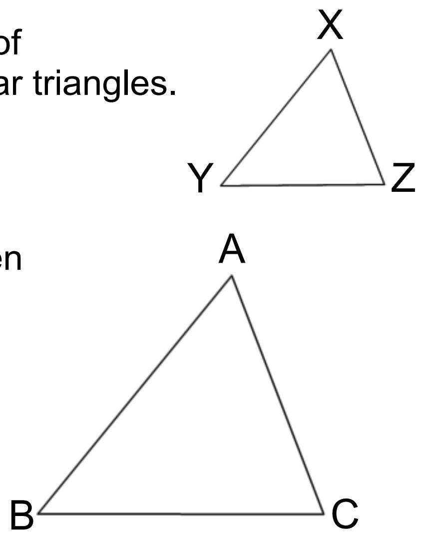
Solving Similar Triangle Problems

Dec 8/2011

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



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

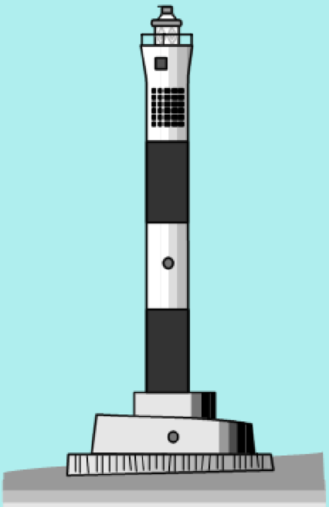
$$n = \frac{AB}{XY}$$

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

May 9 - 6:45 PM

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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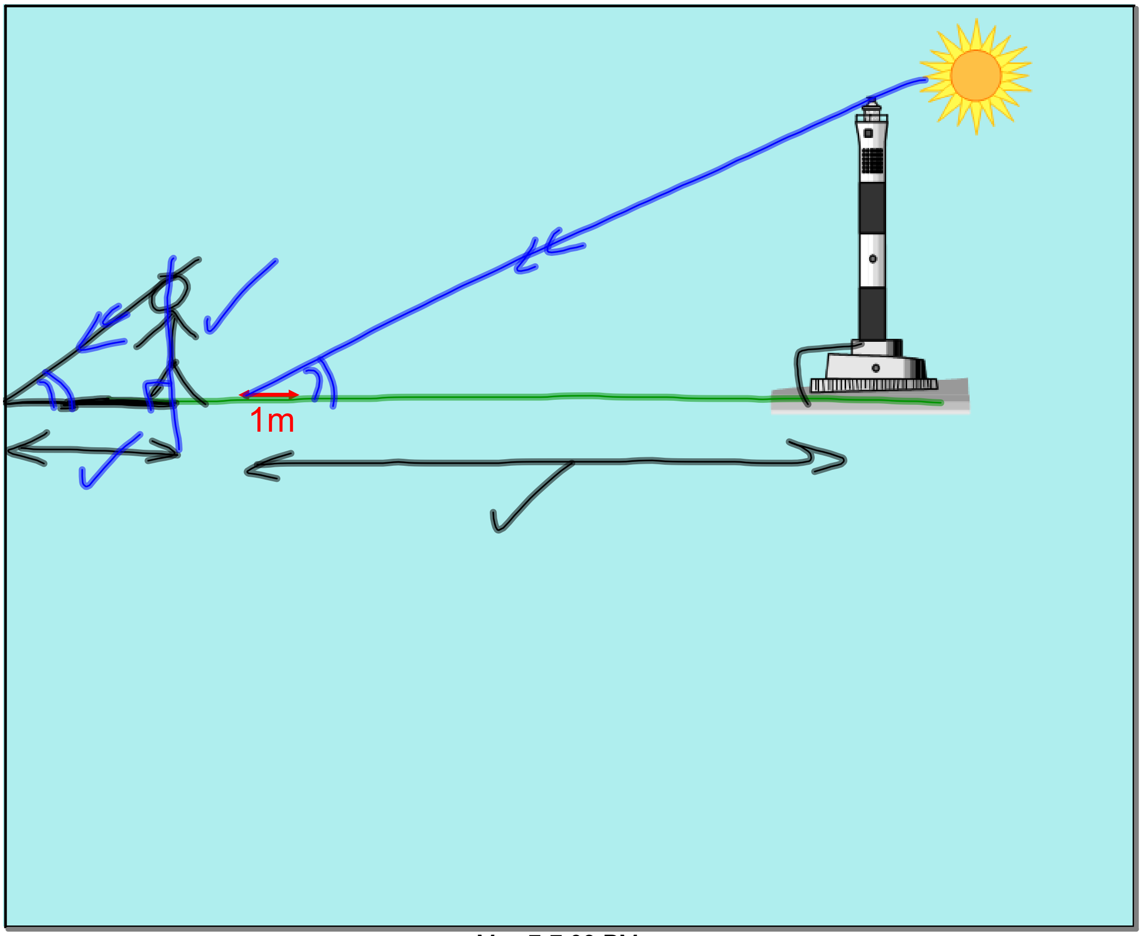

