Corner Brook Intermediate Math 9

Unit 7: Similarity and Transformations Name: ____________________

7.4 Similar Triangles – Notes

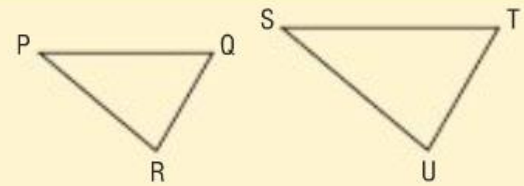
A triangle is a special polygon. When we check whether two triangles are similar:

1. the measures of corresponding angles must be equal; ***OR***
2. the ratio of the lengths of corresponding sides must be equal.

Properties of Similar Triangles

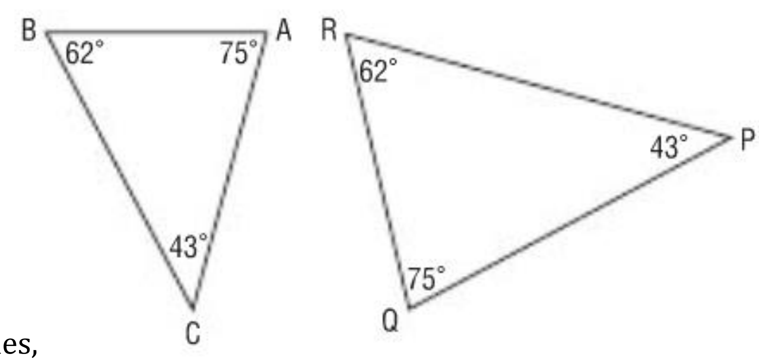
To identify that ΔPQR and ΔSTU are similar, we only need to know that:

- $\angle P = \angle S$ and $\angle Q = \angle T$ and $\angle R = \angle U$; *or*
- $\frac{PQ}{ST} = \frac{QR}{TU} = \frac{PR}{SU}$



These triangles are similar because:

$\angle A = \angle Q = 75°$
$\angle B = \angle R = 62°$
$\angle C = \angle P = 43°$



When we name two similar triangles,

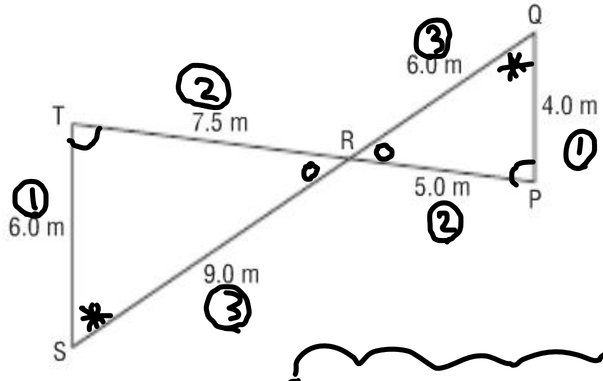
we order the letters to match corresponding angles.

We write: $\Delta ABC \sim \Delta QRP$

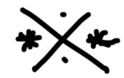
Then we can identify corresponding sides:

$$\frac{AB}{QR} = \frac{BC}{RP} = \frac{CA}{PQ}$$

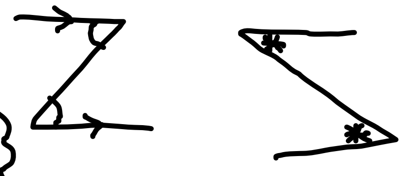
Example (1): Identify the similar triangles. Justify your answer.



vertically opposite



Z-angles (alternate angles)



F-angles (corresponding angles)

$$\frac{ST}{PQ} = \frac{TR}{PR} = \frac{SR}{QR}$$

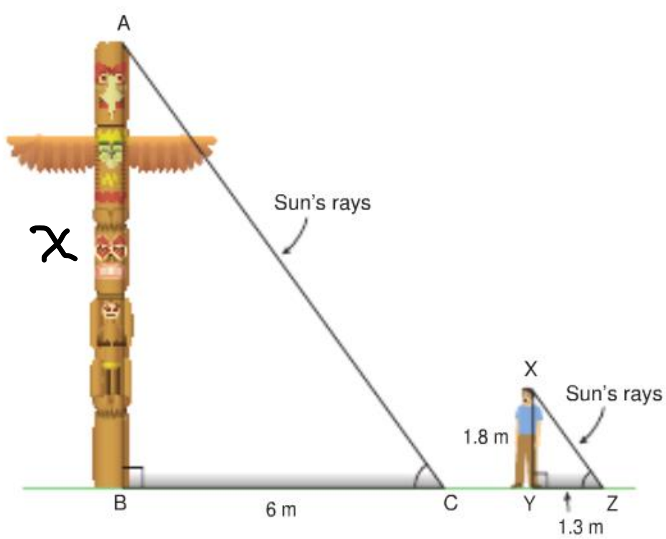
$$\frac{6}{4} = \frac{7.5}{5} = \frac{9}{6}$$

