

3-June-2015

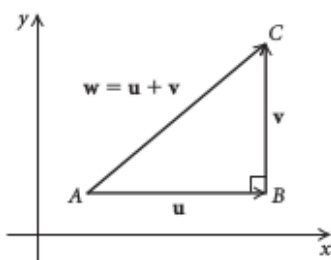
Algebra and Trigonometry in-class worksheet TO BE USED AS NOTES ON THE TEST QUIZ Chapter 7.5: Vectors

Name: _____

Date: _____

Vector

A **vector** in the plane is a directed line segment. Two vectors are **equivalent** if they have the same *magnitude* and *direction*.



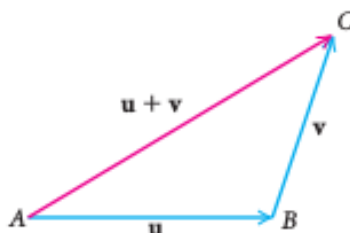
Components

Given a vector w , we may want to find two other vectors u and v whose sum is w . The vectors u and v are called **components** of w and the process of finding them is called **resolving**, or **representing**, a vector into its vector components.

When we resolve a vector, we generally look for perpendicular components. Most often, one component will be parallel to the x -axis and the other will be parallel to the y -axis. For this reason, they are often called the **horizontal** and **vertical** components of a vector. In the figure at left, the vector $w = \overline{AC}$ is resolved as the sum of $u = \overline{AB}$ and $v = \overline{BC}$. The horizontal component of w is u and the vertical component is v .

Vector Addition

In general, two nonzero vectors u and v can be added geometrically by placing the initial point of v at the terminal point of u and then finding the vector that has the same initial point as u and the same terminal point as v , as shown in the following figure.



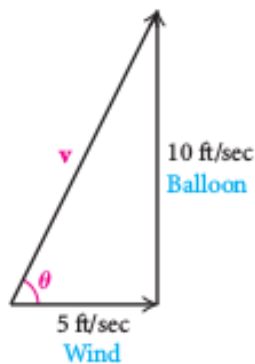
The sum $u + v$ is the vector represented by the directed line segment from the initial point A of u to the terminal point C of v . That is, if

$$u = \overrightarrow{AB} \quad \text{and} \quad v = \overrightarrow{BC},$$

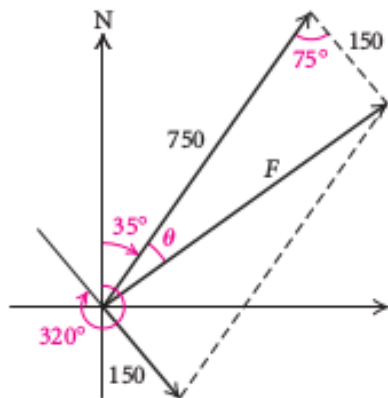
then

$$u + v = \overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}.$$

25. *Hot-air Balloon.* A hot-air balloon is rising vertically 10 ft/sec while the wind is blowing horizontally 5 ft/sec. Find the speed v of the balloon and the angle θ that it makes with the horizontal.



26. *Boat.* A boat heads 35° , propelled by a force of 750 lb. A wind from 320° exerts a force of 150 lb on the boat. How large is the resultant force F , and in what direction is the boat moving?



32. A vector \mathbf{u} with a magnitude of 150 lb is inclined to the right and upward 52° from the horizontal. Resolve the vector into components.
33. *Airplane.* An airplane takes off at a speed \mathbf{S} of 225 mph at an angle of 17° with the horizontal. Resolve the vector \mathbf{S} into components.
34. *Wheelbarrow.* A wheelbarrow is pushed by applying a 97-lb force \mathbf{F} that makes a 38° angle with the horizontal. Resolve \mathbf{F} into its horizontal and vertical components. (The horizontal component is the effective force in the direction of motion and the vertical component adds weight to the wheelbarrow.)



39. A block weighing 100 lb rests on a 25° incline. Find the magnitude of the components of the block's weight perpendicular and parallel to the incline.

