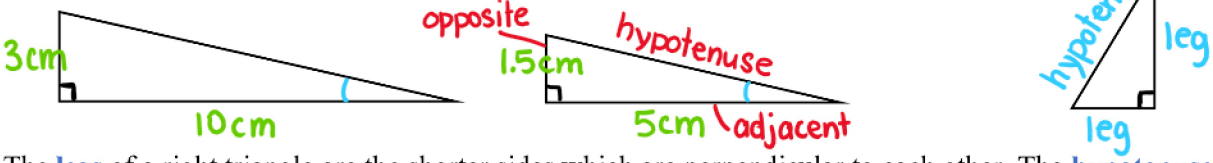
2.1 Trigonometric Ratios

FMP10 2.1 Trigonometric Ratios Name: _____

One property of similar triangles is that the ratios of respective side lengths are the same. What does this mean?



The **legs** of a right triangle are the shorter sides which are perpendicular to each other. The **hypotenuse** is the longest side. It is across from the right angle.

In order to distinguish between the two legs, the terms **opposite** and **adjacent** are used. They are determined by the angle which is being referred to. The opposite side does not touch the angle, whereas the adjacent side, along with the hypotenuse, forms the angle.

The ratios that compare side lengths of right triangles are given special names and are generally known as **trigonometric ratios**.

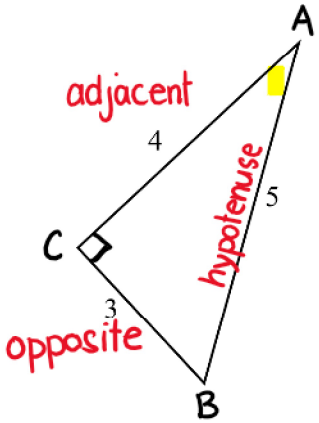
θ → "theta" → angle measurement

sine ratio: $\frac{\text{opposite}}{\text{hypotenuse}}$ cosine ratio: $\frac{\text{adjacent}}{\text{hypotenuse}}$ tangent ratio: $\frac{\text{opposite}}{\text{adjacent}}$

$\sin\theta = \frac{\text{Opp.}}{\text{Hyp.}}$ $\cos\theta = \frac{\text{Adj.}}{\text{Hyp.}}$ $\tan\theta = \frac{\text{Opp.}}{\text{Adj.}}$

"SOH" "CAH" "TOA"

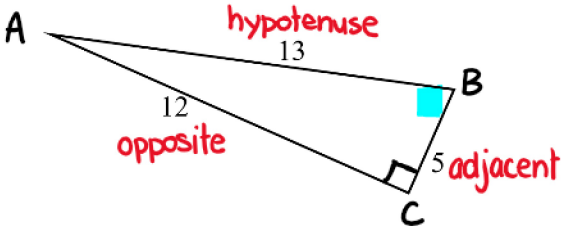
Example: Label each side using the terms opposite, adjacent, and hypotenuse. Then determine each ratio.



$\sin A = \frac{3}{5}$

$\cos A = \frac{4}{5}$

$\tan A = \frac{3}{4}$



$\sin B = \frac{12}{13}$

$\cos B = \frac{5}{13}$

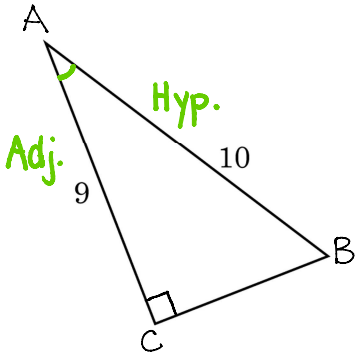
$\tan B = \frac{12}{5}$

Practice: p.40 #1 – 3, p.44 #1, 2

We can use trig ratios to calculate angles since each angle has its own unique set of ratios.

SOH CAH TOA

Example: Determine the measure of each acute angle.



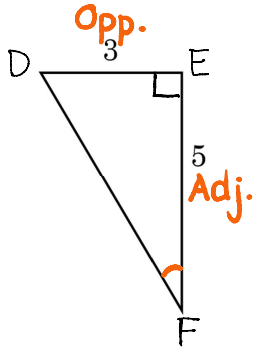
$\cos A = \frac{9}{10}$

$A = \cos^{-1}\left(\frac{9}{10}\right)$

$\doteq 25.84°$

$B = 180 - 90 - 25.84$

$= 64.16°$



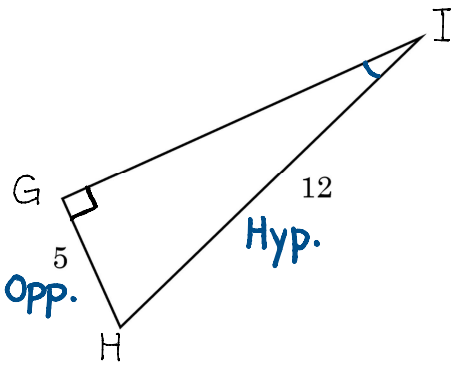
$\tan F = \frac{3}{5}$

$F = \tan^{-1}\left(\frac{3}{5}\right)$

$F \doteq 30.96°$

$D = 180 - 90 - 30.96$

$= 59.04°$



$\sin I = \frac{5}{12}$

$I = \sin^{-1}\left(\frac{5}{12}\right)$

$I \doteq 24.62°$

$H = 180 - 90 - 24.62$

$= 65.38°$

Practice: p.40 #5, 6, 11, p.44 #3, 4, 7, 8

p.44 2e) $\sin A = \frac{5}{6} = \frac{?}{15}$ "SOH"

$15 \cdot \frac{5}{6} = \frac{a}{15} \cdot 15$

$\frac{25}{2} = \frac{a}{1}$

$12.5 = a$

f) $\cos B = \frac{9}{45} = \frac{a}{15}$

$\frac{9}{45} = \frac{a}{15}$ (÷3 on both)

$3 = a$

15 45 15

÷3

3 = a