MAT-222-840

# Activities for Chapter 7.3-5

Name: Solutions

Summer 2016

Date: _____

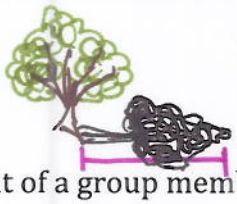
## Activity 1: Using Shadows to Determine the Height of a Tree

For this activity, you will need a tape measure. a tree, and a sunny day.

1. Find a tree (or some other tall object, like a building) on level ground with a visible shadow.
2. Before you begin, guess or estimate the height of your tree in feet:

20 ft?

3. Measure the length of the shadow of the tree (from the base of the tree trunk to the shadow of the tip of the tree).



11.5 feet

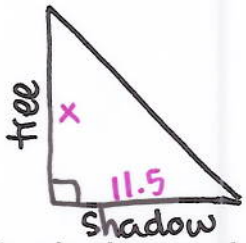
4. Measure the height of a group member.

5ft 8 in ≈ 5.7 ft

5. Measure the length of that group member's shadow.

4 ft 3 in = 4.25 ft

6. Sketch the two similar triangles in this situation.





7. Explain why the triangles are similar. (What postulate guarantees this?)

The sun hits the tree & the person at the same angle, and both are at right angles to the ground, so AA~ guarantees the triangles are similar.

8. Use your similar triangles to find the height of your tree.

$$\frac{x}{11.5} = \frac{5.7}{4.25}$$

$$4.25x = 65.55$$

$$\boxed{x = 15.4 \text{ ft}}$$

Note: You can set up the proportion in lots of different ways to get the same answer, like:

$\frac{5.7}{x} = \frac{4.25}{11.5}$ or $\frac{4.25}{5.7} = \frac{11.5}{x}$

## Activity 1 (Alternate): Measuring Distances by "Sighting"

For this activity, you need a ruler, a yardstick, and a tape measure.

1. Stand a yardstick on end on the edge of a chalkboard.
2. Stand back, away from the yardstick, in a location where you can see the yardstick. Your goal is to find your distance to the yardstick. Guess or estimate this distance before you continue.

10 ft?

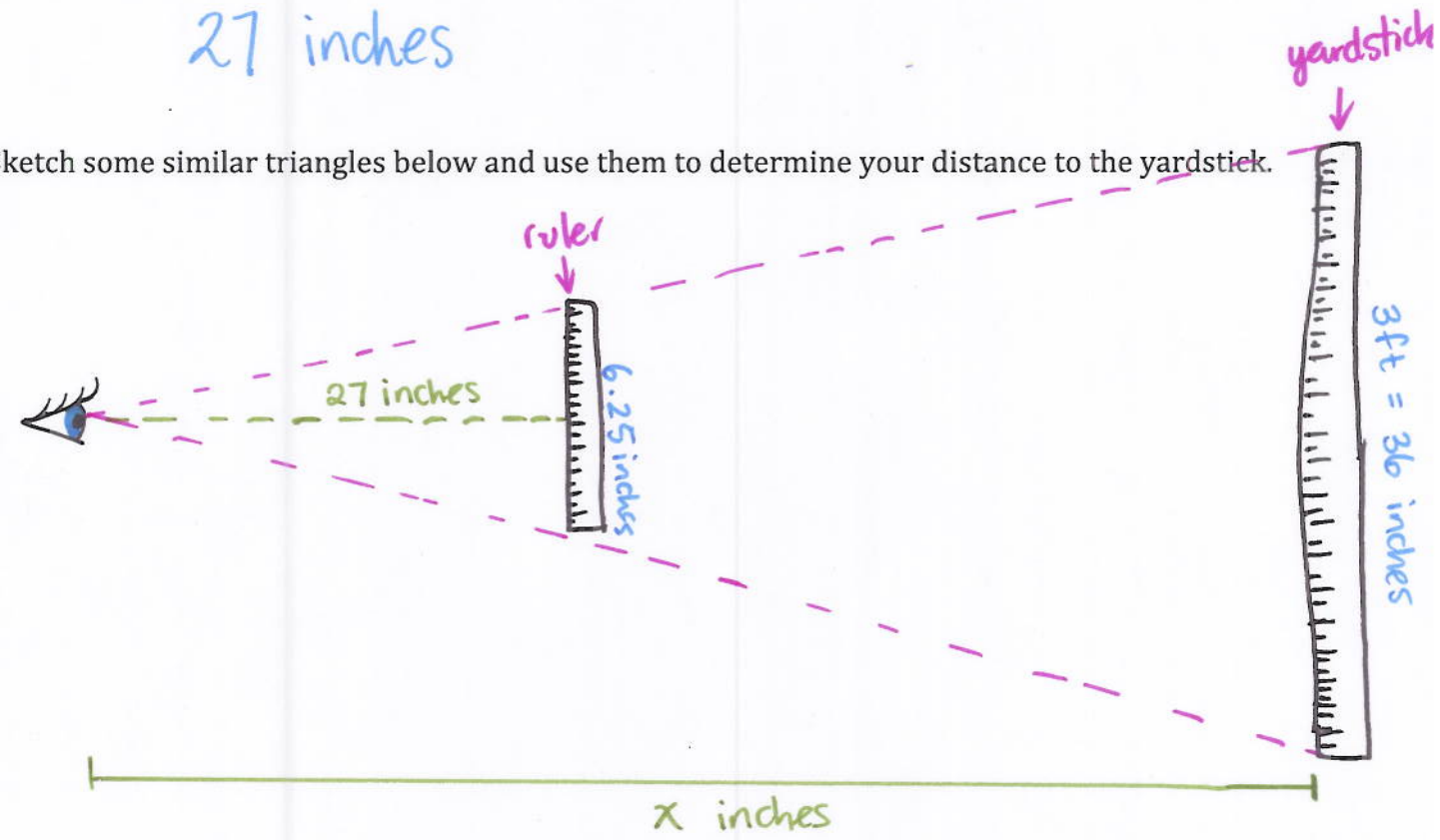
3. Hold your ruler in front of you with an outstretched arm. Make the ruler vertical, so that it is parallel to the yardstick. Close one eye, and with your open eye, "sight" the ruler to the yardstick. Use the ruler to determine how big the yardstick appears to be from your location.

