APRIL 20, 2016

UNIT 7: SIMILARITY AND TRANSFORMATIONS

7.4: SIMILAR TRIANGLES

M. MALTBY INGERSOLL
MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Shape and Space 3" OR "SS3" which states:

"Demonstrate an understanding of similarity of polygons."

SIMILAR TRIANGLES

TO IDENTIFY SIMILAR TRIANGLES:

* **the measures of the 3 pairs of corresponding angles must be EQUAL**

OR

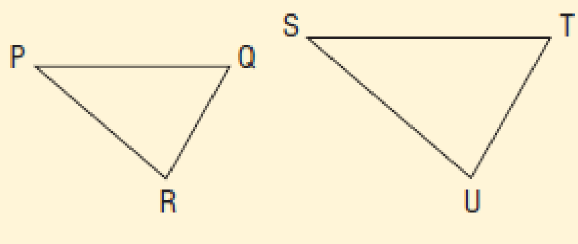
* **the ratios of the lengths of the 3 pairs of corresponding sides must be EQUAL; in other words, corresponding sides are proportional**

***MMS9*, Page 344:**

Properties of Similar Triangles

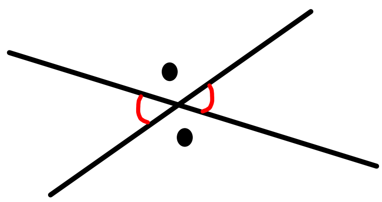
To identify that ΔPQR and ΔSTU are similar, we only need to know that:

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

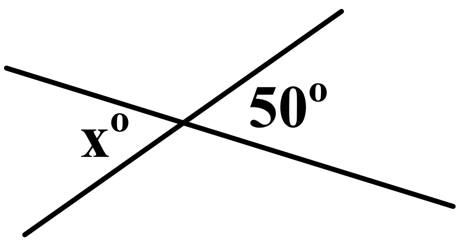


There are two angle theorems that you will need for your similar triangles proofs:

1. **OPPOSITE ANGLES THEOREM (OAT):**
   opposite angles are EQUAL



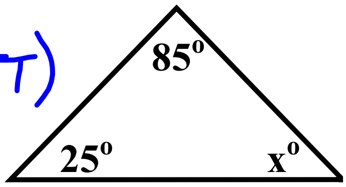
Ex.:



$\angle x = 50^\circ$ (OAT)

2. SUM OF THE ANGLES IN A TRIANGLE THEOREM (SATT): the sum of the angles in a triangle is 180^{o} .

Ex.: Calculate the unknown angle measure.

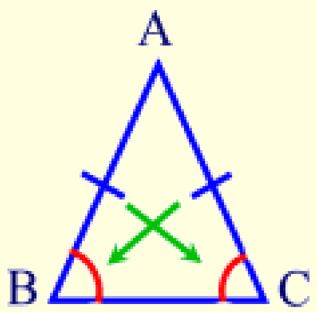


$\angle x = 180 - (25 + 85)$ (SATT)

$= 180 - 110$

$= 70^{\circ}$

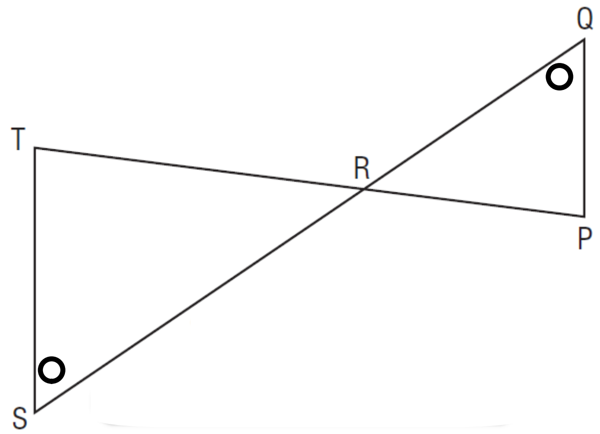
3. **ISOSCELES TRIANGLE THEOREM (ITT) : The two angles that are opposite to the two congruent sides in an isosceles triangle are also congruent.**



$If: \ \overline{AB} \cong \overline{AC}$

$then: \ \measuredangle B \cong \measuredangle C$

WARM UP: ARE THESE TWO TRIANGLES SIMILAR?



$\angle S = \angle Q$ (given)

$\angle R = \angle R$ (OAT)

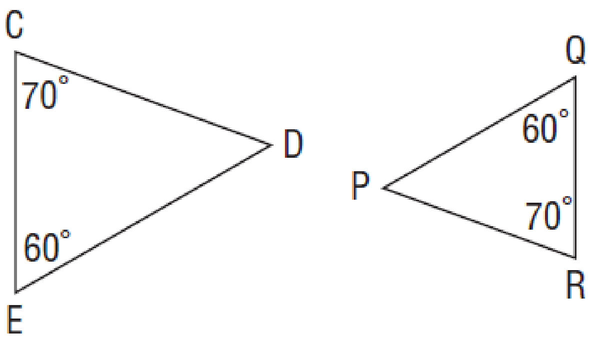
$\angle T = \angle P$ (SATT)

$\therefore \triangle RST \sim \triangle RQP$ (AAA)

HOMEWORK QUESTIONS?

