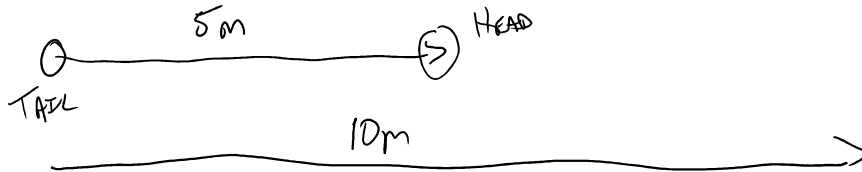


VECTORS

1

What is a vector quantity?

- A quantity that has both magnitude and direction
- Vectors (or arrows) are used to symbolize the quantity's size and direction



2

How Are Vectors Used?

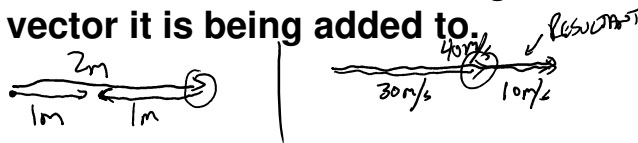
- Vectors are used to represent size and direction graphically.
- Common vector quantities are:

VELOCITY ACCELERATION
DISPLACEMENT FORCE

3

How Are Vectors Added?

- Vectors are added head to tail.
 - Draw the first vector the appropriate length and direction.
 - Draw the second vector starting at the head (point) of the vector it is being added to.



4

Drawing the resultant

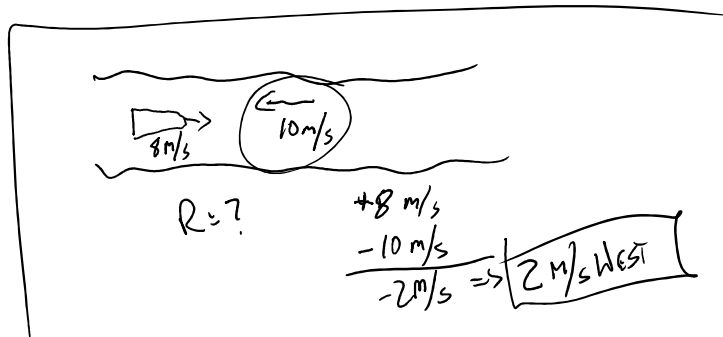
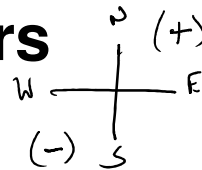
- Draw the ^{RESULTANT} vector sum from the tail end of the first vector to the head (point) end of the last vector.

5

Adding Parallel Vectors

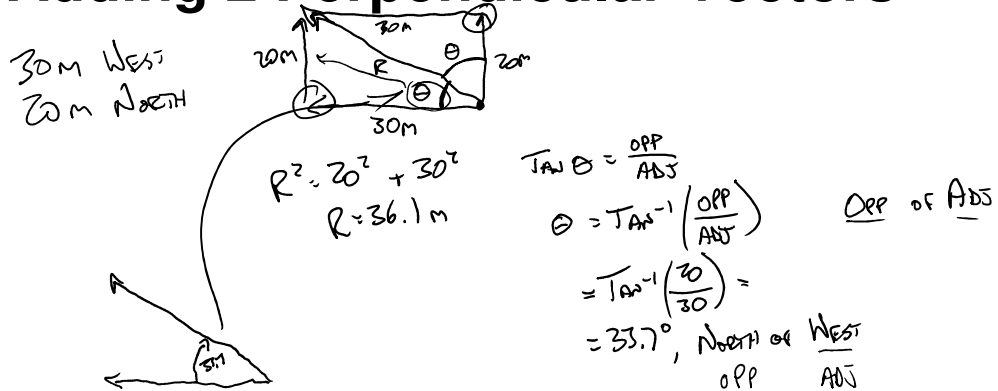
+ 3 BLOCKS EAST
+ 2 BLOCKS EAST
- 8 BLOCKS WEST
- 4 BLOCKS WEST
6 7 BLOCKS WEST