6.25 inches

4. With your arm still stretched out in front of you, have a classmate measure the distance from your sighting eye to the ruler.

27 inches

5. Sketch some similar triangles below and use them to determine your distance to the yardstick.




$$\frac{27}{6.25} = \frac{x}{36}$$

$6.25x = 972$

$x = 155.52$ in

$x \approx 13$ ft

## Activity 2: Sorting for Similarity

You will need an envelope with triangle cards for this activity.

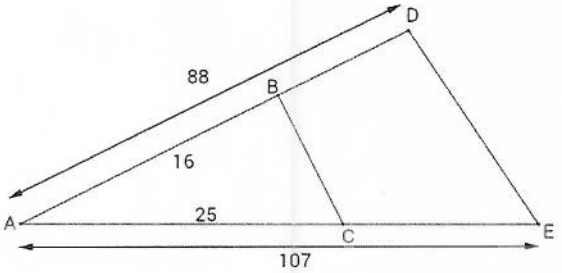
Sort the cards into the following three categories: "Similar," "Not Similar," and "Cannot be determined."

- For the "Similar" cards, write a similarity statement and the postulate that proves the triangles are similar.
- For the "Not Similar," show how you determined that they were not similar.
- For "Cannot be determined," give a piece of information that, if added to the figure, would mean the triangles were similar.

*NOTE: DO NOT ASSUME THAT THE TRIANGLES ARE DRAWN TO SCALE.*

| Similar | Not Similar | Cannot be determined |
|---|---|---|
| 2. $\triangle KJL \sim \triangle MNO$ by SSS$\sim$ because $\frac{72}{12} = \frac{84}{14} = \frac{48}{8}$ | 1. $\triangle ABC \not\sim \triangle ADE$ because $\frac{88}{16} \neq \frac{107}{25}$ | 3. We don't know if $\overline{QS} \cong \overline{SR}$. (But if it was, the triangles would be similar.) |
| 4. $\triangle TVZ \sim \triangle WUZ$ by SAS$\sim$ because $\frac{49}{14} = \frac{28}{8}$ and $\angle Z$'s are vertical. | 5. $\triangle ADB \not\sim \triangle ABC$ because they have different angles. | 8. Even though $\frac{18}{42} = \frac{9}{21}$ and $\angle T \cong \angle V$, the angle is not included. If we knew $\angle U \cong \angle W$, the triangles would be similar |
| 6. $\triangle GHI \sim \triangle JKI$ by AA$\sim$ because $\angle G$ & $\angle J$ are corresponding angles & $\angle I$ is shared. | 9. $\triangle ADE \not\sim \triangle CBE$ because $\triangle CBE$ is isosceles but $\triangle ADE$ is not. | |
| 7. $\triangle ADE \sim \triangle ABC$ by SSS$\sim$ because $\frac{96}{36} = \frac{24+40}{24} = \frac{45+27}{27}$ | | |
| 10. $\triangle FHG \sim \triangle IJK$ by SAS$\sim$ because $\frac{27}{9} = \frac{30}{10}$ and $\angle H \cong \angle J$ | | |

1.

