

## Addition of Vectors

We can add two or more vectors together to determine a single vector, called the **resultant**. This is the result of applying one vector followed by another, which is what we saw yesterday when we looked at the perpendicular components of a resultant vector.

If two vectors are parallel, in the same direction, the resultant is also in the same direction.

If two vectors are parallel but going in the opposite directions, the resultant has the same direction as the larger vector.

When adding two opposite vectors, it is possible to get the **zero vector** which has a magnitude of 0 and has no specific direction.

### 2 Methods

1. **Triangle Law** – used when adding two vectors together that are placed head-to-tail

2. **Parallelogram Law** – used when adding vectors together that are placed tail-to-tail

**Example 1** Determine the magnitude and direction of  $\vec{u} + \vec{v}$  if  $|\vec{u}| = 5$  units,  $|\vec{v}| = 8$  units and the angle between them is  $30^\circ$  when they are placed:

a) head-to-tail

b) tail-to-tail

**Example 2** A plane is flying N $30^\circ$ E at 500 km/h. A wind of 80 km/h is blowing due west. Find the resultant velocity of the plane relative to the ground.