# Understanding Vectors and Their Direction

**Lesson Notes**

## What is a Vector?

A vector is a type of quantity that is fully described by a **magnitude** (i.e., a numerical value) and a **direction**.

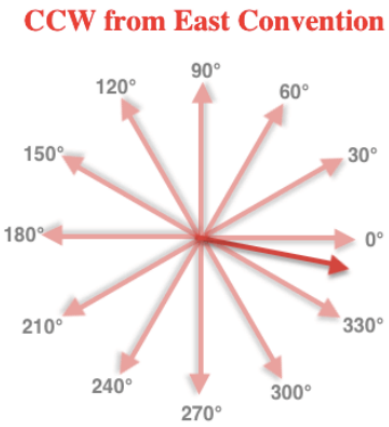
## Vector Diagrams

Vectors are commonly represented in diagrams by an arrow … known as a **vector arrow**. The **length** of the vector arrow represents the magnitude; the **direction** of the arrow is in the direction of the vector quantity.

## Counter-Clockwise from East Convention

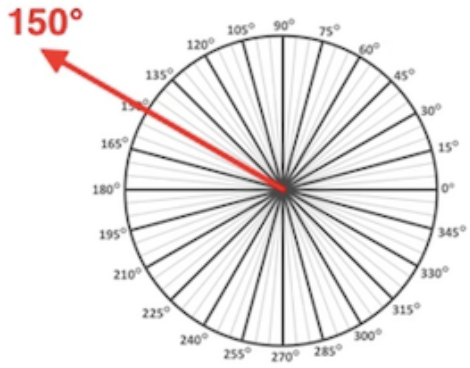
When a vector is not directed along one of the four cardinal directions, an angle measure must be used to indicate its precise direction. In the **counter-clockwise (CCW) from East** convention, the direction east is defined as 0°, and the direction of all vectors is described by the counter-clockwise angle of rotation that the vector makes with due East.

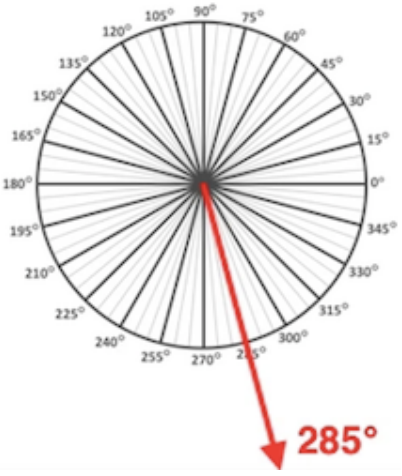
Examples are shown at the right.




## Identifying the CCW from East Direction

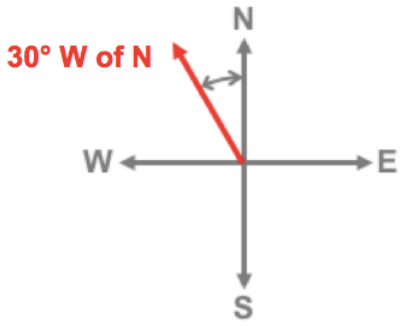
Drag the origin of the protractor to the tail of the vector and read the direction off the protractor.



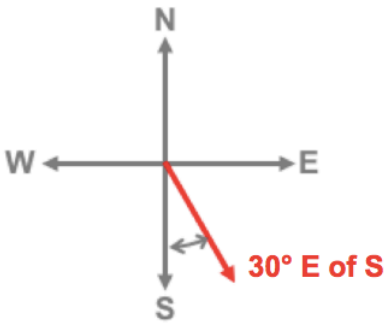



## Another Useful Convention

A vector's direction is often expressed as the angle of rotation that the vector makes relative to one of the two nearest cardinal directions (i.e., East, West, North, or South).




Meaning, starting at North, rotate a vector towards the West by 30°.




Meaning, starting at South, rotate a vector towards the East by 30°.