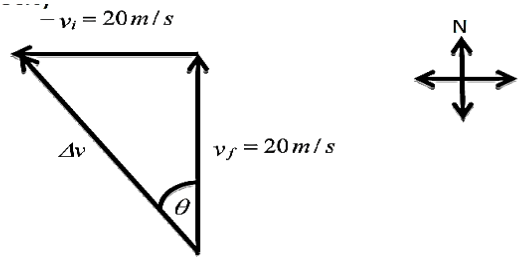
SUVA SANGAM COLLEGE

YEAR 12

PHYSICS

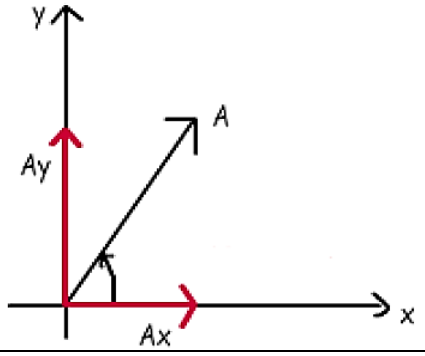
WORKSHEET 4

STRAND 1 MECHANICS

NO.	**CONCEPT IN BRIEF: VECTORS** **VECTOR SUBTRACTION** When adding or subtracting vectors, always use head to tail method. Example 1 A car is moving due East at 20 m/s. A short time later it is moving due North at 20 m/s. Calculate the ***change in velocity*** of the car. $$\Delta v = v_f - v_i = v_f + (-v_i)$$ Since that is how we draw the vector diagram. We simply add the negative of the initial velocity to the final velocity  Use Pythagoras theorem to solve for ***change in velocity*** and use SOH, CAH or TOA to solve for θ $$\Delta v = \sqrt{(20^2 + 20^2)} = 28.28 m/s$$ $$\theta = \tan^{-1}\frac{20}{20} = 45°$$ $\boldsymbol{\Delta v = 28.28 m/s\,,\, 45°\ west\ of\ north}$
1	a) A car is moving due west at 600 m/s. A short time later it is moving due south at 500 m/s. Calculate the ***change in velocity*** of the car. b) A truck is moving due north at 450m/s. A short time later it is moving due west at 200 m/s. Calculate the ***change in velocity*** of the truck

CONCEPT IN BRIEF: VECTORS
VECTOR COMPONENTS

Any vector can be **resolved** into a number of components and when these are added together they result in the original vector.

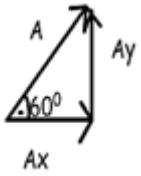


Example 1

using SOH,CAH,TOA we get,

$$\sin 60 = \frac{A_y}{A} \; thus \; A_y = Asin60$$

$$\cos 60 = \frac{A_x}{A} \; thus \; A_x = Acos\ 60$$



All vectors can be divided into their components.

2 Find the horizontal and vertical components:

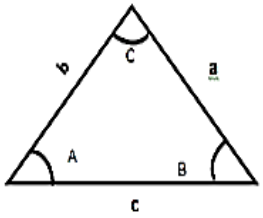
a) $50km\ at\ 20°\ east\ of\ north$

b) $70km\ at\ 30°\ south\ of\ east$

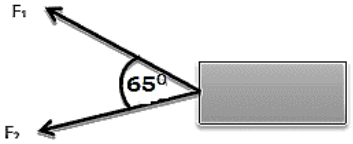
CONCEPT IN BRIEF: VECTORS
ADDING NON PERPENDICULAR VECTORS

SINE RULE: $\frac{a}{SinA} = \frac{b}{SinB} = \frac{c}{SinC}$

COSINE RULE: $c^2 = a^2 + b^2 - (2abCosC)$



3 (a) Two equal forces of 50 Newton act on a body at **65⁰** to each other as shown on the diagram given below. Determine the magnitude of the resultant force acting on the body.



(b) A force of 6.0 N south and 9.0 N S 60⁰ W act on the same point **P**. Determine the total force that must be acting on that point.