Name:_____ Date:_____

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

Resolving Vectors Notes

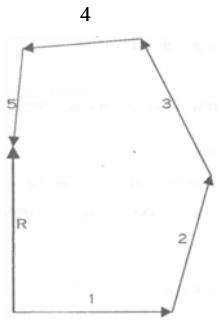
Example problem:

You are going to buy a piece of property to build a home on. The Property has been surveyed and you have seen given the following boundary Lines and directions. When reviewing the vectors you realize that the Surveyor has made some error. There are five boundary lines but they don't add up. You ask the surveyor if there should be six? He says, "yes." Using vector Analysis you tell the surveyor that you have already figured out where the sixth boundary line should be.

These are the vectors that you were given:

1. 200 ft. @ 0° P.C.
2. 240 ft. @ 75° P.C.
3. 273 ft. @ 102° P.C.
4. 189 ft. @ 193° P.C.
5. 110 ft. @ 260° P.C.

Solve for the missing variables.



1. Draw a diagram of what is taking place.
2. Sketch out your remaining or resultant vector (In this case it is the bold vector.)
3. Label your vectors 1-5. And the resultant vector with an "r" or the number six. As long as you realize that is what you are solving for.
4. Construct a table to determine the x and y components of each vector. (be sure that your vectors are in polar coordinates and that you account for all signs +/- for the direction of these components).
5. Plug in the angles and the magnitude of the vector to determine what needs to be entered in to your table.
6. Add the x-components and the y-components in the table together.
7. Now you have the x-component and the y-component of your sixth or resultant vector.

	x-components (R cos θ)	y-components (R sin θ)
1. 200 ft. @ 0° P.C.	200.00	0.00
2. 240 ft. @ 75° P.C.	62.12	231.82
3. 273 ft. @ 102° P.C.	-56.76	267.03
4. 189 ft. @ 193° P.C.	-184.16	-42.52
5. 110 ft. @ 260° P.C.	-19.10	-108.33
Sum:	2.10	348.01

8. Use the Pythagorean Theorem to determine the magnitude of the vector.

$$R(magnitude) = \sqrt{2.1^2 + 348.01^2} = 348.02$$

9. Use the tan function to solve for the angle of the vector.

$$\theta(direction) = \tan^{-1}\frac{348.01}{2.10} = 89.7°$$

10. Make sure your angle is correct based on the quadrants of the components.
11. Write your answer accounting for the magnitude and then the direction.

$$Resultant = 348.02\ ft\ @\ 89.7°$$

12. Make sure your units and your significant figures are correct.
13. Make sure your answer is in the units asked for. If you need to convert do so.

$\theta = \text{atan}\frac{R_y}{R_x} + 180°$ in quadrants II and III

Quadrant	
II	I
III	IV

$\theta = \text{atan}\frac{R_y}{R_x}$ gives a negative angle in quadrant IV. Can add 360° to get standard angle.