

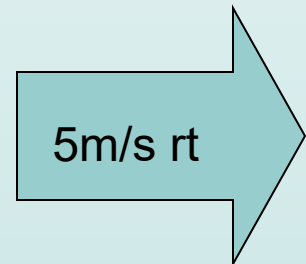
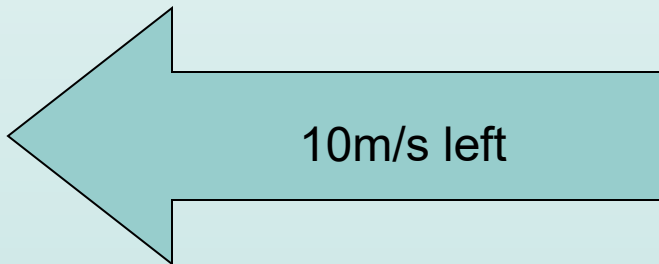
Vectors

(NEP Semester I - Chapter 1)

Dr. Debojyoti Halder
Department of Physics,
R. B. C. Evening College, Naihati

VELOCITY VECTORS

- VECTOR: An arrow drawn to scale that represents the magnitude and direction of a given velocity.



Scaled Vector Diagrams

- There are several characteristics of this diagram which make it an appropriately drawn vector diagram.
 - a scale is clearly listed
 - a vector arrow (with arrowhead) is drawn in a specified direction. The vector arrow has a *head* and a *tail*.
 - the magnitude and direction of the vector is clearly labeled.

Direction Conventions

- Use East as zero degrees.
- Click here to practice:

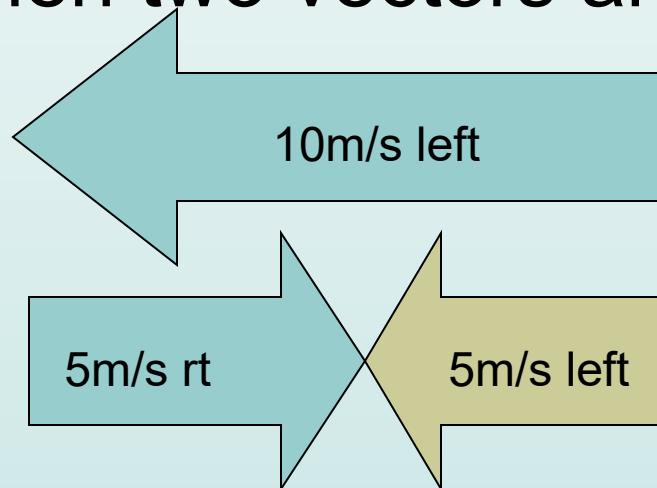
Practice set at The Physics Classroom

Direction = 0 degrees



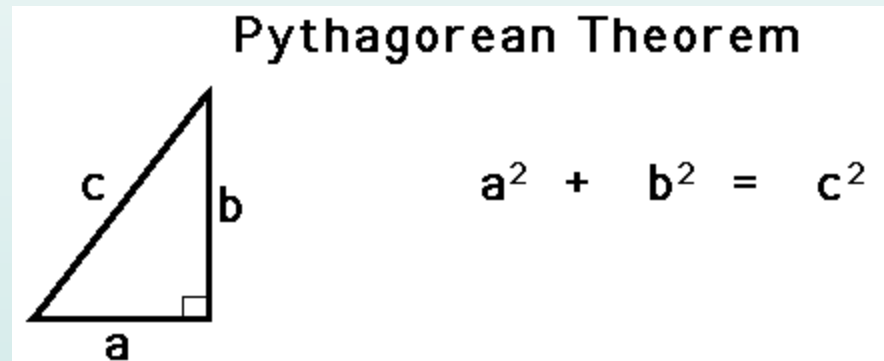
Direction Conventions

- **RESULTANT:** The single vector that **results** when two vectors are combined.



Adding Noncollinear vectors

- The Pythagorean theorem is a useful method for determining the result of adding two (and only two) vectors which make a right angle to each other.

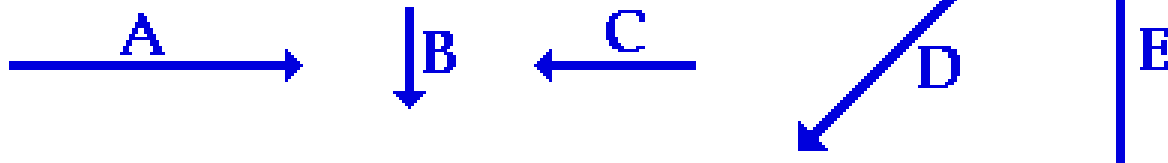


Graphical Vector Addition: $A + B$

- Step 1- Draw a start point.
- Step 2- Decide on a scale.
- Step 3- Draw Vector A to scale.
- Step 4- Vector B's tail begins at Vector A's head. Draw Vector B to scale.
- Step 5- Draw a line connecting the initial start point to the head of B. This is the resultant.
- Step 6- Measure the resultant's length with a ruler and direction with a protractor.
- Step 7- Convert back to the given units using your scale.

Animation of head-to-tail vector addition – three times

Addition of five vectors:



Resultants and Equilibrants

- The **resultant** is the vector sum of two or more vectors. It is *the result* of adding two or more vectors together.
- The **equilibrant** is the balancing vector... the vector equal in magnitude but opposite in direction to the resultant.

Vector Components

- Some vectors are directed at angles to the coordinate axes, and will need to be *transformed* into two parts with each part being directed along the axes. Each part of a two-dimensional vector is known as a **component**.
- Any vector directed in two dimensions can be thought of as having an influence in two different directions. The components of a vector depict the influence of that vector in a given direction.