

EXAM 1

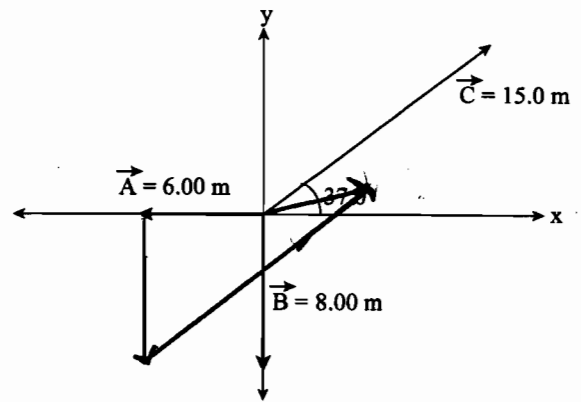
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A. Three vectors,  $\vec{A}$ ,  $\vec{B}$ , and  $\vec{C}$  are shown in drawing.

1. [4 pts.] On the drawing, show the vector sum  $\vec{D} = \vec{A} + \vec{B} + \vec{C}$  using the head-to-tail approach.

2. [14 pts.] Determine the x and y components of the sum vector  $\vec{D}$ .  
 $A_x = -6.00\text{m}, B_x = 0$   
 $C_x = C \cos 37^\circ = (15\text{m})(.8) = 12.0\text{m}$   
 $A_y = 0, B_y = -8.00\text{m}, C_y = C \sin 37^\circ$   
 $C_y = (15\text{m})(.6) = 9.00\text{m}$



$$D_x = A_x + B_x + C_x = 6.00\text{m}$$

$$D_y = A_y + B_y + C_y = 1.00\text{m}$$

3. [4 pts.] Express  $\vec{D}$  in magnitude-direction form or in unit vector notation.

MAG. + DIR.  
 $D = \sqrt{D_x^2 + D_y^2} = \sqrt{.36\text{m}^2 + 1.00\text{m}^2} = 6.08\text{m}$

$\theta = \tan^{-1}\left(\frac{1}{6}\right) = 9.50^\circ$

UNIT VECTOR

$\vec{D} = (6.00\text{m})\hat{i} + (1.00\text{m})\hat{j}$

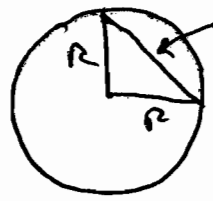
B. A couple walks one-quarter of the way around a circular lake whose radius is 1.80 km. They start at the north point on the lake and proceed clockwise. They require 45.0 minutes to complete this partial trip around the lake. Note: The circumference of a circle is  $2\pi R$  where  $R$  = radius.

$d = \frac{2\pi R}{4} = \frac{\pi(1.80\text{km})}{2} = 2.83\text{km}$

1. [8 pts.] What is the average speed of the couple (in km/hr)?

$v_{AV} = \frac{d}{\Delta t} = \frac{2.83\text{km}}{.75\text{hr}} = 3.77\text{km/hr}$

2. [8 pts.] What is the magnitude of the average velocity of the couple (in km/hr)?



DISP ( $\Delta s$ )  $\Delta R = \sqrt{2} R = \sqrt{2}(1.80\text{km}) = 2.55\text{km}$

$|\vec{v}_{AV}| = \frac{\Delta R}{\Delta t} = \frac{2.55\text{km}}{.75\text{hr}} = 3.39\text{km/hr}$