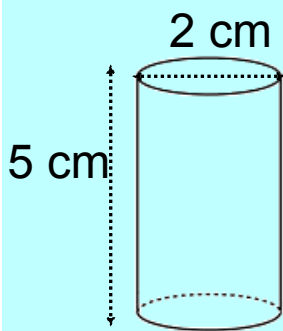
$$= 3$$

Note

- the units must be the same on the original and scale diagram
- if not, you must convert one to make them the same
- scale factors **do not** have units

Example # 2

The cylinder is to be enlarged by a scale factor of $\frac{5}{2}$. Find the dimensions of the enlargement.



Write the scale factor as a decimal.

$$\frac{5}{2} = 5 \div 2 = 2.5$$

Multiply each dimension by the scale factor.

Diameter Original: 2cm

Diameter Enlargement: $2\text{cm} \times 2.5 = 5\text{cm}$

Height Original: 5cm

Height Enlargement: $5\text{cm} \times 2.5 = 12.5\text{cm}$

The enlargement has diameter 5cm and height 12.5cm.

Try this one!

A photo has dimensions 10cm by 15cm.

Two enlargements are to be made with each scale factor below. Find the dimensions of each enlargement.

A) scale factor 4

B) scale factor $\frac{13}{4}$



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Solution

A) Scale Factor = 4

Original Width: 10cm

Enlargement Width: $10\text{cm} \times 4 = 40\text{cm}$

Original Length: 15cm

Scale Length: $15\text{cm} \times 4 = 60\text{cm}$

Enlargement has dimensions 40cm by 60cm

B) Scale Factor = $\frac{13}{4} = 3.25$

Original Width: 10cm

Enlargement Width: $10\text{cm} \times 3.25 = 32.5\text{cm}$

Original Length: 15cm

Enlargement Length: $15\text{cm} \times 3.25 = 48.75\text{cm}$

Enlargement has dimensions
32.5cm by 48.75cm



#6. a) scale factor = 12

original 17.5 cm by 12.5 cm
photo

$$\text{Original length} \times \text{Scale factor} = \text{enlargement length}$$

$$17.5 \times 12 = 210 \text{ cm}$$

$$\text{Original width} \times \text{scale factor} = \text{enlargement width}$$

$$12.5 \times 12 = 150 \text{ cm}$$

The dimensions of the enlargement are
210 cm by 150 cm

d) scale factor $\frac{17}{4}$

change to decimal $17 \div 4 = 4.25$

$$\text{Original} \times \text{SF} = \text{enlargement}$$

$$17.5 \times 4.25 = 74.38 \text{ cm}$$

$$12.5 \times 4.25 = 53.13 \text{ cm}$$

11 a. dimensions of the shaded figure

1 by 3

or $\frac{1}{3}$

SF=2

A) ~~$\frac{1}{2}$~~

b) ~~$\frac{2}{3}$~~

c) $\frac{2}{6}$

d) ~~$\frac{2}{3}$~~

Which fractions are equivalent to $\frac{1}{3}$? $\frac{x^2}{x^2}$

b) dimensions of shaded $\frac{2}{4} = \frac{1 \times 3}{2 \times 3}$ SF=3

A) ~~$\frac{3}{4}$~~

b) ~~$\frac{5}{4}$~~

c) $\frac{3}{6}$

d) $\frac{3}{6}$