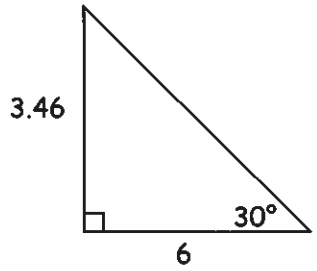
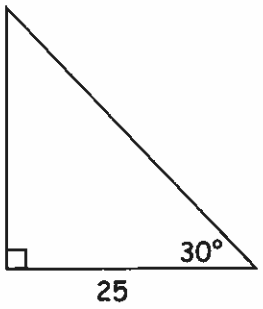
Trigonometric Ratios

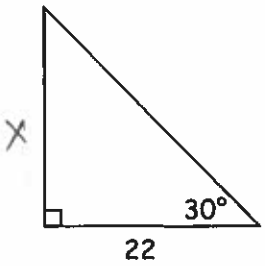
- Since similar triangles contain the same angles and have proportional sides, we can use these relationships to solve problems.





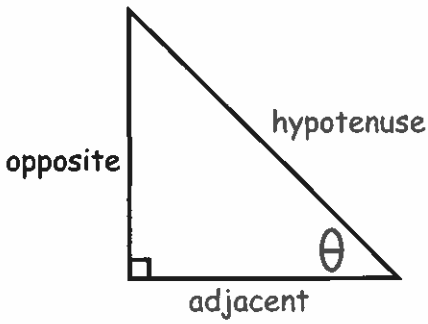
* We could use $a^2+b^2=c^2$ and $\frac{6}{25} = \frac{3.46}{\quad} = \_\_\_$

- Since proportions always remain the same, all we really need is an angle and a side to determine the other parts of the triangle.



* We know the ratio between $\frac{3.46}{6}$ must stay the same as $\frac{X}{22}$ since they have the same angles (all we need is the ratio!!)

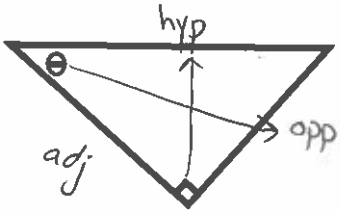
- Right triangles are labelled according to a given angle. One of these sides we know, the hypotenuse.

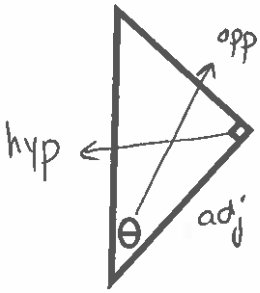


Adjacent - side beside the given angle

Opposite - side across from the given angle

Ex/ Label the sides of the triangles given below.

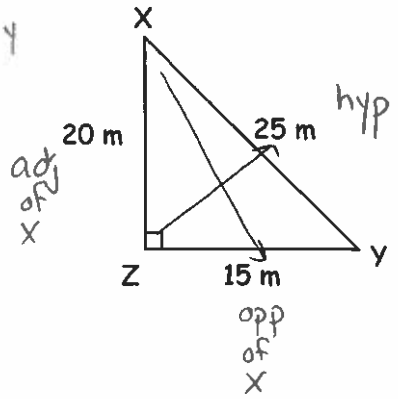




Primary Trigonometric Ratios

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

Ex/ a) Write down the ratio for the tan X, sin X and cos X.
b) How would the ratios for angle Y be different?



a) $\sin X = \frac{15}{25}$ ← opp of x, ← hyp

$\cos X = \frac{20}{25}$ ← adj of x, ← hyp

$\tan X = \frac{15}{20}$

b) $\sin Y = \frac{20}{25}$ ← opp to Y

$\cos Y = \frac{15}{25}$ ← adj to Y

$\tan Y = \frac{20}{15}$

Ex/ Use your calculator to determine the value of each ratio to 3 significant figures.

a) sin36° b) tan78° c) cos12°

button on your calculator → $= 0.5877$ $= 0.588$ $= 4.70$ $= 0.978$

★ If you get different answers you may need to reset your calculator to degrees

Ex/ Given the ratio and scale factor, determine the unknown angle.

a) $\cos x = 0.866$ b) $\sin A = 0.2345$

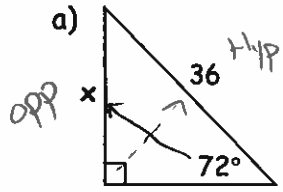
called an inverse button usually press shift or 2nd

$X = \cos^{-1}(0.866)$ $= 30°$

$A = \sin^{-1}(0.2345)$ $= 13.56°$

Ex/ Solve the following unknowns.

a)



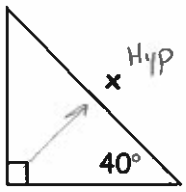
① label sides with information on them

② Choose the ratio with the right letters SOH CAH TOA — we have O, H

$\sin 72 = \frac{x}{36}$ ↙ cross multiply

$x = 36\sin 72$
$= 36(0.951)$ $= 34.24$

b) CAH



$\cos 40 = \frac{48}{x}$ ↙ cross multiply

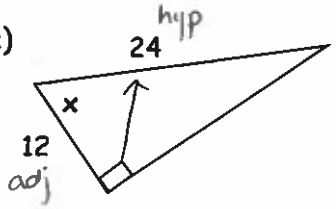
$x\cos 40 = 48$

$x(0.766) = 48$

$\frac{0.766x}{0.766} = \frac{48}{0.766}$ ↙ divide

$x = 62.66$

c)

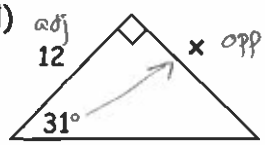


$\cos X = \frac{12}{24}$

★ use inverses for angles

$X = \cos^{-1}(12 \div 24)$
$= \cos^{-1}(0.5)$
$= 60°$

d)



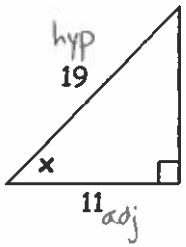
$\tan 31 = \frac{x}{12}$ cross multiply

$12 \tan 31 = x$

could write decimal or just type in calculator all at once

$x = 7.21$

e)



$\cos x = \frac{11}{19}$ inverse for angles

$x = \cos^{-1}(11 \div 19)$

$x = 54.62$

Homework: Handout - Trig Ratios