Solving Similar Triangle Problems

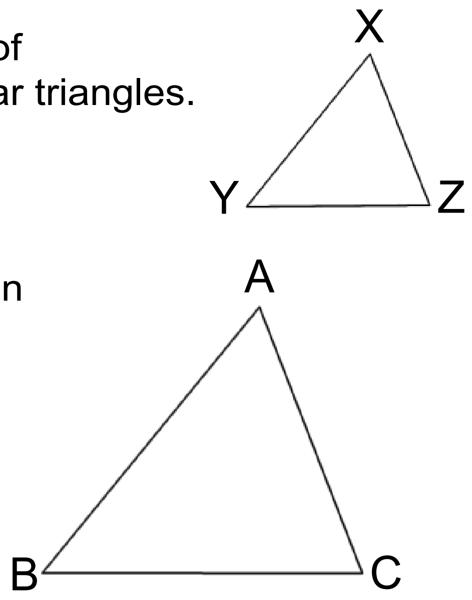
May 10, 2016

The scale factor is the ratio of corresponding sides in similar triangles.

If $\Delta XYZ \sim \Delta ABC$,
and n is the scale factor, then

$$n = \frac{AB}{XY}$$

* we often write the scale factor using the larger side over the smaller side



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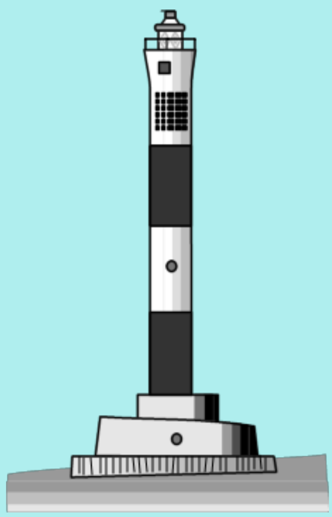
Suppose you are asked to find the height of a building (or a lighthouse) using only a metre stick and a piece of chalk.

How would you do it?



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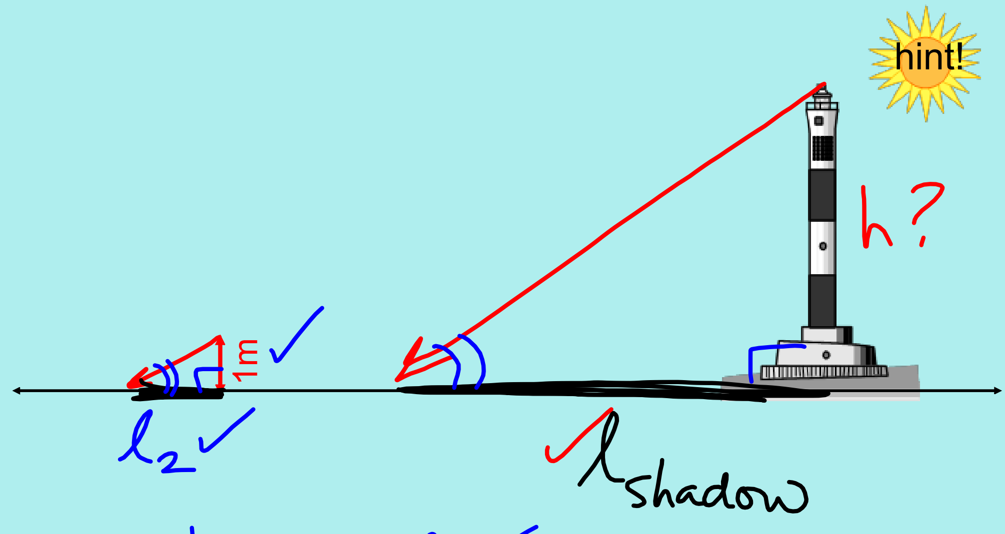

$$\frac{h}{1} = \frac{l_s}{l_2}$$

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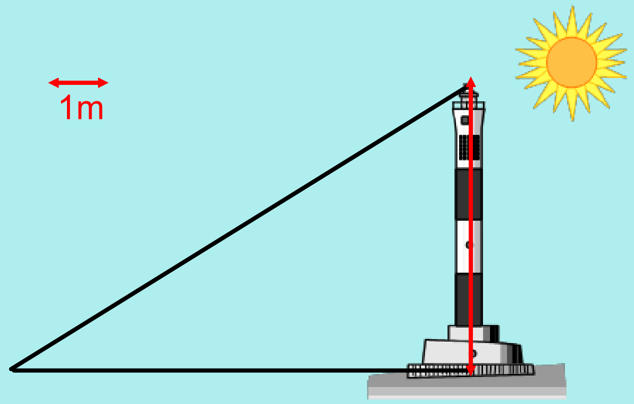

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Similar triangles and the scale factor can be used to determine distances that are difficult (or impossible) to measure directly.

For example,
- distances across rivers and canyons
- heights of tall structures (artificial or natural)
- distances in outer space.