$$1.5 = 1.5 = 1.5$$

Since corresponding sides are proportional

$\Delta RST \sim \Delta RQP$

Example (2): At a certain time of day, a person who is 1.8 m tall has a shadow 1.3 m long. At the same time, the shadow of a totem pole is 6 m long. The sun's rays intersect the ground at equal angles. How tall is the totem pole, to the nearest tenth of a metre.

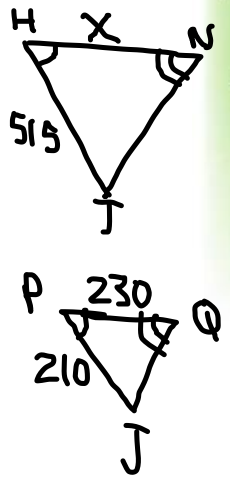


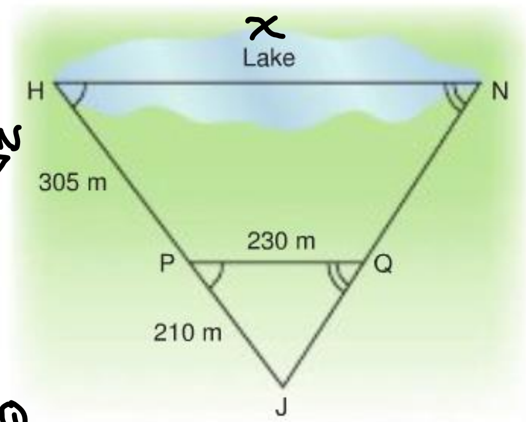
$$\frac{x}{1.8} = \frac{6}{1.3}$$

$$\frac{1.3x}{1.3} = \frac{10.8}{1.3}$$

$$\boxed{x = 8.31m}$$

Example (3): A surveyor wants to determine the width of a lake at two points on opposite sides of the lake. She measures distances and angles on land, then sketches this diagram. How can the surveyor determine the length HN to the nearest metre?



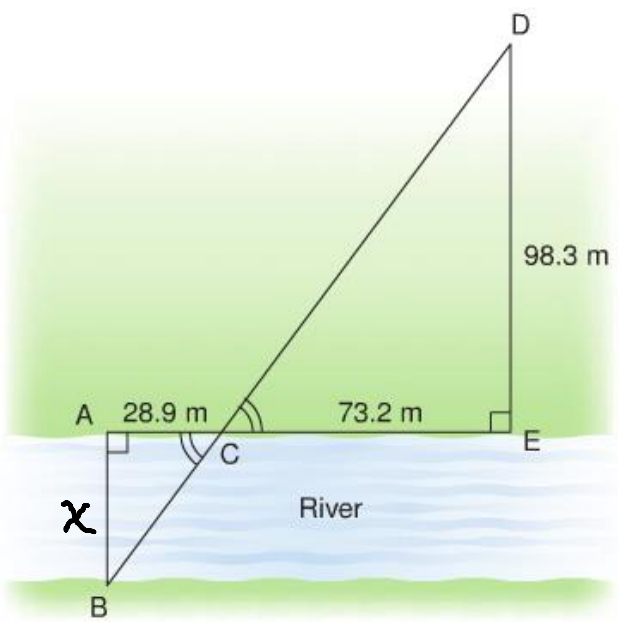


$$\frac{x}{230} = \frac{515}{210}$$

$$\frac{210x}{210} = \frac{118\,450}{210}$$

$$\boxed{x = 564.05\text{m}}$$

Example (4): A surveyor used this scale diagram to determine the width of a river. The measurements he made and the equal angles are shown. What is the width, AB, to the nearest tenth of a metre?



$$\frac{x}{98.3} = \frac{28.9}{73.2}$$

$$\frac{73.2x}{73.2} = \frac{2840.87}{73.2}$$

$$\boxed{x = 38.81\text{m}}$$