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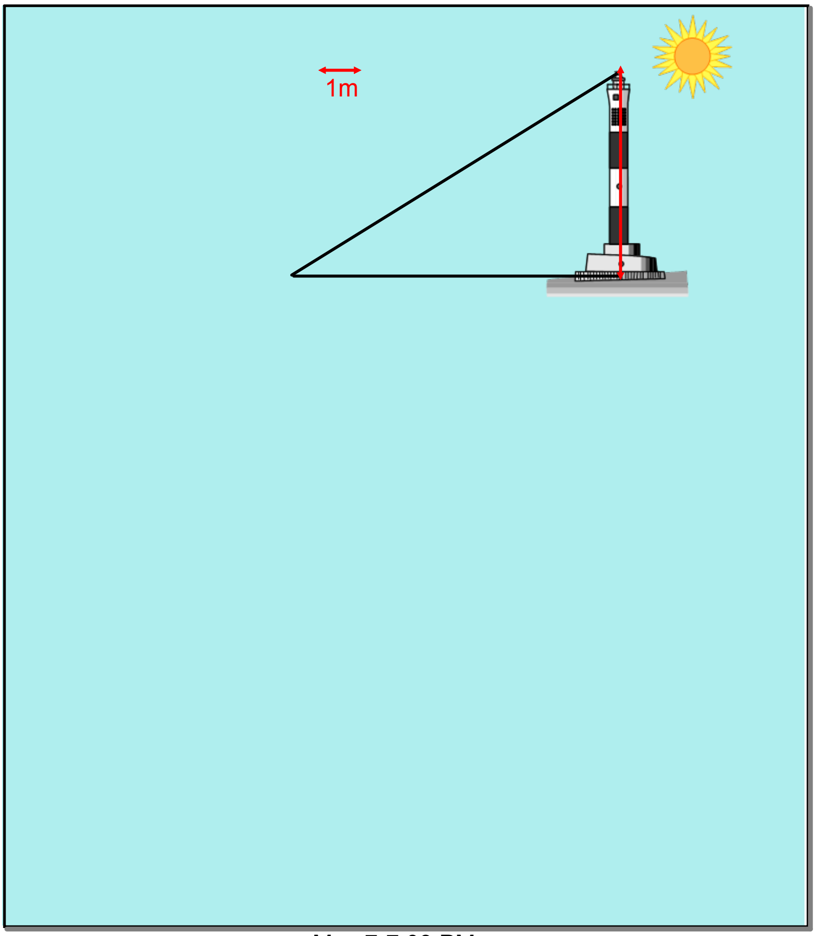

