

Lesson 7-5

Objective – To use techniques of indirect measure to solve for unknown distances.
Find the height of the tree.

$$\frac{x}{25} \times \frac{6}{5}$$

$$5x = 150 \quad x = 30 \text{ feet}$$

A man stands on one side of a river and takes the measurements of the similar triangles shown below. How can he find the distance across the river, x?

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$$\frac{x}{18} \times \frac{15}{12}$$

$$12x = 270 \quad x = 22.5 \text{ feet}$$

A man's silhouette is projected on to a wall using a projector. Given the measurements below, how tall will the shadow be on the wall?

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Wrong!

$$\frac{5}{6} = \frac{x}{6 + 10}$$

$$\frac{5}{6} \times \frac{x}{16}$$

$$\frac{80}{6} = \frac{6x}{6} \quad x = \frac{80}{6} \text{ or } 13\frac{1}{3} \text{ feet}$$

Scale Drawing
The dimensions of Mesha's kitchen are 5m x 8m. Make a scale drawing of her rectangular kitchen using the scale 1 cm = 2 m.

	<u>Width</u>	<u>Length</u>
map (in.)	$\frac{1}{2} \times w$	$\frac{1}{2} \times L$
actual (ft.)	$2w = 5$	$2L = 8$
	Width = 2.5 cm	Length = 4 cm

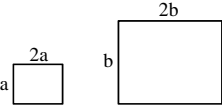
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



Proportionality of Perimeter and Areas Theorem

If the similarity ratio of two figures is $\frac{a}{b}$, then the ratio of their perimeters is $\frac{a}{b}$ and the ratio of their areas is $\frac{a^2}{b^2}$.

Similarity Ratios

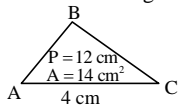
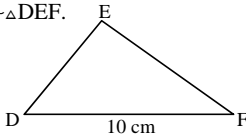
Width: $\frac{a}{b}$
 Length: $\frac{2a}{2b} = \frac{a}{b}$
 Perim: $\frac{6a}{6b} = \frac{a}{b}$
 Area: $\frac{a \cdot 2a}{b \cdot 2b} = \frac{2a^2}{2b^2} = \frac{a^2}{b^2}$



	<u>1-D</u>	<u>2-D</u>
Original Figure	2  P = 10 un.	A = 6 un ²
2x sides	4  P = 20 un.	A = 24 un ²
3x sides	6  P = 30 un.	A = 54 un ²
5x sides	10  P = 50 un.	A = 150 un ²

If the dimensions of a 2D figure increase by scale factor k, then the area increases by k².

Find the following if $\triangle ABC \sim \triangle DEF$.

1) Perimeter of $\triangle DEF$

1-D Ratio
 $\frac{AC}{DF} = \frac{4}{10} = \frac{2}{5}$

Proportion
 $\frac{2}{5} = \frac{\text{Perim } \triangle ABC}{\text{Perim } \triangle DEF}$
 $\frac{2}{5} = \frac{12}{P} \quad 2P = 60 \quad \boxed{P = 30 \text{ cm}}$

2) Area of $\triangle DEF$

1-D Ratio 2-D Ratio
 $\frac{2}{5} \quad \frac{2^2}{5^2} = \frac{4}{25}$

Proportion
 $\frac{4}{25} = \frac{\text{Area } \triangle ABC}{\text{Area } \triangle DEF}$
 $\frac{4}{25} = \frac{14}{A} \quad 4A = 350 \quad \boxed{A = 87.5 \text{ cm}^2}$