(pages 349 / 350, #4 to #6)

4. c)



$\angle C = \angle R$ (given)

$\angle E = \angle Q$ (given)

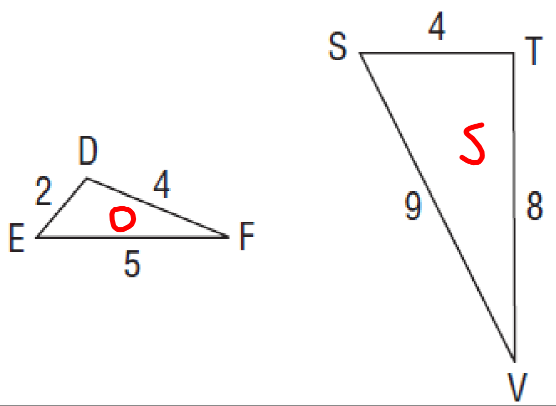
$\angle D = \angle P$ (SATT)

$\therefore \triangle CDE \sim \triangle RPQ$ (AAA)

HOMEWORK QUESTIONS?

(pages 349 / 350, #4 to #6)

4. d)



$$\frac{ST}{DE} = \frac{TV}{DF} = \frac{SV}{EF}$$

$$\frac{4}{2} = \frac{8}{4} = \frac{9}{5}$$

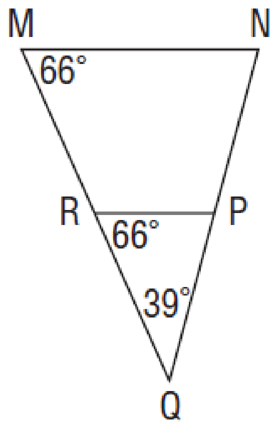
$$2 = 2 \neq 1.8$$

$\therefore \triangle DEF$ is not $\sim$ to $\triangle TSV$ (ratios)

HOMEWORK QUESTIONS?

(pages 349 / 350, #4 to #6)

5. c)



$\angle M = \angle R$ (given)

$\angle Q = \angle Q$ (given)

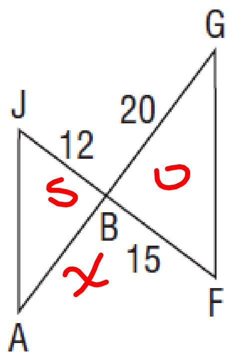
$\angle N = \angle P$ (SATT)

$\therefore \triangle MNQ \sim \triangle RPQ$ (AAA)

HOMEWORK QUESTIONS?

(pages 349 / 350, #4 to #6)

6. b)



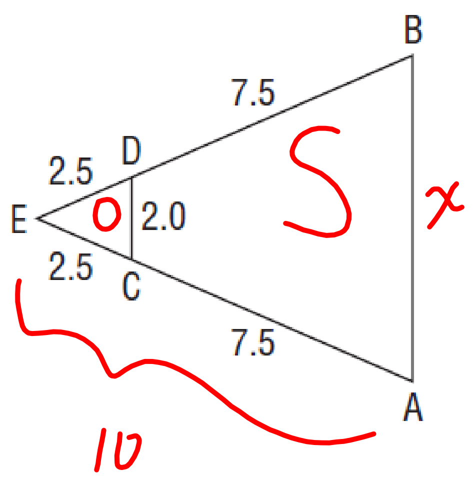
$$SF = \frac{s}{o} = \frac{12}{15} = \frac{4}{5} = 0.8$$

$$AB = \frac{4}{\cancel{5}_{1}} \times \frac{\cancel{20}^{4}}{1} = 16$$

HOMEWORK QUESTIONS?

(pages 349 / 350, #4 to #6)

6. c)



