6.2 Vector Addition

Suppose that a cargo ship has a mechanical problem and must be towed into port by 2 tugboats.

1. Draw a picture (or pictures) of what this might look like.

2. Now, suppose you're given this additional information: the tugboats are pulling at an angle of 32^{o} to each other. Can you add to your picture or draw a new picture to show what direction you think the cargo ship will travel?

3. Suppose you're told that one tugboat pulls with a force of 42 N and the other pulls with a force of 62 N. Can you find the force and direction that the cargo ship is moving in?

6.2 Vector Addition

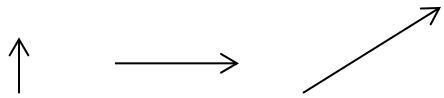
When we are presented with vectors that are working together (or against each other), we have to find ways to combine these vectors into a single vector that shows the outcome. This is called the ***RESULTANT*** vector. We can find the resultant vector in one of two ways:

1. The Parallelogram Law for Vector Addition

Example 1: Given vectors $\vec{a}$ and $\vec{b}$ such that the angle between the two vectors is 60°, $|\vec{a}| = 3$ and $|\vec{b}| = 2$, determine $|\vec{a} + \vec{b}|$.

2. The Triangle Law for Vector Addition

Example 2: Use the three vectors below to sketch $\vec{a} - \vec{b} + \vec{c}$.



What can you conclude about how to find the difference between vectors?

Example 3: An airplane heads due south at a speed of 300 km/h and meets a wind from the west at 100 km/h. What is the resultant velocity of the airplane? (relative to the ground).