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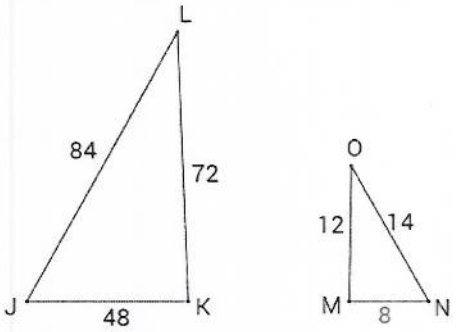


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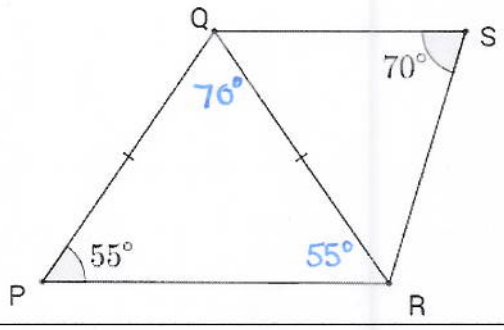


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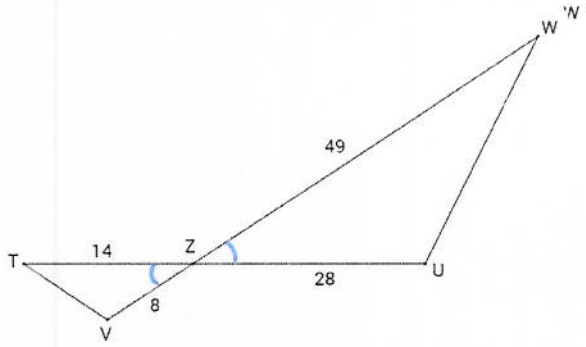


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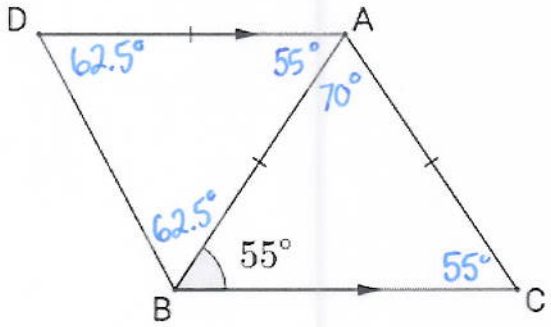


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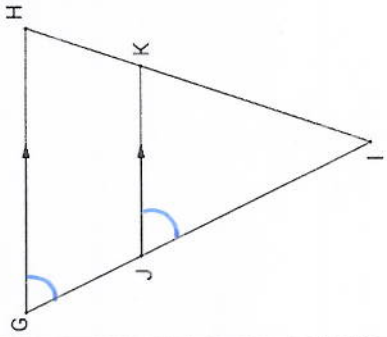


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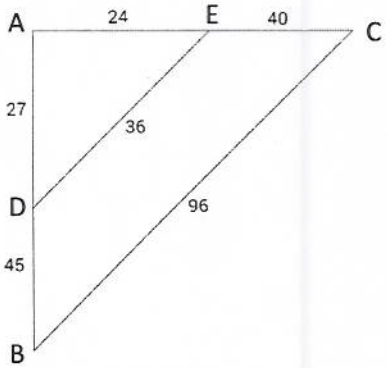


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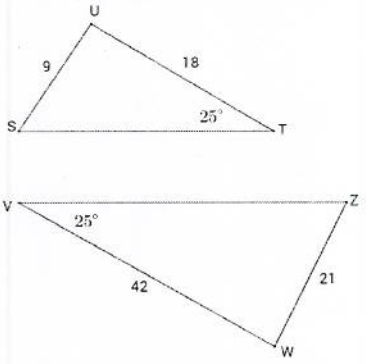


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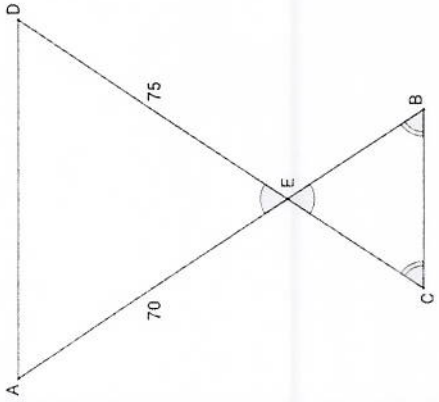


10.