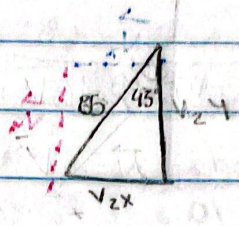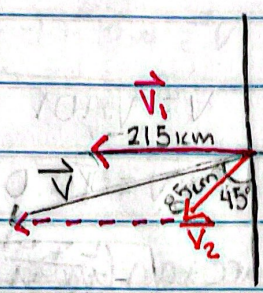# PHYSICS II : HOMEWORK

1. (I) A car is driven 215 km west and then 85 km southwest. What is the displacement of the car from the point of origin (magnitude and direction)? Draw a diagram

$\sin 45 = \dfrac{V_2 x}{85}$ $\cos 45 = \dfrac{V_2 y}{85}$
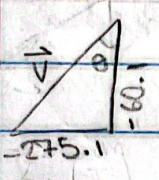
$.85$ $.65$ $.65$ $.85$

$V_2 x = -60.1$ $V_2 y = -60.1$

$\vec{V_1} = (-215, 0)$ $\vec{V_2} = (-60.1, -60.1)$

$V = \sqrt{(-275.1)^2 + (-60.1)^2}$

$V = \sqrt{79292.02} =$

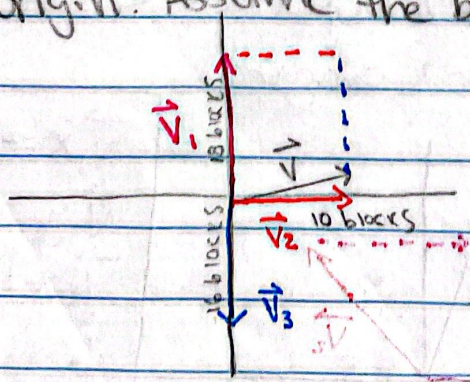281.59

$V_1 x + V_2 x = V_x = -215 + (-60.1) = -275.1$

$V_1 y + V_2 y = V_y = 0 + (-60.1) = -60.1$

$\arctan\left(\dfrac{-275.1}{-60.1}\right) = \theta = 77.7°$ $90 - 77.7 = 12.3°$

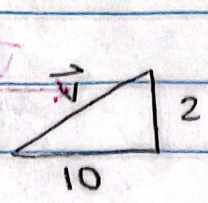Displacement = 281.59 ; Direction = 12.3° south of west

2. (I) A delivery truck travels 18 blocks north, 10 blocks east, and 16 blocks south. What is the final displacement from the origin? Assume the blocks are equal length.

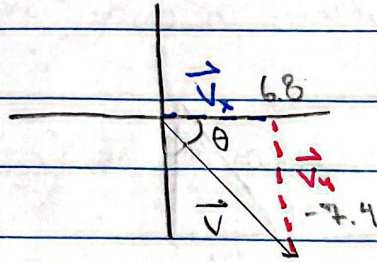$V_1 + V_3 = 18 + (-16) = 2 = V_y$

$V_2 = 10 = V_x$

$V = (10, 2)$

$V^2 = 10^2 + 2^2$

$V = \sqrt{100 + 4}$

$V = 10.2$ blocks

Displacement = 10.2 blocks

4. (I) $V_x = 6.80$ units and $V_y = -7.40$ units, determine the magnitude and direction of $\vec{V}$.
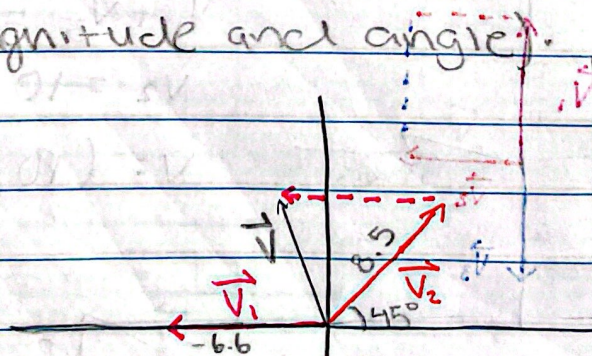

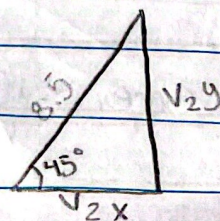$V^2 = 6.8^2 + (-7.4)^2$

$V = \sqrt{101}$

$V = 10.05$ units

$\arctan\left(\frac{-7.41}{16.81}\right) = \theta = 47.42°$

$360° - 47.42° = 312.58°$

magnitude of $\vec{V}$ is 10.05 units
direction of $\vec{V}$ is 312.58°

8. (II) Vector $\vec{V_1}$ is 6.6 units long and points along the negative x axis. Vector $\vec{V_2}$ is 8.5 units long and points at +45° to the positive x-axis. (a) What are the x and y components of each vector? (b) Determine the sum of $\vec{V_1} + \vec{V_2}$ (magnitude and angle).

$\vec{V_1} x = -6.6$ units
$\vec{V_1} y = 0$ units
$\vec{V_2} x = 6.01$ units
$\vec{V_2} y = 6.01$ units

$\sin(45) = \frac{V_2 y}{8.5}$
$\cdot 8.5 \quad \cdot 8.5$
$V_2 y = 6.01$

$\cos(45) = \frac{V_2 x}{8.5}$
$\cdot 8.5 \quad \cdot 8.5$
$V_2 x = 6.01$

$V_1 x + V_2 x = V_x = -6.6 + 6.01 = -0.59$

$V_1 y + V_2 y = V_y = 0 + 6.01 = 6.01$

$\vec{V} = (-0.59, 6.01)$

-0.59

$\vec{V}$ θ 6.01
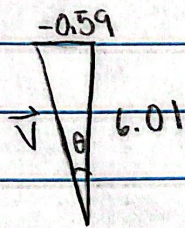
$V^2 = (-0.59)^2 + 6.01^2$

$V = \sqrt{36.47} = 6.04$

$\arctan\left(\frac{|-0.59|}{6.01}\right) = \theta = 5.6$

$90 + 5.6 = 95.6°$

magnitude = 6.04 units
angle = 95.6°