Name_____ Math 8
Date_____ Geometry 13

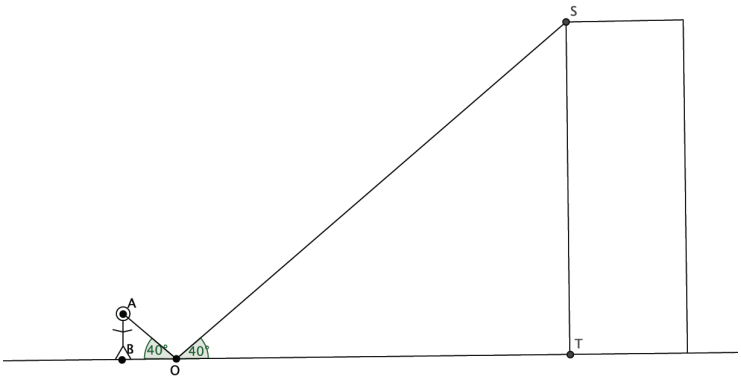
More Similarity - Triangle Applications

AA Similarity

If two angles of a triangle are congruent to two angles of a second triangle, then the remaining angles must be congruent as well (since the sum of the angles of a triangle is 180°). **Since the angles are congruent, then the triangles must be similar.**
If the triangles are similar, then the sides are proportional.

Examples:

1. You want to determine the approximate height of one of the tallest buildings in the city. You are told that if you place a mirror some distance from yourself so that you can see the top of the building in the mirror, then you can indirectly measure the height using similar triangles. Let O be the location of the mirror so that the figure shown can see the top of the building.



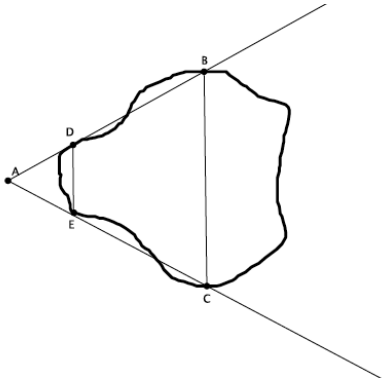
a. Explain why $\triangle ABO \sim \triangle STO$.

b. Label the diagram with the following information: The distance from eye-level to the ground is 5.3 feet. The distance from the figure to the mirror is 7.2 feet. The distance from the figure to the base of the building is $1{,}750$ feet. The height of the building will be represented by x.

c. What is the distance from the mirror to the building?

d. Do you have enough information to determine the approximate height of the building? If yes, determine the approximate height of the building. If not, what additional information is needed?

2. A geologist wants to determine the distance across the widest part of a nearby lake. The geologist marked off specific points around the lake so that line DE would be parallel to line BC. The segment BC is selected specifically because it is the widest part of the lake. The segment DE is selected specifically because it was a short enough distance to easily measure. The geologist sketched the situation as shown below:

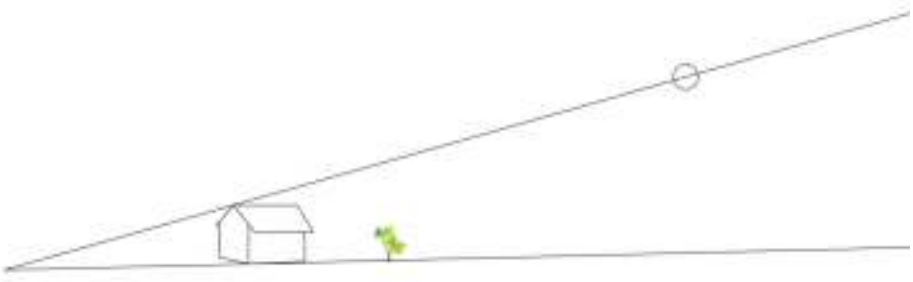


   a. Has the geologist done enough work so far to use similar triangles to help measure the widest part of the lake? Explain.

   b. The geologist has made the following measurements: $|DE| = 5$ feet, $|AE| = 7$ feet, and $|EC| = 15$ feet. Does she have enough information to complete the task? If so, determine the length across the widest part of the lake. If not, state what additional information is needed.

   c. Assume the geologist could only measure a maximum distance of 12 feet. Could she still find the distance across the widest part of the lake? What would need to be done differently?

3. A tree is planted in the backyard of a house with the hope that one day it will be tall enough to provide shade to cool the house. A sketch of the house, tree, and sun is shown below.



   a. Assume that the sun casts a shadow 32 feet long from a point on top of the house to a point in front of the house. The distance from the end of the house's shadow to the base of the tree is 53 feet. If the house is 16 feet tall, how tall must the tree get to provide shade for the house?

   b. Assume that the tree grows at a rate of 2.5 feet per year. If the tree is now 7 feet tall, about how many years will it take for the tree to reach the desired height?