ORDER
DOES NOT
MATTER



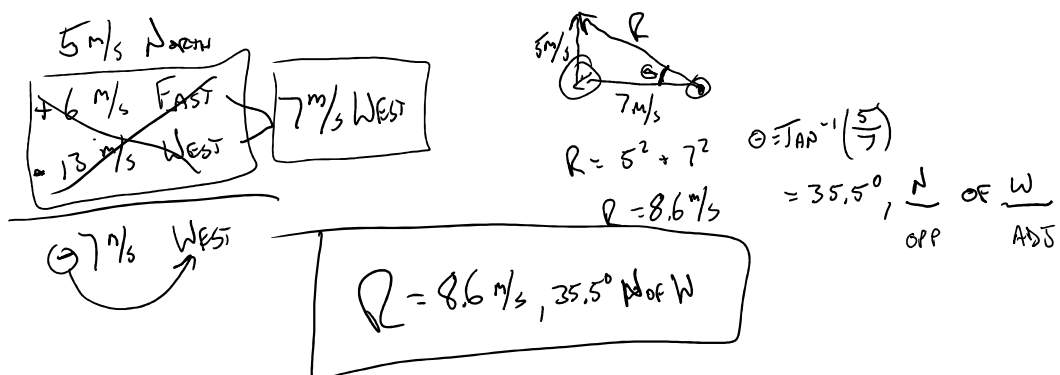
6

Adding 2 Perpendicular Vectors



7

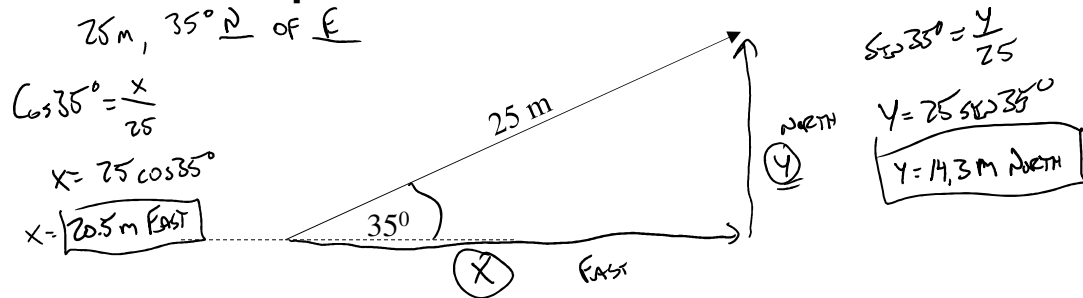
Adding 3 (or more) Perpendicular Vectors



8

Components SOUTH CAN TDA

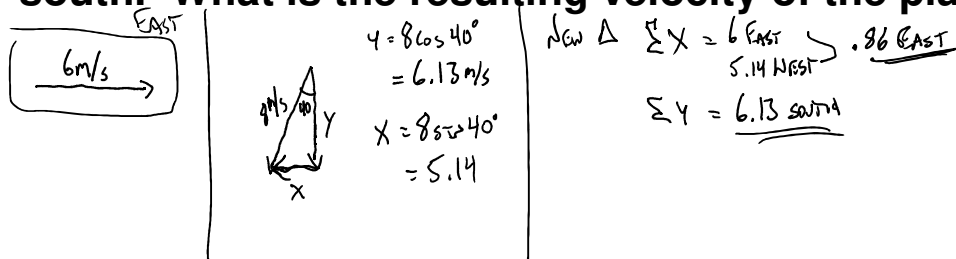
- All vectors can be broken into horizontal and vertical components



9

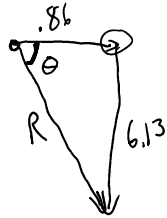
Non-Perpendicular Vectors Sample Question 1

- A paper airplane is thrown at 6 m/s to the East. There is a wind blowing at 8 m/s, 40° West of south. What is the resulting velocity of the plane?



10

Non-Perpendicular Vectors Sample Question 1



$$R^2 = .86^2 + 6.13^2$$

$$R = 6.19 \text{ m/s}$$

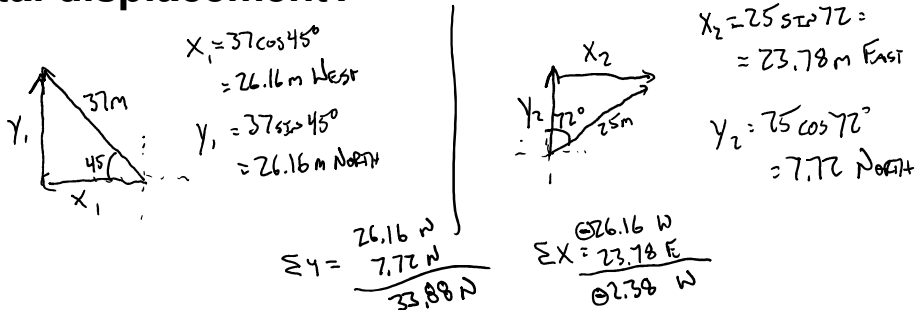
$$\theta = \tan^{-1}\left(\frac{6.13}{.86}\right)$$

$$= 82.01^\circ \text{ S of E}$$

11

Adding Non-Perpendicular Vectors Sample 2

- Jimmy walks 37 m ^{45°} northwest. He then turns and walks 25 m, 72° East of North. What is Jimmy's total displacement?



12

Adding Non-Perpendicular Vectors Sample 2



$$R^2 = 2.38^2 + 33.88^2$$

$$R = 34 \text{ m}$$

$$\theta = \tan^{-1} \left(\frac{2.38}{33.88} \right)$$

$$= 4.07^\circ \text{ W of N}$$

$$\text{OR}$$
$$\underline{85.98^\circ \text{ N of W}}$$