

Proportions and Similar Figures Guided Notes

What is a Proportion?

A proportion is an equation having two ratios equal.

$$\frac{a}{b} = \frac{c}{d}$$

b & c → means

a & d → extremes

Solving proportions using Cross-Product property

In a proportion, the product of extremes is equal to the product of means i.e. we cross multiply the terms on both sides of equality and simplify to solve for the given variable.

$$\frac{a}{b} \swarrow \searrow \frac{x}{d}$$

Cross Multiply

→ $ad = bx$

→ $x = \frac{ad}{b}$

Similar Figures

Two figures are similar if they have same shape but not the same size.

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- The corresponding **angles** of the similar figures are **equal in measures**.
- The corresponding **sides** of the similar figures are **proportional**.

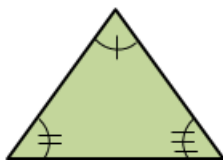


Figure 1

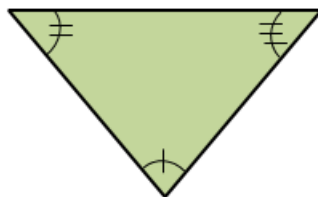
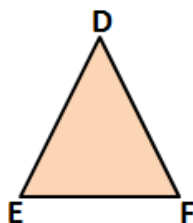
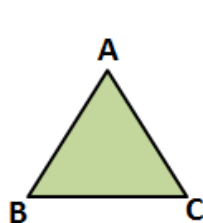


Figure 2

The **figure 1** and **figure 2** are similar since both shapes are triangles but their size is different. (Similarity represented as ' \sim '))

Problem 1: Write the corresponding sides as proportions and list the corresponding angles of the triangles shown below.



Corresponding Sides

$$\frac{AB}{DE}$$

$$\frac{BC}{EF}$$

$$\frac{AC}{DF}$$



$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

Corresponding Angles

Angle A and Angle D

Angle B and Angle E

Angle C and Angle F

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Problem 2: The figures given below are similar. Find the missing length.



Since the two figures are similar, their corresponding sides are proportional.

$$\begin{aligned} &\Rightarrow \frac{3}{6} = \frac{x}{4} \Rightarrow \frac{3 \times 4}{6} = x \\ &\Rightarrow \boxed{x = 2} \end{aligned}$$

Scale Drawing

A scale drawing of an object is a drawing on the paper using a certain scale which is similar to the actual shape of the object.

Scale

A scale is the ratio of the drawing length on paper to the actual length.

Example: 1 cm represents 100 m, so the scale is **1 cm : 100 m**

Problem 3: On a map, the scale is 1 inch : 11 km. If the distance between city A and city B on the map is 6 inches, what is the actual distance between the two cities?

We will write the proportion to find the unknown x representing the distance between city A and city B.

$$\begin{aligned} &\Rightarrow \frac{1 \text{ inch}}{11 \text{ km}} = \frac{6 \text{ inch}}{x \text{ km}} \Rightarrow \frac{11 \times 6}{1} = x \\ &\Rightarrow \boxed{x = 66 \text{ km}} \end{aligned}$$