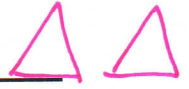


Similar Triangles: Solving Angles & Lengths

Date Notes

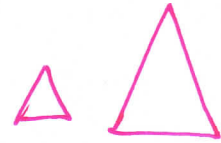
Two triangles are CONGRUENT (the same) if:

- They are the same shape / size and have the same angles

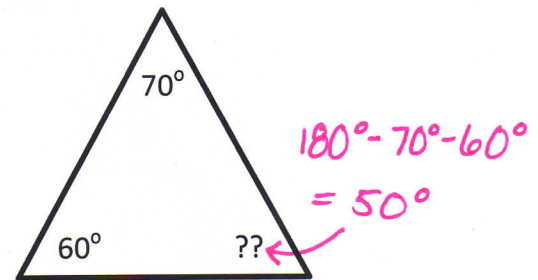


Two triangles are SIMILAR if:

- They have the same angles
- They have the same RATIOS of corresponding sides
- Notation is $\triangle ABC \sim \triangle DEF$

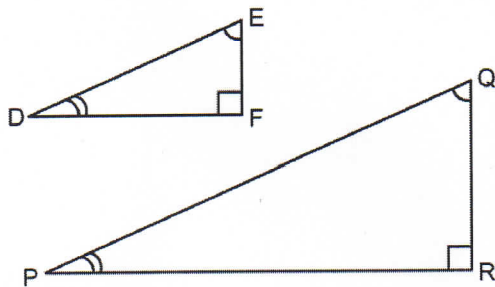


RECALL: The interior angles of a triangle add up to 180°



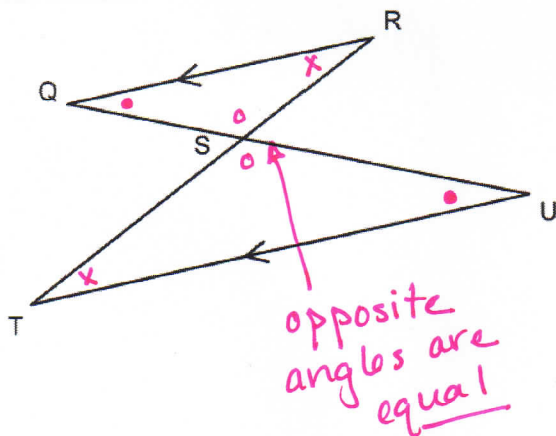
EXAMPLE 1: Finding Corresponding Angles and Sides

a) Find the corresponding angles and sides for the similar triangles:



$\angle E$ corresponds to $\angle Q$
 $\angle F$ " " $\angle R$
 $\angle D$ " " $\angle P$
 DE corresponds to PQ
 EF " " QR
 FD " " RP

b) If $\triangle QRS \sim \triangle UTS$, find the corresponding angles and sides for the triangles.



Order of letters matter! Label same angles!

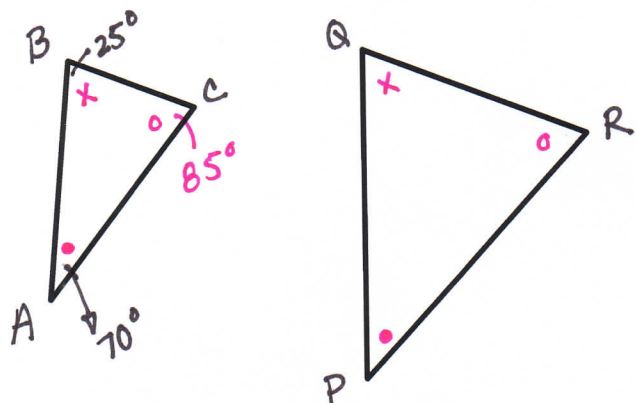
$\angle Q$ corresponds to $\angle U$
 $\angle R$ " " $\angle T$
 $\angle S$ " " $\angle S$
 QR corresponds to UT
 RS " " TS
 SQ " " SU

Similar Triangles: Solving Angles & Lengths

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EXAMPLE 2: Finding Missing Angles

a) Given that $\triangle ABC \sim \triangle PQR$, find the measures of $\angle C$, $\angle P$, and $\angle Q$ and $\angle R$



Find $\angle C$

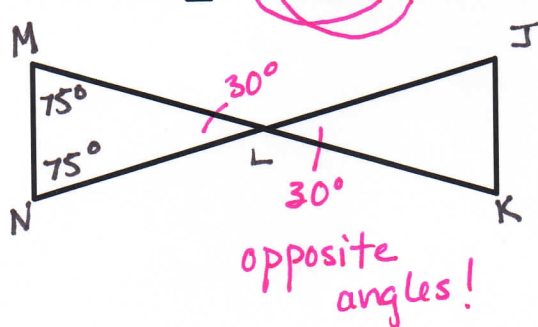
$$180^\circ - 25^\circ - 70^\circ = 85^\circ$$

$$\angle R = 85^\circ \text{ (same as } \angle C)$$

$$\angle Q = 25^\circ \text{ (same as } \angle B)$$

$$\angle P = 70^\circ \text{ (same as } \angle A)$$

b) Given that $\triangle LMN \sim \triangle LJK$, find the measures of $\angle L$, $\angle J$, and $\angle K$.



