Name:_____ Date:_____

Mr. Croom's Physics Chapter 3: Two Dimensional Motion

Vector Addition Analytically 1

Magnitude of a Vector: $R^2 = R_x^2 + R_y^2 (+R_z^2)$ **Calculation of x-component R_x:** $R_x = R\cos\theta$ **Calculation of y-component R_y:** $R_y = R\sin\theta$ **Calculation of θ:** $\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$	Express in Polar Coordinates: [R, θ] Express in Rectangular Coordinates: $R_x\hat{i} + R_y\hat{j}$

1. Analytically compute the resultant of the following coplanar forces: 100 N @ 30˚, 141.4 N @ 45˚, and 100 N @ 240˚.

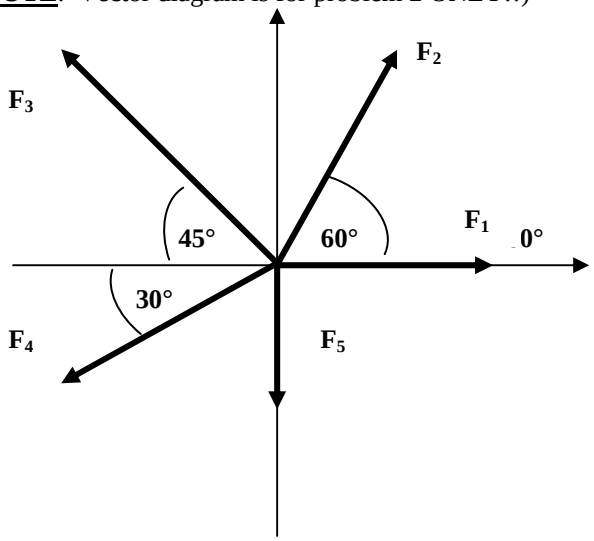
2. If the w = – 5 i – 7 j and F = 4 i – 1 j, then determine the magnitude and direction of the vector sum of these vectors.

3. If a = 15 @ 80˚ and b = 12 i – 16 j, what is the magnitude and direction of a – b?

4. If a =25 @ 30˚ and b = – 6 i + 14 j, what is the magnitude and direction of a + b?

5. Calculate the **resultant** of the following 2 vectors in analytic form: **P** = 2 m @ 40˚ and **E** = 4 m @ 127˚.

(**NOTE**: Vector diagram is for problem 2 ONLY!!)



6. Five coplanar forces shown in the diagram at right act on an object. Find their **vector sum resultant**. $F_1 = 19$ N, $F_2 = 15$ N, $F_3 = 16$ N, $F_4 = 11$ N, $F_5 = 22$ N (NOTE: NOT DRAWN TO SCALE!)

7. Using the analytical method, find the magnitude and direction of the resultant of the following
   a. 16 m @ 67°;
   b. 30m @ 232°

8. Using the analytical method, find the magnitude and direction of the resultant of the following
   a. 10 m @ 45°;
   b. 15 m @ 315°

9. Using the analytical method, find the magnitude and direction of the resultant of the following:

$\vec{r}_1 = 5m@135^\circ$

$\vec{r}_2 = 8m@290^\circ$

$\vec{r}_3 = 3m@25^\circ$

$\vec{r}_4 = (2\hat{i} - 2\hat{j})m$

10. Using the analytical method, find the magnitude and direction of the resultant of the following:

$\vec{r}_1 = 8m@235^\circ$

$\vec{r}_2 = 5m@190^\circ$

$\vec{r}_3 = 4m@5^\circ$

$\vec{r}_4 = (2\hat{i} - 6\hat{j})m$