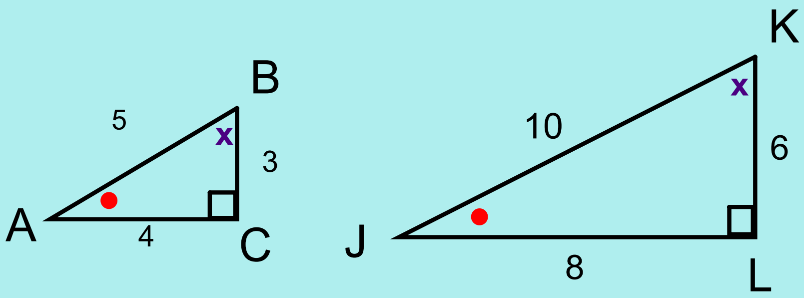
With similar triangles, the ratios of corresponding sides are equal, and corresponding angles are equal.

$\Delta ABC \sim \Delta JKL$

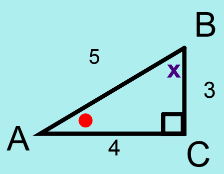


$$\frac{AB}{JK}=\frac{BC}{KL}=\frac{AC}{JL}$$

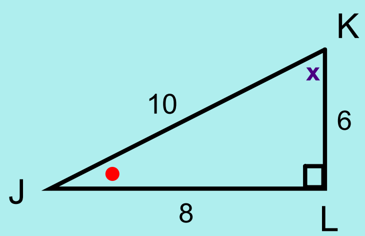
$$\angle A = \angle J$$
$$\angle B = \angle K$$
$$\angle C = \angle L$$

Dec 8-9:57 PM

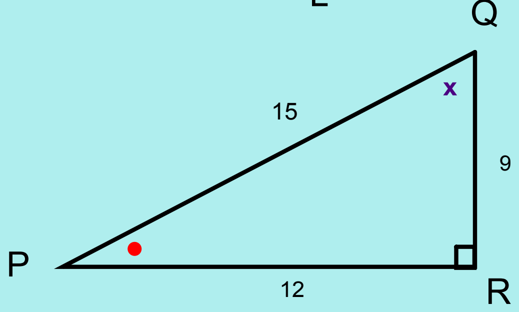
What about ratios of sides <u>within</u> triangles?



$$\frac{BC}{AC}=\frac{3}{4}=0.75$$



$$\frac{KL}{JL}=\frac{6}{8}=0.75$$



$$\frac{QR}{PR}=\frac{9}{12}=0.75$$

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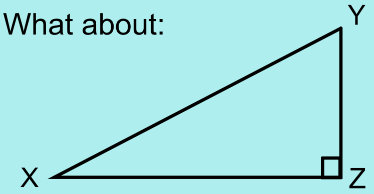
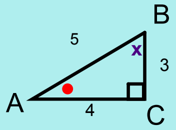
What about:



$$\frac{YZ}{XZ} = 0.75$$

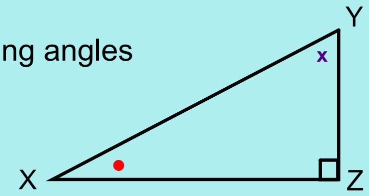


$$\frac{BC}{AC} = 0.75$$

Are these triangles similar?

If they are similar, what does that tell us?

The corresponding angles must be equal.



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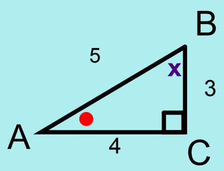
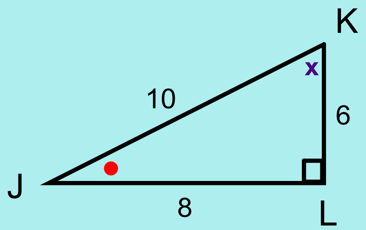
With similar triangles, we work with ratios of sides between the different triangles.





What happens when we calculate ratios for sides within each triangle?

For example: $\frac{BC}{AC} = \frac{3}{4} = 0.75$ $\frac{KL}{JL} = \frac{6}{8} = 0.75$

In right-triangles, the ratios of sides are related to the angles. When matching ratios are equal, the angles are equal.

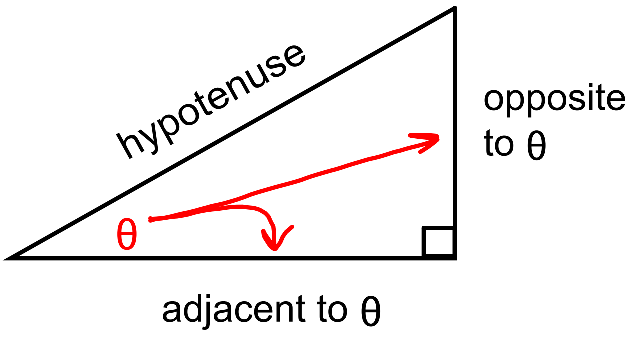
Dec 7-9:08 PM

Ratios in Right-Triangles

May 11/2016

To be consistent when finding ratios for a right-triangle, the sides have to be identified with respect to the angle of interest (never the 90° angle).

