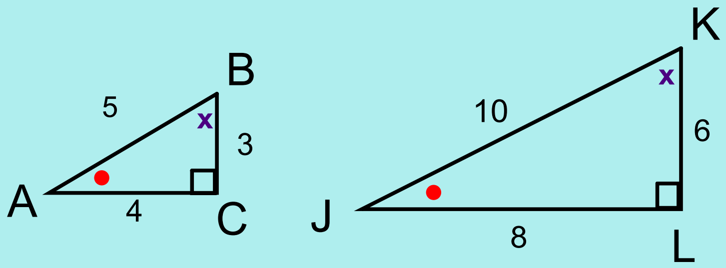
With similar triangles, the ratios of corresponding sides are equal, and corresponding angles are equal.

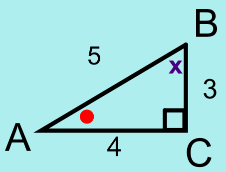
ΔABC ~ ΔJKL



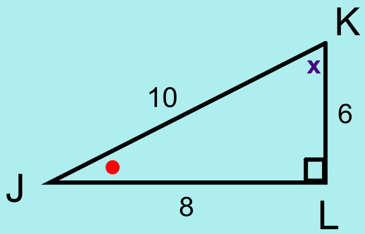
$$\frac{AB}{JK}=\frac{BC}{KL}=\frac{AC}{JL}$$

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

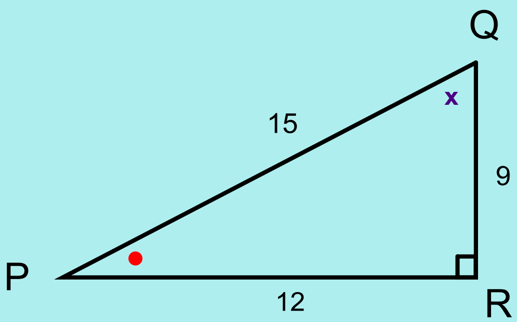
Dec 8-9:57 PM



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



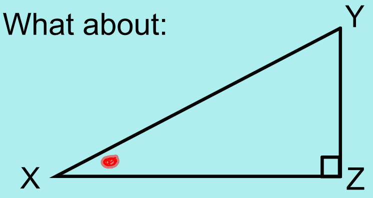
$$\frac{KL}{JL}=\frac{6}{8}=0.75$$



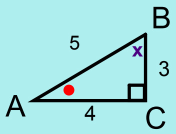
$$\frac{QR}{PR}=\frac{9}{12}=0.75$$

Dec 7-9:08 PM

What about:



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

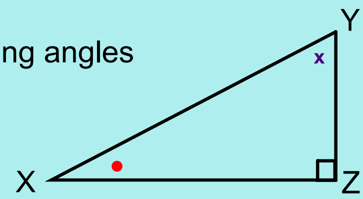


$$\frac{BC}{AC} = 0.75$$

Are these triangles similar?

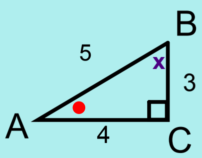
If they are similar, what does that tell us?

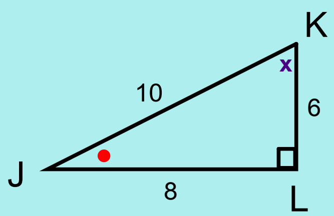
The corresponding angles must be equal.



Dec 7-9:08 PM

With similar triangles, we work with ratios of sides <u>between</u> the different triangles.





What happens when we calculate ratios for sides <u>within</u> each triangle?

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

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

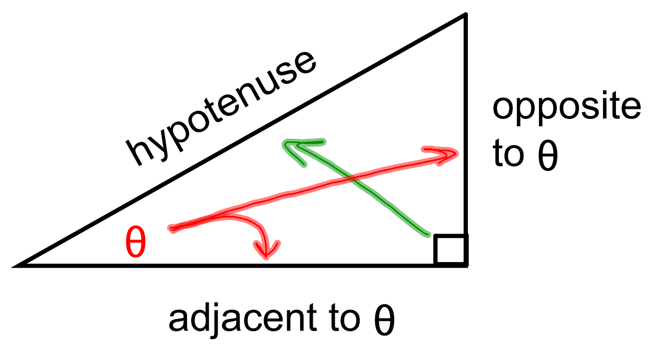
Dec 7-9:08 PM

Ratios in Right-Triangles

Dec 9/2011

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"



α
β
γ

Dec 7-9:58 PM

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

trig-o-no-metric

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

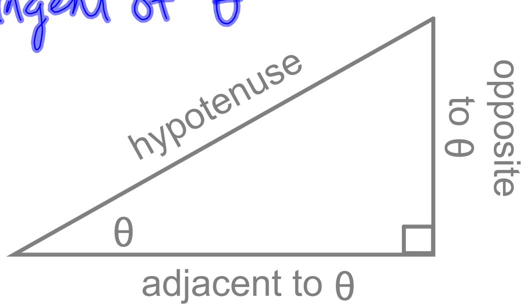
"sine of θ"

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

"cosine of θ"

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

"tangent of θ"



Dec 7-9:58 PM

To remember the trigonometric ratios:

S o h C a h T o a

A mnemonic is a memory device

$$\sin\theta = \frac{o}{h} \qquad \cos\theta = \frac{a}{h} \qquad \tan\theta = \frac{o}{a}$$

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.