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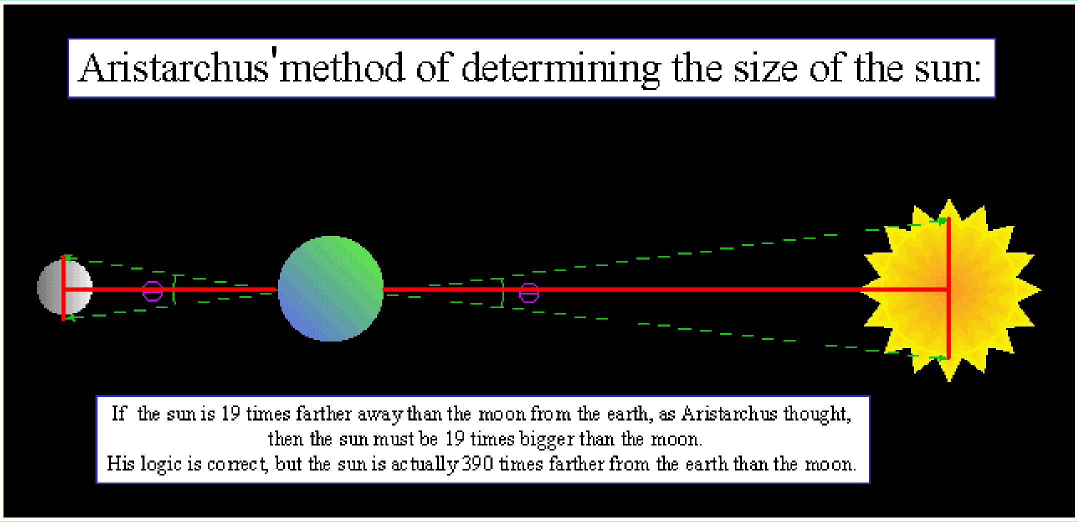

Why is Aristarchus' logic correct?

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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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 buildings or structures
- 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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Assigned Work:

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

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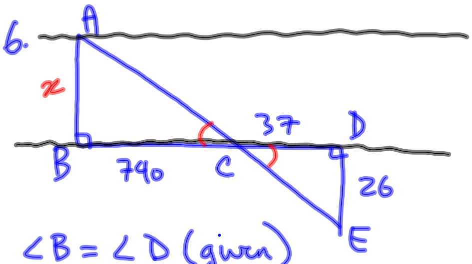
6.



$\angle B = \angle D$ (given)

$\angle BCA = \angle DCE$ (opposite angles)

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

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

$$\frac{x}{26} = \frac{740}{37}$$

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$$37x = 26(740)$$

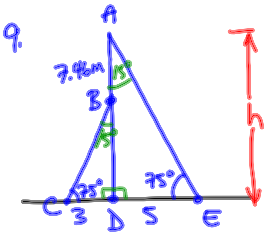
$$x = \frac{26(740)}{37}$$

$$x = 520$$

$\therefore$ the width of the gorge is 520 m.

Dec 9-9:12 AM

9.



$BD + 7.46 = h$
$BD = h - 7.46$

$\triangle BCD \sim \triangle AED$ (by AA~)

$$\cancel{\frac{BC}{AE}} = \frac{CD}{ED} = \frac{BD}{AD}$$

$$\frac{3}{5} = \frac{(h-7.46)}{h}$$

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

$$3h = 5h - 37.3$$

$$-5h \quad -5h$$

$$-2h = -37.3$$

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

$$h = 18.65$$

∴ the height of the pole is 18.65m

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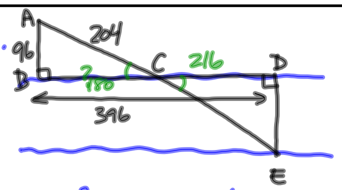
14.



$(\text{side } 1)^2 + (\text{side } 2)^2 = (\text{hypotenuse})^2$

$$AB^2 + \underset{?}{\underline{BC^2}} = AC^2$$

$$96^2 + BC^2 = 204^2$$

$$BC^2 = 204^2 - 96^2$$

$$BC^2 = 32400$$

$$BC = 180$$

$$CD = 396 - 180$$
$$= 216$$

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

$$\frac{DE}{96} = \frac{216}{180}$$

$$180\,DE = 96(216)$$

$$DE = \frac{96(216)}{180}$$

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Attachments

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

02 Scale Factor - GSP.gsp