$$\angle L = 180^\circ - 75^\circ - 75^\circ$$

$$\angle L = 30^\circ$$

$$\angle J = 75^\circ \text{ (same as } \angle M)$$

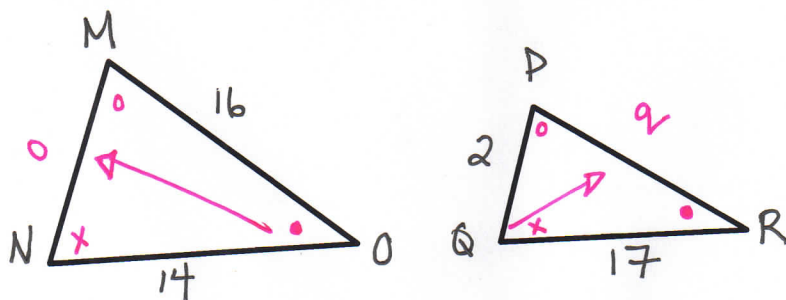
$$\angle K = 75^\circ \text{ (same as } \angle N)$$

EXAMPLE 3: Finding Unknown Sides

a) Given that $\triangle MNO \sim \triangle PQR$, find the length of q .

STEPS:

1. Indicate on the triangles which angles are the same.
2. Set up two ratios or corresponding sides (put the 1st triangle numbers on top).
3. Cross multiply to solve for the unknown side.



+ sides are opposite $\angle$ s.

Find q

$$\frac{16}{q} = \frac{14}{17}$$

1st triangle sides
2nd triangle sides

$$\frac{272}{14} = \frac{14q}{14}$$

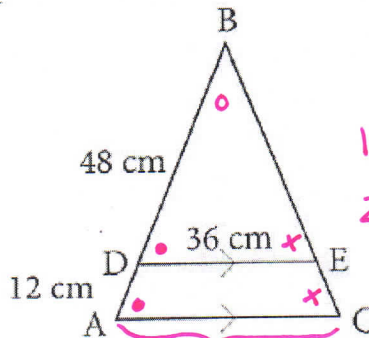
cross multiply
solve for q

$$19.43 = q$$

Similar Triangles: Solving Angles & Lengths

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b) In the diagram DE is parallel to AC. What is the length of AC?



Find AC

1st $\Delta \rightarrow \frac{1st}{36} = \frac{2nd}{AC}$

2nd $\Delta \rightarrow \frac{48}{60} = \frac{36}{AC}$

cross X $\frac{2160}{48} = \frac{48 AC}{48}$

solve for AC $45 = AC$

one ratio has to be complete.

1st Δ 2nd Δ

EXAMPLE 4: Word Problem

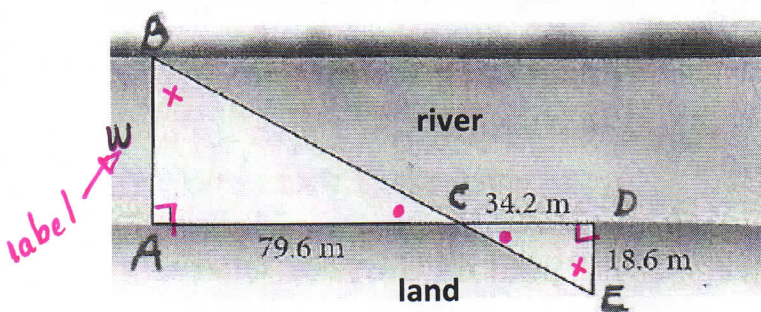
A surveyor wants to determine the width of a river. She surveys the area and finds the following measures below. She uses a pair of similar triangles to help her find the answer.

Step 1: Label all vertices of the triangles. ✓

Step 2: Find the similar triangles and indicate the angles that are the same.

Step 3: Assign a variable to represent the distance you need to determine.

Step 4: Set up equivalent ratios using corresponding sides and solve.



1st Δ 2nd Δ

$$\frac{w}{DE} = \frac{AC}{DC}$$

unknown $\frac{w}{18.6} = \frac{34.2}{79.6}$ known.

$$\frac{34.2w}{34.2} = \frac{1480.56}{34.2}$$

$$w = 43.3$$

$\therefore$ width of river is 43.3 m.