$SF = \frac{S}{O}$

$= \frac{10}{2.5}$

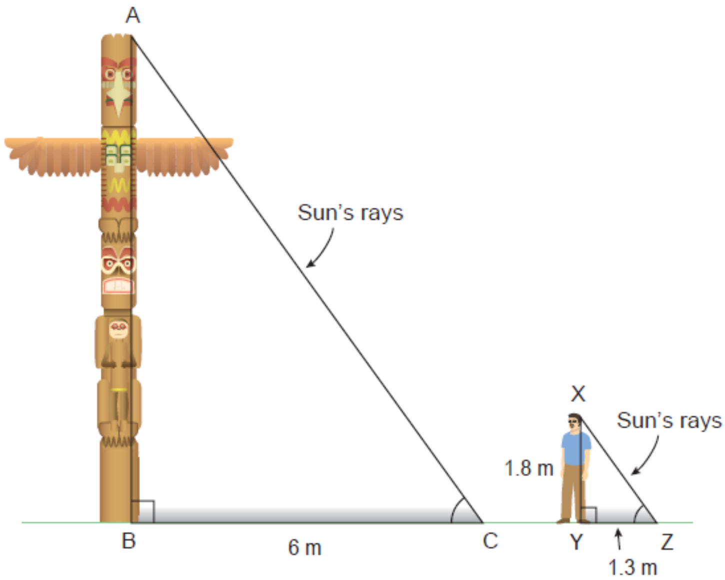
$= 4$

$AB = 2 \times 4$

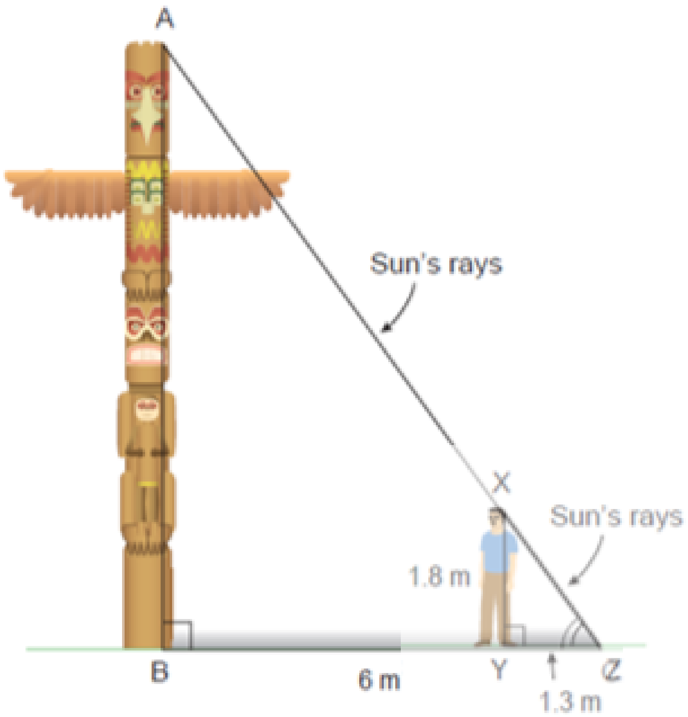
$= 8$

EXAMPLE -*MMS9*, PAGE 346:

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?

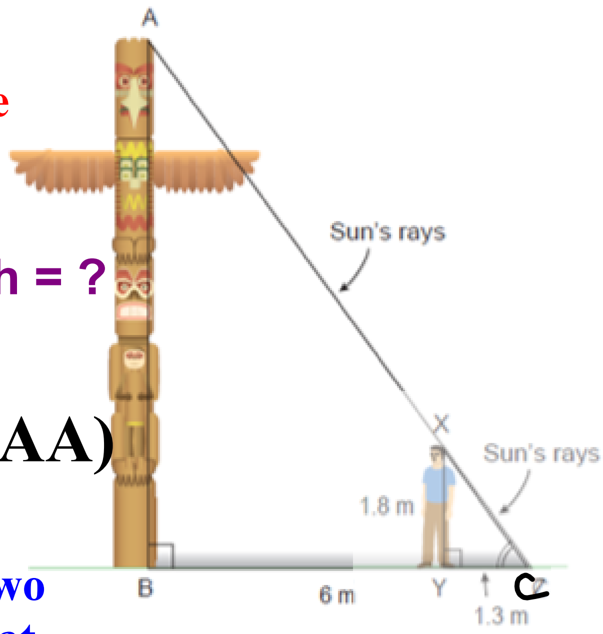


Merge these 2 diagrams together to see how the sun's rays work:



Now, you can prove that the 2 triangles are similar to determine the height of the totem pole:

h = ?



<B = <Y (given)
<C = <C (common)
<A = <X (SATT)

$\therefore \triangle ABC \sim \triangle XYC$ **(AAA)**

Now that we have proven these two triangles are similar, we know that their corresponding sides are proportional. We use two pairs of corresponding sides to determine the height of the totem pole:

$$\frac{AB}{XY} = \frac{BC}{YZ}$$
$$\frac{h}{1.8} = \frac{6}{1.3}$$
$$\frac{1.3h}{1.3} = \frac{10.8}{1.3}$$
$$h \doteq 8.3076...$$
$$h \doteq 8.3 \text{ m}$$

OR

$$SF = \frac{s}{o} = \frac{6}{1.3} \doteq 4.6154$$

$$h \doteq 1.8(4.6154) \doteq 8.30772 \doteq 8.3 \text{ m}$$

CONCEPT REINFORCEMENT:

MMS9:

PAGE 350: #9 (the "PROOF" of similarity is required before finding the tree heights)