Name: KEY

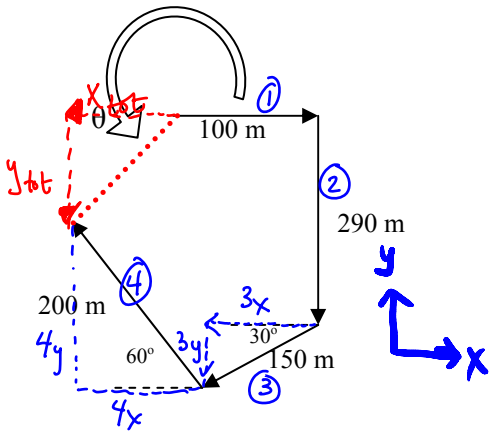
Date:

Section C D F

The Masters School
Mr. Alex Rawson
Physics

Vectors and Trig II

1. A person walks the path shown in Figure 3-27. The total trip consists of four straight-line paths. At the end of the walk, what is the person's resultant displacement measured from the starting point? Find the distance, and the direction, measured counterclockwise from the +x direction.



$X_{tot} = ① - 3x - 4x$

$= 100 - 129.9 - 100$

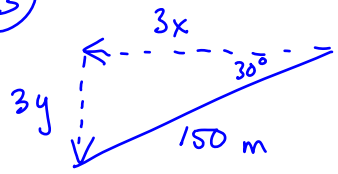
$X_{tot} = -129.9\ m$

$y_{tot} = 4y - ② - 3y$

$= 173.2 - 290 - 75$

$y_{tot} = -191.79\ m$

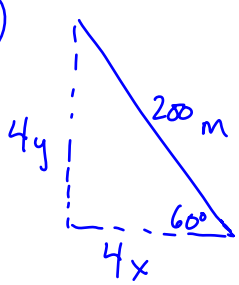
③



$3x = (150)\cos 30 = 129.9\ m$

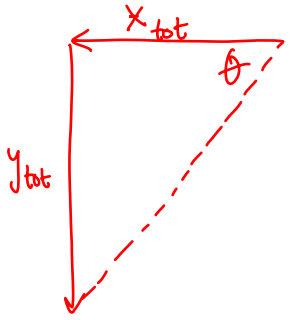
$3y = (150)\sin 30 = 75\ m$

④



$4x = (200)\cos 60 = 100\ m$

$4y = (200)\sin 60 = 173.2\ m$



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

$(-129.9)^2 + (-191.79)^2 = c^2$

$c = 231.6\ m$

$\tan\theta = \frac{y_{tot}}{x_{tot}}$

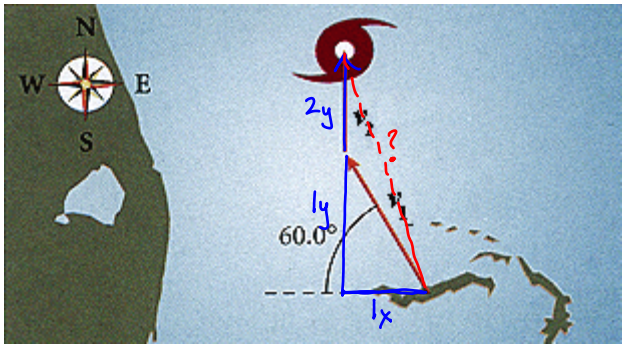
$\tan\theta = 1.476$

$\theta = 55.89°$

$\theta_{tot} = 55.89° + 180° = 235.89°$

The final displacement was 231.6 meters at 235.89° counterclockwise from the +x direction

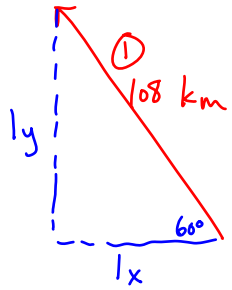
2. The eye of a hurricane passes over Grand Bahama Island. It is moving in a direction 60.0° north of west with a speed of $v_1 = 36.0$ km/h. Exactly three hours later, the course of the hurricane shifts due north, and its speed slows to $v_2 = 27.0$ km/h, as shown in Figure 3-30. How far from Grand Bahama, in kilometers, is the hurricane 4.50 h after it passes over the island? distance



$V_1 = 36$ km/h

$\Delta t_1 = 3$ hrs.

$\Delta X_1 = 108$ km



$1_x = 108 \cos 60 = 54$ km

$1_y = 108 \sin 60 = 93.53$ km

② $V_2 = 27$ km/h

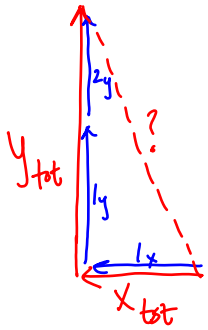
$\Delta t_2 = 1.5$ hr

$\Delta X_2 = 40.5$ km

② is completely in y-direction

$x_{tot} = 1_x = 54$ km

$y_{tot} = 1_y + 2_y = 134.03$ km



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

$54^2 + 134.03^2 = c^2$

$c = 144.5$ km