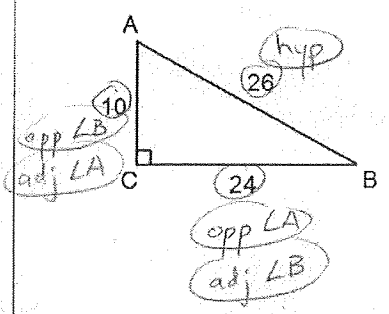
Geometry - 7.4 - Trigonometry

- The study of trigonometry involves triangle measurement. A ratio of the lengths of sides of a right triangle is called a trigonometric ratio. The three most common trigonometric ratios are sine, cosine, and tangent.
- The acronym SOHCAHTOA helps in remembering trigonometric ratios:

$\sin = \frac{\text{opp. leg}}{\text{hypotenuse}}$, $\cos = \frac{\text{adj. leg}}{\text{hypotenuse}}$, $\tan = \frac{\text{opp. leg}}{\text{adj. leg}}$

Ex 1 - Find sin A, cos A, tan A, sin B, cos B, and tan B. Express each ratio as a ~~fraction and a decimal.~~ simplified fraction.



$\sin A = \frac{opp}{hyp} = \frac{24}{26} = \frac{12}{13}$

$\cos A = \frac{adj}{hyp} = \frac{10}{26} = \frac{5}{13}$

$\tan A = \frac{opp}{adj} = \frac{24}{10} = \frac{12}{5}$

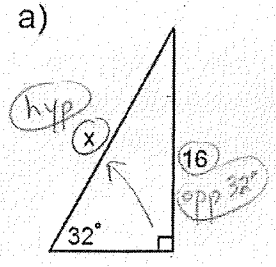
$\sin B = \frac{opp}{hyp} = \frac{10}{26} = \frac{5}{13}$

$\cos B = \frac{adj}{hyp} = \frac{24}{26} = \frac{12}{13}$

$\tan B = \frac{opp}{adj} = \frac{10}{24} = \frac{5}{12}$

Ex 2 - Use trigonometry to find the value of x, rounding to the nearest hundredth.

a)



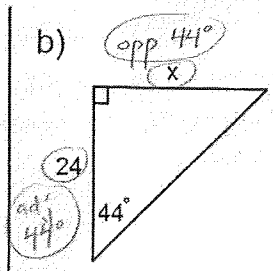
$\sin 32^\circ = \frac{16}{x}$

$x \cdot \sin 32^\circ = \frac{16}{\sin 32^\circ} \cdot \sin 32^\circ$

$x = \frac{16}{\sin 32^\circ}$

$x \approx 30.19$

b)



$\tan 44^\circ = \frac{x}{24}$

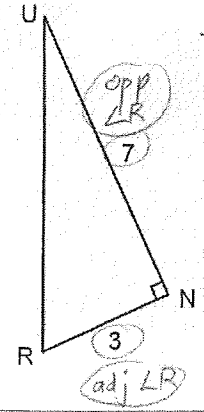
$24 \cdot \tan 44^\circ = x$

$23.17 \approx x$

Talk about radians here!

Ex 3 - Use trigonometry to find the angle measures, rounding to the nearest tenth.

a) $m\angle R$



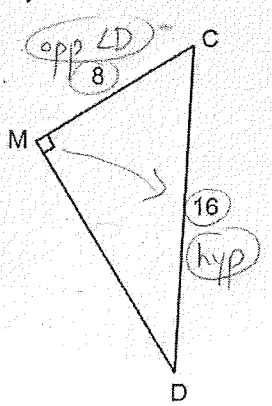
$\tan R = \frac{7}{3}$

$\tan^{-1}(\tan R) = \tan^{-1}\left(\frac{7}{3}\right)$

$m\angle R = \tan^{-1}\left(\frac{7}{3}\right)$

$m\angle R \approx 66.8^\circ$

b) $m\angle D$



$\sin D = \frac{8}{16}$

$\sin^{-1}(\sin D) = \sin^{-1}\left(\frac{8}{16}\right)$

$m\angle D = \sin^{-1}\left(\frac{1}{2}\right)$

$m\angle D = 30^\circ$