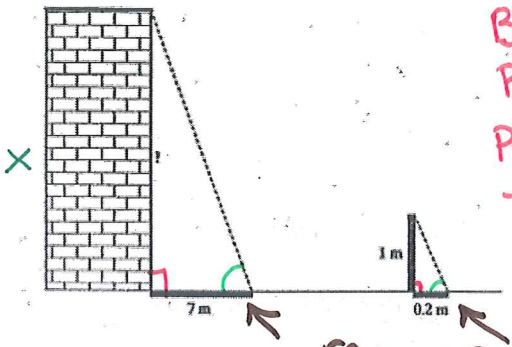
Indirect Measurement Notes- Geometry

Using Similar Triangles

Mrs. Smith's class is using the shadow method to estimate the height of their school building. They have made the following measurements and sketch:

Length of the meterstick = 1 m
Length of the meterstick's shadow = 0.2 m
Length of the building's shadow = 7 m



Use what you know about similar triangles to find the building's height from the given measurements. Explain your work.

Big Δ

$\frac{\text{height}}{\text{height}} = \frac{\text{shadow}}{\text{shadow}}$

little Δ

$\frac{x}{1} = \frac{7}{0.2}$

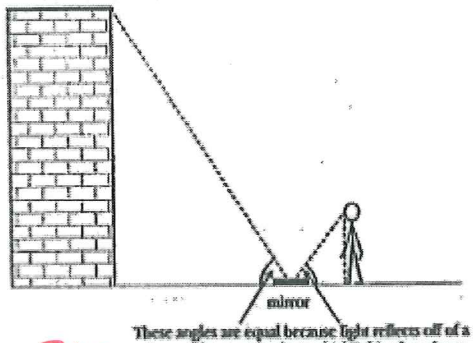
$0.2x = 7$

$x = 35\text{m}$

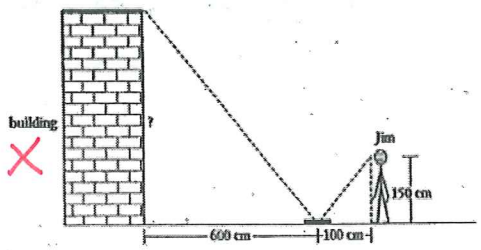
In a perfect world Buildings, trees, People are all ⊥ Perpendicular to the ground so Right ∠s are ≅

ray of sun hits ground at some angle ∴ AA Similarity.

Jim and Sally, students in Mrs. Smith's class, are using the mirror method to estimate the height of their school building. They have made the following measurements and sketch:



Height from the ground to Jim's eyes = 150 cm
Distance from the middle of the mirror to Jim = 100 cm
Distance from the middle of the mirror to the building = 600 cm



Big

$\frac{\text{height}}{\text{height}} = \frac{\text{to mirror}}{\text{to mirror}}$

little

$\frac{x}{150} = \frac{600}{100}$

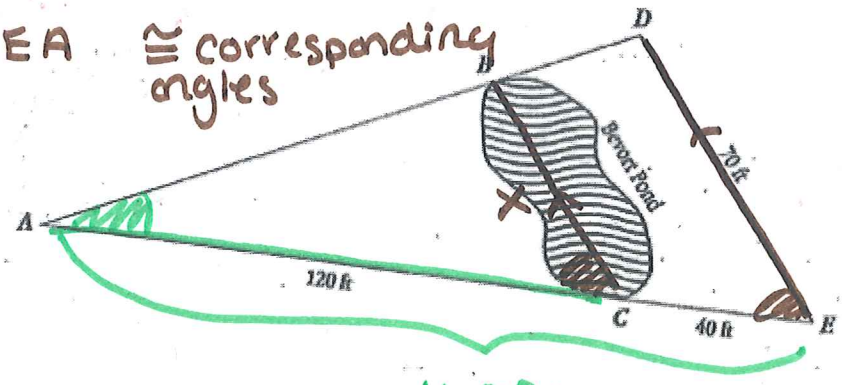
$x = 900\text{cm}$

Mrs. Smith's class went to Beaver Pond for a picnic. Darnell, Angie, and Trevor wanted to find the distance across the pond. Darnell and Angie suggested that Trevor swim across with the end of a tape measure in his mouth. Trevor declined - the water was very cold! They decided to try to use what they had learned about similar triangles to find the distance across the pond. They drew a diagram and started making the necessary measurements.

Here is the diagram Darnell, Angie, and Trevor made, including their measurements.

$\angle A \cong \angle A$ reflexive

$\angle BCA \cong \angle DEA$ $\cong$ corresponding angles



160ft
must use full Δ sides

$$\frac{70}{x} = \frac{160}{120}$$

$x = 52.5$ ft