V. Trigonometry

A) Find the value of the side marked X based on given side and angle.

1.) 30 m, 30°, X

$\tan\theta = \frac{OPP}{ADJ}$ OPP

$ADJ = \frac{OPP}{\tan\theta}$

$ADJ = \frac{30}{\tan 30^\circ} =$

$ADJ = 52.0$

2.) X, 45°, 120 m

$\cos\theta = \frac{ADJ}{HYP}$

$HYP = \frac{ADJ}{\cos\theta}$

$= \frac{120m}{\cos 45^\circ}$

$HYP = 170.m$

3.) X, 8 m, 4 m

$a^2+b^2=c^2$

$b = \sqrt{c^2-a^2}$

$b = \sqrt{(18m)^2-(4m)^2}$

$b = 16.93m$

4.) 18 m, X, 24 m

$a^2+b^2=c^2$

$c = \sqrt{a^2+b^2}$

$c = \sqrt{(18m)^2+(24m)^2}$

$c = 30.0m$

B) Based on the given sides, find the angles of the Y and X.

5.) 30 m, X, 50 m, Y

$\theta = \cos^{-1}\left(\frac{ADJ}{HYP}\right)$

$\theta = \cos^{-1}\left(\frac{30m}{50m}\right)$

$\theta = 53.1^\circ$

6.) 50 m, Y, X, 87 m

$\theta = \sin^{-1}\left(\frac{OPP}{HYP}\right)$

$\theta = \sin^{-1}\left(\frac{30m}{50m}\right)$

$\theta = 36.9^\circ$

$\theta = \tan^{-1}\left(\frac{OPP}{HYP}\right)$

$\theta = \tan^{-1}\left(\frac{87m}{50m}\right)$

$\theta = 60.1^\circ$

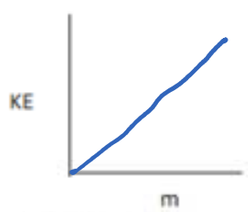
$\theta = \tan^{-1}\left(\frac{OPP}{ADJ}\right)$

$\theta = \tan^{-1}\left(\frac{50m}{87m}\right) = 29.9^\circ$

VI. Graphing/Mathematical Models

For the following equations, sketch the corresponding graphical relationship for the given variables on the axis. Identify the type of relationship, as well.

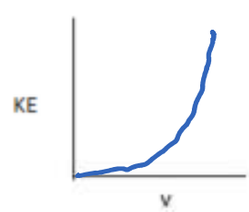
1. $KE = \frac{1}{2}mv^2$ (assume the variable that is not being plotted)



$KE = \frac{1}{2}mv^2$

$KE \propto m$

Type of Relationship: DIRECT (LINEAR)



$KE = \frac{1}{2}mv^2$

$KE \propto v^2$

Type of Relationship: DIRECT SQUARE