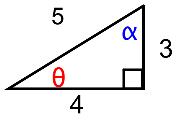
There are 6 possible ratios for each triangle. The most important form the three <u>primary trigonometric ratios</u>.

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?



"alpha"

$\sin\theta = \frac{o}{h} = \frac{3}{5} = 0.6$ $\cos\theta = \frac{a}{h} = \frac{4}{5} = 0.8$ $\tan\theta = \frac{o}{a} = \frac{3}{4} = 0.75$

$\theta \doteq 37°$ $\theta \doteq 37°$ $\theta \doteq 37°$

$\sin\alpha = \frac{o}{h} = \frac{4}{5} = 0.8$ $\cos\alpha = \frac{a}{h} = \frac{3}{5} = 0.6$ $\tan\alpha = \frac{o}{a} = \frac{4}{3} \doteq 1.3333$

$\sin\alpha = 0.8$
$\alpha = \sin^{-1}(0.8)$
$\alpha \doteq 53.1°$

Dec 8-10:55 PM

Ex.2 Solve $\cos 70° = \frac{x}{15}$

Dec 8-11:09 PM

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

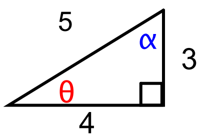
Ex.3 Solve using trig table or calculator

(a) $\sin\theta = 0.524$

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

May 11-3:01 PM

Ex.4 Solve for θ and α.



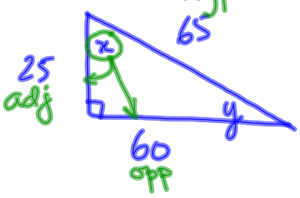
May 11-3:06 PM

Assigned Work:

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

Dec 8-11:10 PM

7.



(a) SohCahToa

$\sin x = \frac{60}{65}$

$\sin x = 0.9231$

$x \doteq 67°$

"inverse sine"

OR

$x = \sin^{-1}(0.9231)$

$\boxed{2nd}$ $\boxed{\sin}$ 0.9231 $\boxed{=}$

$x \doteq 67.4°$

Dec 12-10:30 AM

8(a) $\cos 45^\circ = \frac{x}{6}$

$\frac{0.7071}{1} \doteq \frac{x}{6}$

$x \doteq 6(0.7071)$

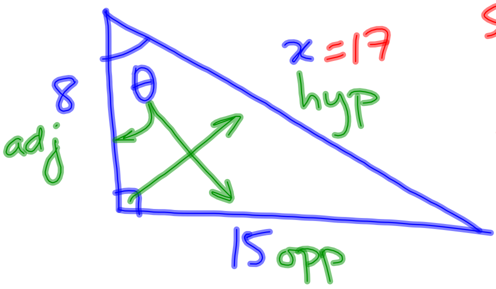
$x \doteq 4.2426$

$\boxed{x \doteq 4.2}$

Dec 12-10:37 AM

10 (a)

SohCahToa



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

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

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

$x^2 = 8^2 + 15^2$ (Pythagorean)

$x^2 = 64 + 225$

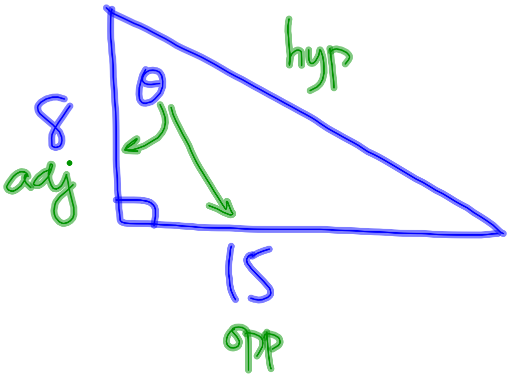
$x^2 = 289$

$x = \pm 17$, but $x > 0$ (length)

$\boxed{x = 17}$

Dec 12-10:40 AM

11. (a) So~~h~~ Ca~~h~~ Toa



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

$$\tan\theta = 1.875$$

$$\theta = \tan^{-1}(1.875)$$

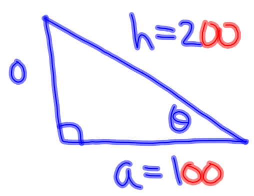
$$\theta \doteq 61.93^\circ$$

$$\theta \doteq 62^\circ$$

Dec 12-10:45 AM

13. $\cos 60^\circ = \frac{1}{2}$ $\quad \cos\theta = \frac{a}{h}$

$$\frac{a}{h} = \frac{1}{2}$$



Dec 12-10:49 AM

Attachments

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

02 Scale Factor - GSP.gsp