Steps:

1. Show triangles are similar using:
   SSS~, SAS~, or AA~

2. Use properties of similar triangles to determine unknown quantities:
   - corresponding angles are equal
   - corresponding sides are proportional

If $\Delta ABC \sim \Delta XYZ$, $\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$

$\angle A = \angle X$
$\angle B = \angle Y$
$\angle C = \angle Z$

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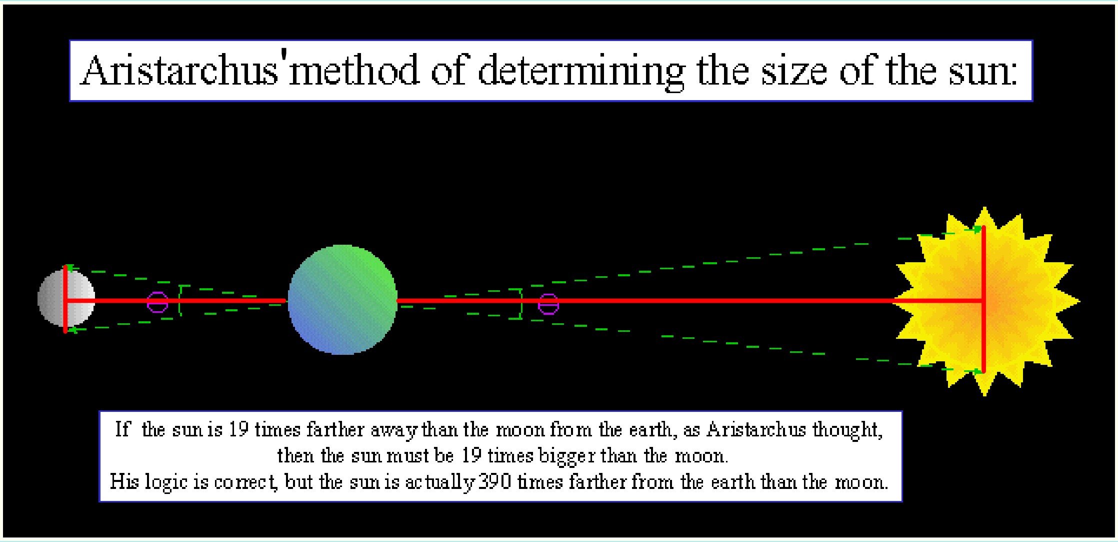

Why is Aristarchus' logic correct?

Aristarchus also reasoned that since the Sun and the Moon have the same angular size, but the Sun is 19 times further (or so he thought), then the Sun must be 19 times bigger than the Moon.

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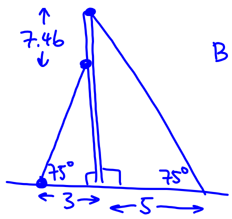
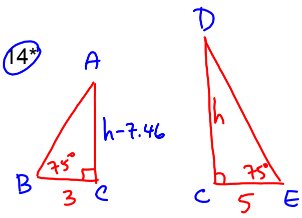
Assigned Work:

p.386 # 4, 6, 9, 12, 14*

9.





$\Delta ABC \sim \Delta DEC$ (AA~)

$$\frac{AB}{DE} = \frac{BC}{EC} = \frac{AC}{DC}$$

$$\frac{AB}{DE} = \boxed{\frac{3}{5} = \frac{h-7.46}{h}}$$

$$3h = 5(h-7.46)$$

$$3h = 5h - 37.3$$

$$\frac{37.3}{2} = \frac{2h}{2}$$

$$h = 18.65$$

$\therefore$

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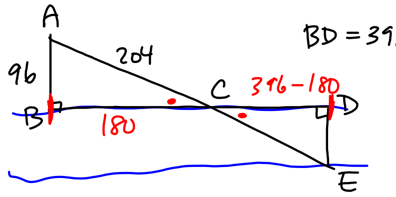
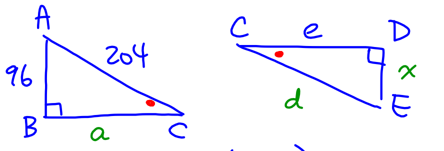
14.



$BD = 396$



$\triangle ABC \sim \triangle EDC$ (AA~)

$$\frac{AB}{ED}=\frac{BC}{DC}=\frac{AC}{EC}$$

$$\frac{96}{x}=\frac{a}{e}=\frac{204}{d}$$

$$a^2+96^2=204^2$$
$$a^2=204^2-96^2$$
$$a^2=32400$$
$$a=180$$

$$e=396-180$$
$$=216$$

$$\frac{96}{x}=\frac{180}{216} \qquad \frac{180}{216}=\frac{204}{d}$$

$x=$ ____ $\qquad d=$ ____

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Attachments

MPM 2D (L39- Scale Factor (GSP)).gsp

02 Scale Factor - GSP.gsp