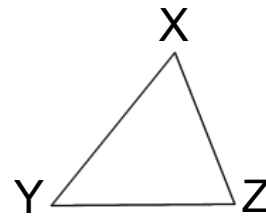


Solving Similar Triangle Problems

May 10, 2016

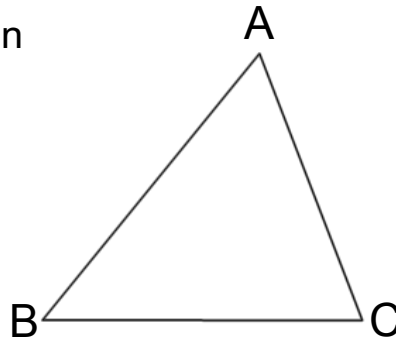
The **scale factor** is the ratio of corresponding sides in similar triangles.



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

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

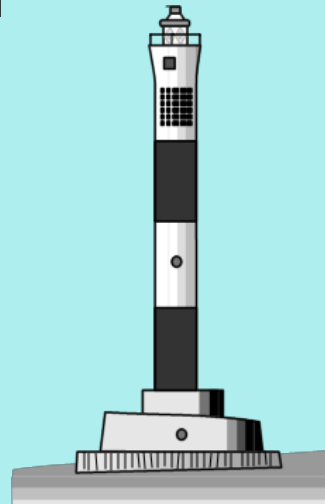
* we often write the scale factor using the larger side over the smaller side



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?



May 7-7:03 PM

A diagram illustrating similar triangles for height measurement. On the left, a small right-angled triangle has a vertical leg labeled "1m" and a horizontal leg labeled "l₂". On the right, a larger right-angled triangle has a vertical leg labeled "h?" and a horizontal leg labeled "l_{shadow}". A red line representing the sun's rays connects the top of the small triangle to the top of the lighthouse. A sun icon with the word "hint!" is in the upper right. Blue checkmarks are next to the "1m" and "l₂" labels. A red checkmark is next to the "l_{shadow}" label.

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

May 7-7:03 PM

A diagram showing a lighthouse on the right with a shadow cast to the left. A sun icon is in the upper right. A red double-headed arrow above the shadow is labeled "1m". A red vertical line is drawn on the lighthouse tower.

May 7-7:03 PM

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

$$\text{If } \triangle ABC \sim \triangle XYZ, \quad \frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ} \quad \begin{array}{l} \angle A = \angle X \\ \angle B = \angle Y \\ \angle C = \angle Z \end{array}$$

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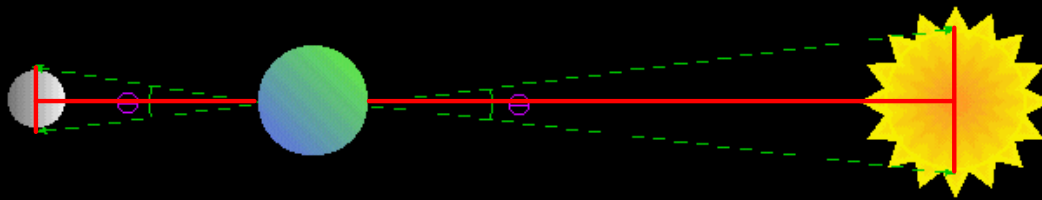
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May 7-7:34 PM

Aristarchus' method of determining the size of the sun:



If the sun is 19 times farther away than the moon from the earth, as Aristarchus thought, then the sun must be 19 times bigger than the moon. His logic is correct, but the sun is actually 390 times farther from the earth than the moon.

Why is Aristarchus' logic correct?

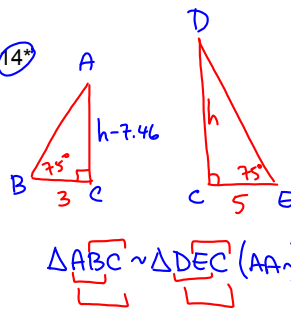
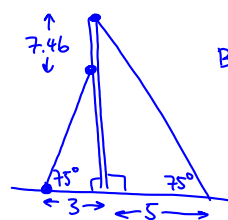
Aristarchus also reasoned that since the Sun and the Moon have the same angular size, but the Sun is 19 times further (or so he thought), then the Sun must be 19 times bigger than the Moon.

May 9 - 1:17 PM

Assigned Work:

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

9.



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

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

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

$$3h = 5h - 37.3$$

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

$$h = 18.65$$

∴ _____

May 9 - 8:41 PM

14.

$BD = 396$

96 204 180 $396 - 180$

A B C D E

A B C D E

96 204 a e d x

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

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

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

$$a^2 + 96^2 = 204^2$$

$$a^2 = 204^2 - 96^2$$

$$a^2 = 32400$$

$$a = 180$$

$e = 396 - 180$
 $= 216$

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

$$\frac{180}{216} = \frac{204}{d}$$

$x = \underline{\hspace{2cm}}$ $d = \underline{\hspace{2cm}}$

May 11-12:41 PM

Attachments

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

02 Scale Factor - GSP.gsp