

Vector Definitions:

Magnitude – Magnitude is the size of either a scalar or a vector quantity.

Scalar – A scalar is a quantity that has magnitude only without regard to direction. Examples of scalars are speed, and distance.

Vector – A vector is a quantity that has both magnitude and direction associated with it. Examples of vector include displacement, position, velocity, acceleration, and force.

Displacement – Displacement is a vector that represents the position of one point relative to another point.

Vector Sum – The addition of two or more vectors.

Components – A vector's components consists of two perpendicular vectors that when added together equal the original vector.

Tip to tail method – is the method used to arrange vectors in vector addition.

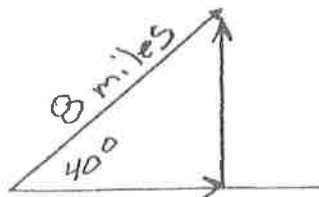
Vectors Review

Definitions:

Scalar - Has Magnitude only	Vector - Has Magnitude & direction
Magnitude - SIZE of a vector	Direction -
Displacement - Position Relative	Distance - Scalar
Vector Sum - Addition of Vectors	TIP TO TAIL Tail-to-Head Method -
Components -	Polar-coordinates
Map or Cartesian coordinates	

Look, some problems just for you!

1. A displacement vector is drawn below. The scale is 1 cm = 2 miles



- a) Completely describe this vector using Map and Polar coordinates.

8 miles @ 40° N of E

- b) What are the vectors components?

6.1 miles EAST

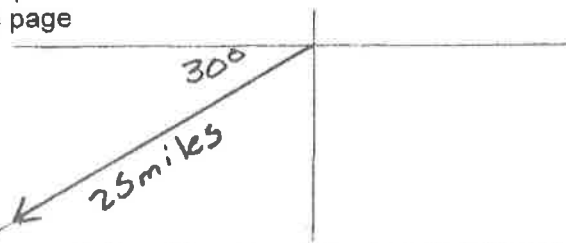
5.1 miles NORTH

2. Completely describe the components of the displacement vector of 25 miles @ 30° South of West.

$$\Delta x = 25 \cos 30 = 21.7 \text{ miles WEST}$$

$$\Delta y = 25 \sin 30 = 12.5 \text{ miles SOUTH}$$

3. Draw the vector from problem #2 below using a scale of 1 cm = 5 miles, and North being toward the top of the page



4. Write a short, simple description of how to add vectors graphically.

START BY drawing the vectors to scale and aligning them TIP TO TAIL. Then draw the Resultant FROM the Tail of the First Vector to the Tip of the LAST.

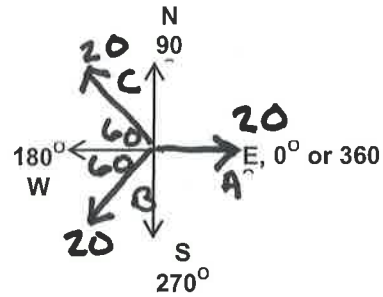
5. Write a short, simple description of how to add two vectors mathematically using the Component Method:

Calculate the x & y components of each Vector. The sum of the x components is the resultant Vector's x component & Likewise with the y components. Calculate the Resultant Vector FROM ITS COMPONENTS

Class Notes

6. Find the sum of the following three displacements using the component method. Please fill out the chart below: A. Draw the vectors below:

- a. 20 miles due East
- b. 20 miles @ 60° S of W
- c. 20 miles @ 60° N of W



- B. Make a chart and determine the resultant mathematically.

Vector	X calculation	X component	Y calculation	Y component
A	-	20	-	-
B	$-20 \cos(60)$	-10	$-20 \sin 60$	-17
C	$-20 \cos(60)$	-10	$20 \sin 60$	17
	Total	0	Total	0

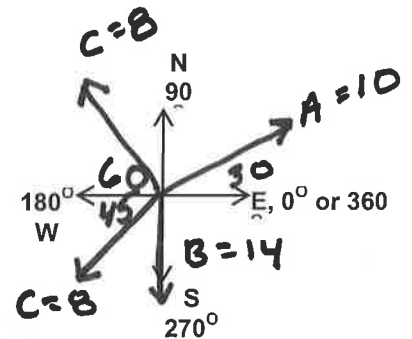
- C. What is the resultant displacement?

0

7. Felicia Fern takes a trip consisting of the following four legs...

- a. 10 miles @ 30° N of E
- b. 14 miles due South
- c. 8 miles @ 45° S of W
- d. 8 miles @ 60° N of W

- A. Draw the vectors



- B. Make a chart and determine the resultant mathematically.

Vector	X calculation	X component	Y calculation	Y component
A	$10 \cos(30)$	8.66	$10 \sin(30)$	5.0
B	-	-	-	-14
C	$-8 \cos(45)$	-5.66	$-8 \sin(45)$	-5.66
d	$-8 \cos(60)$	-4.00	$8 \sin(60)$	6.93
	Total	-1.00	Total	-7.73

- C. Draw and name the resultant.



$$d = \sqrt{7.73^2 + 1^2} = 7.79 \text{ miles}$$

$$\theta = \tan^{-1} \left(\frac{7.73}{1} \right) = 82.6^\circ$$

7.79 miles @ 82.6° S of W