9SS3.4 Draw and interpret scale diagrams of 2-D shapes.

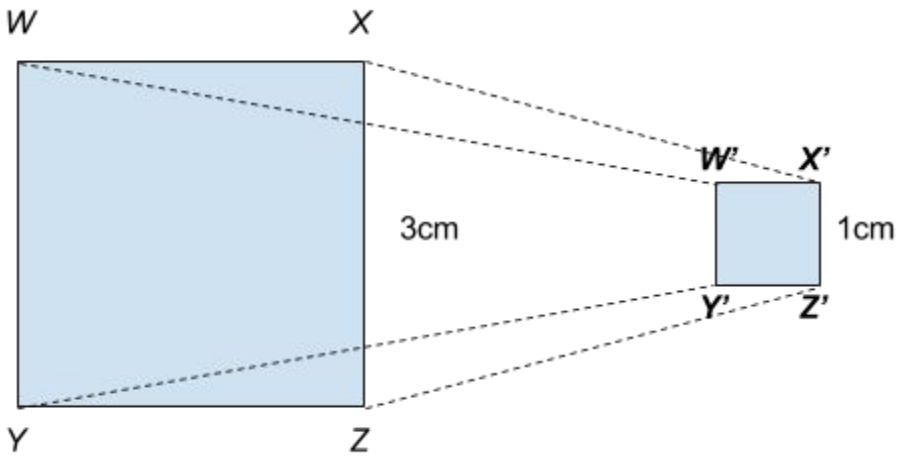
Scale Diagrams of 2-D Shapes

Scale drawings are used when objects are too large or small to be drawn on a piece of paper.

The scale factor can be calculated using the following formula:

$$scale\ factor = \frac{image\ length}{original\ length} \qquad \text{or} \qquad SF = \frac{i}{o}$$

Example



What is the scale factor of the given diagram?

Solution

Determine scale factor by using the following formula:

$$scale\ factor = \frac{image\ length}{original\ length}$$

Using the values from $\overline{XZ}$ and $\overline{X'Z'}$, calculate the scale factor

$$scale\ factor = \frac{\overline{X'Z'}}{\overline{XZ}}$$
$$= \frac{1}{3}$$

If the scale factor is less than 1, the image will be a reduction of the original shape. If the scale factor is greater than 1, the image will be an enlargement of the original shape.

If the scale factor is given, it is possible to determine the side length of the image by applying the same formula.

Example

Rectangle ABCD has a length of 9 units and a width of 12 units. It is reduced by a scale factor of $\frac{1}{3}$ to form rectangle A'B'C'D'.
What are the dimensions of rectangle A'B'C'D'?

Apply the formula
$scale\ factor = \frac{image\ length}{original\ length}$ to determine the dimensions of the reduced rectangle.

Step 1

Calculate the length of the new rectangle.

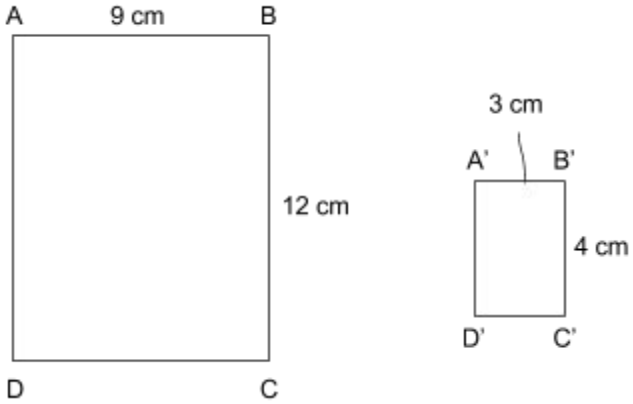
$$scale\ factor = \frac{image\ length}{original\ length}$$
$$\frac{1}{3} = \frac{l}{9}$$
$$1 \times 9 = 3 \times l$$
$$9 = 3l$$
$$3 = l$$

Step 2

Calculate the width of the new rectangle

$$scale\ factor = \frac{image\ width}{original\ width}$$
$$\frac{1}{3} = \frac{w}{12}$$
$$1 \times 12 = 3 \times w$$
$$12 = 3w$$
$$4 = w$$

The dimensions of rectangle A'B'C'D' are 3 units by 4 units.

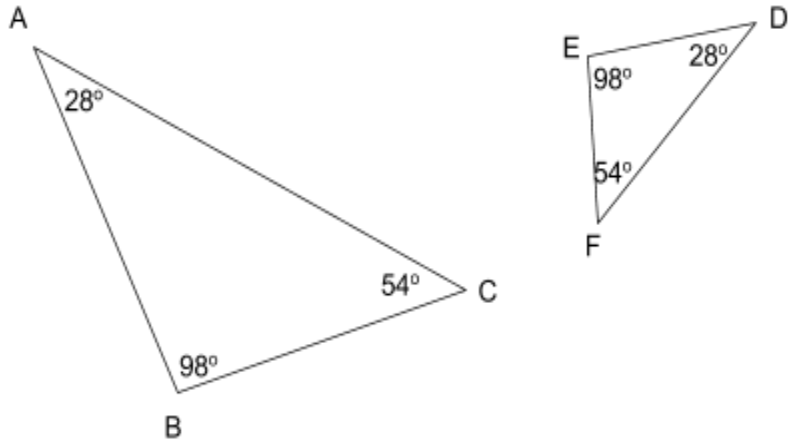


Properties of Similar Triangles

There are two properties of similar triangles.

1) All corresponding angles are equal.
2) All corresponding sides are proportionately equal in length

Example



Prove triangle ABC is similar to triangle DEF using the property of corresponding angles.

Solution

Identify the corresponding angles.

Corresponding angles have the same place in the triangles.

- ∠A corresponds to ∠D because both are 28°.
- ∠B corresponds to ∠E because both are 98°.
- ∠C corresponds to ∠F because both are 54°.

Since all three corresponding angles are equal, △ABC ~ △DEF.