θ is the Greek letter "theta"



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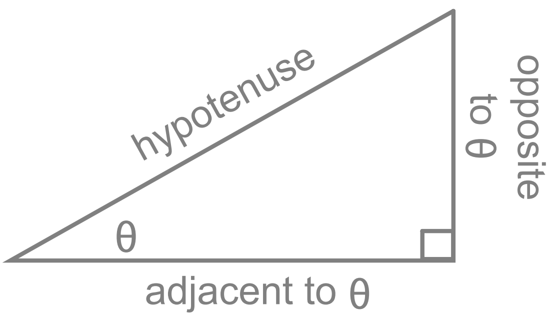
For any angle of interest, there are three (3) primary trigonometric ratios.

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$



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To remember the trigonometric ratios:

S o h C a h T o a

A mnemonic is a memory device

$\sin\theta = \frac{opp}{hyp}$ $\cos\theta = \frac{adj}{hyp}$ $\tan\theta = \frac{opp}{adj}$

$S\frac{o}{h}C\frac{a}{h}T\frac{o}{a}$

Dec 8-10:24 PM

The study of the ratios of triangle sides dates back as far as 140 BCE, with the Greek mathematician Hipparchus.

There are 6 possible ratios for each triangle. The most important form the three primary trigonometric ratios.

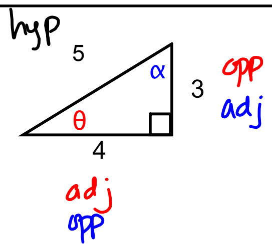
The decimal value of each trigonometric ratio corresponds to a particular angle.

Handout: Trigonometric Table

Dec 7-10:11 PM

Ex.1 Find all trig ratios for θ and α.
Express as a decimal.
Are the angles θ and α equal?

SohCahToa



$\sin\theta = \frac{opp}{hyp} = \frac{3}{5} = 0.6$

$\cos\theta = \frac{adj}{hyp} = \frac{4}{5} = 0.8$

$\tan\theta = \frac{opp}{adj} = \frac{3}{4} = 0.75$

$\sin\alpha = \frac{4}{5} = 0.8$

$\cos\alpha = \frac{3}{5} = 0.6$

$\tan\alpha = \frac{4}{3} \doteq 1.3333$

$\because \sin\theta \neq \sin\alpha$ $\therefore \theta \neq \alpha$

or $\cos\theta \neq \cos\alpha$

or $\tan\theta \neq \tan\alpha$

"not equal"

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Ex.2 Solve $\cos 70° = \frac{x}{15}$

$\frac{0.342}{1} \doteq \frac{x}{15}$

$x \doteq 15(0.342)$

$x \doteq 5.13$

$x = 15\cos 70°$

$x \doteq 5.1303$

$\boxed{\cos}$ 7 0 $\boxed{=}$

or

7 0 $\boxed{\cos}$

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You can also use a ratio to determine the angle.

Since $\sin 30° = 0.5$, then $\sin^{-1}(0.5) = 30°$

Find the $\sin^{-1}$ "sine inverse" button on the calculator

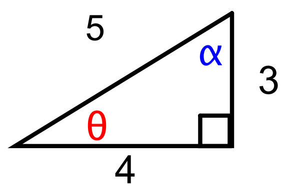
Ex.3 Solve using trig table or calculator

(a) $\sin \theta = 0.524$ (b) $\cos\theta = \frac{7}{8}$

$\theta \doteq 31.6°$

May 11-3:01 PM

Ex.4 Solve for θ and α.

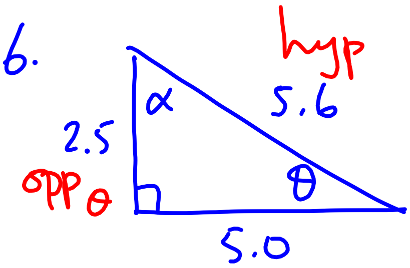


May 11-3:06 PM

Assigned Work:

p.398 # 2, 3, 6, 7, 8abc, 9, 10a, 11a, 13

6.



SohCahToa

(a) $\sin\theta = 0.4$

$$\sin\theta = \frac{opp}{hyp}$$
$$= \frac{2.5}{5.6}$$
$$\doteq 0.45$$

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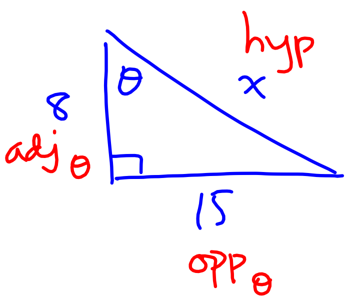
10 (a)



S^o_h C^a_h T^o_a

$$\sin\theta = \frac{15}{17}$$

$$\cos\theta = \frac{8}{17}$$

$$\tan\theta = \frac{15}{8}$$

$$x^2 = 8^2 + 15^2$$
$$x^2 = 64 + 225$$
$$x^2 = 289$$
$$x = 17$$

May 12-1:57 PM

Attachments

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

02 Scale Factor - GSP.gsp