Polygon law of vector addition-

Polygon law of vector addition states that if a number of vectors can be represented in magnitude and direction by the sides of a **polygon** taken in the same order, then their resultant is represented in magnitude and direction by the closing side of the **polygon** taken in the opposite order.

Proof:

Let there be a polygon of n-sides (Here 5 -sides) .

In Triangle ABC,

By triangle law of vector addition,

AB + BC = AC (All are in vector form) ---(1)

And, Similarly

AC + CD = AD ---(2) and AD + DE = AE ----(3)

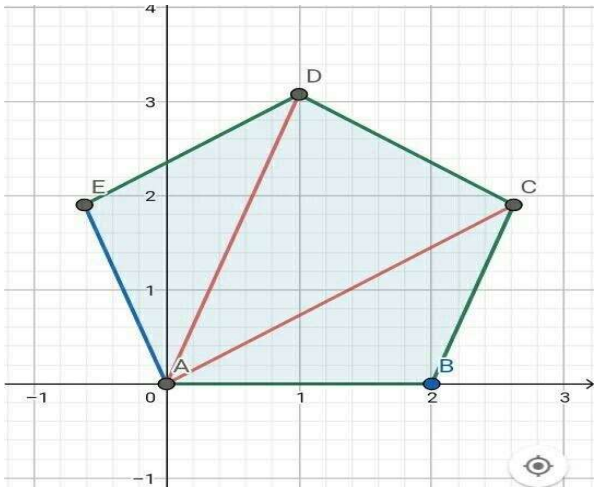
Similarly, we will do this for all sides in a polygon (Here 5-sides) .

Then, Add all these equations. we get,

AB + BC +CD + DE = AE.

AE = Closing side (Resultant) , other are normal vector sides .

For n-sides, it can be written analogously and stated as the above theorem.

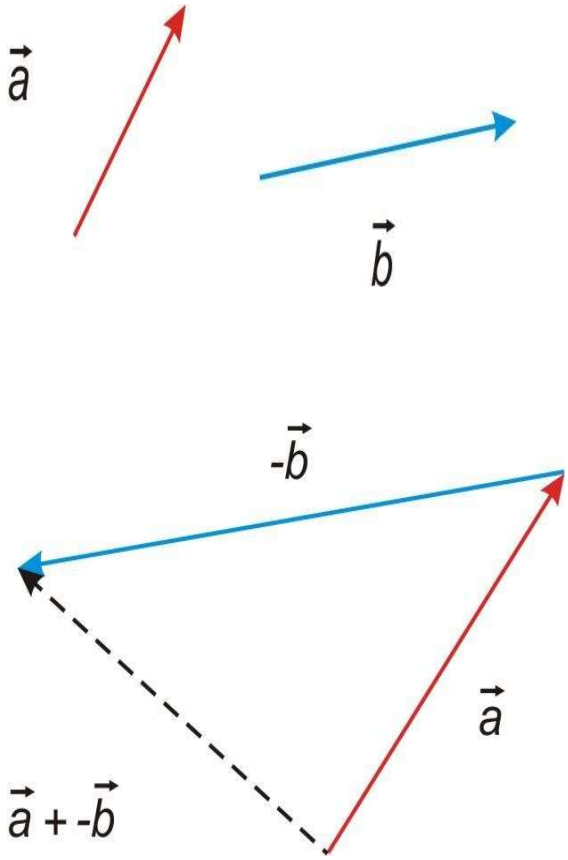


Vector Subtraction-

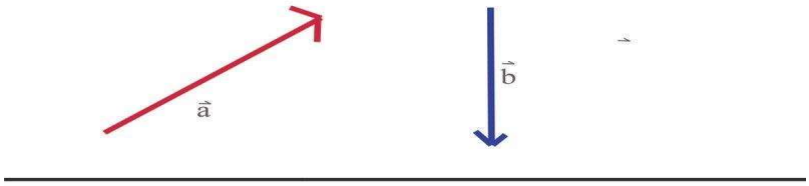
As you know from Algebra, A−B=A+ (−B). When we think of vector subtraction, we must think about it in terms of adding a negative vector.
A **negative** vector is the same magnitude of the original vector, but its direction is opposite.

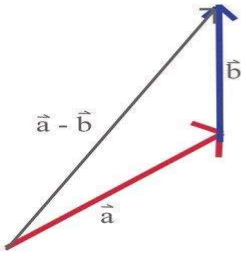
In order to subtract two vectors, we can use either the triangle method or the parallelogram method from above. The only difference is that instead of adding vectors A and B, we will be adding A and −B.
Let's solve the following problems using the triangle method for subtraction

Example 1



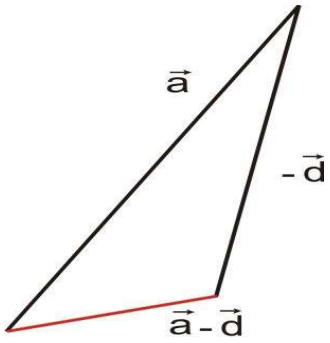
Example 2





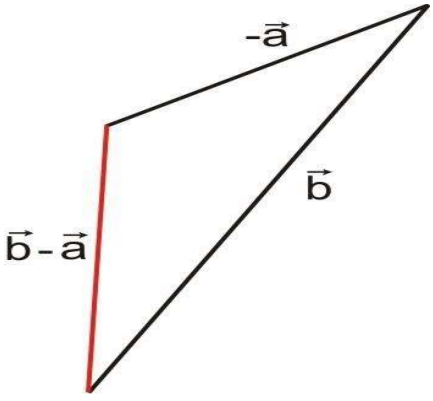
Question 1

For the vector subtraction below, make a diagram of the subtraction. $\vec{a} - \vec{d}$



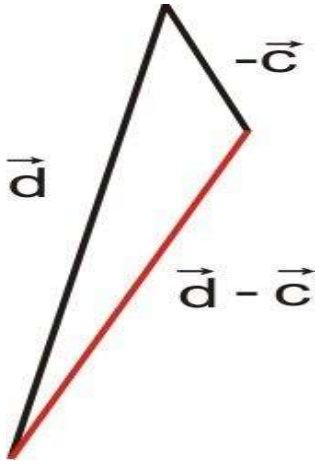
Question 2

For the vector subtraction below, make a diagram of the subtraction. $\vec{b} - \vec{a}$



Question 3

For the vector subtraction below, make a diagram of the subtraction. $\vec{d} - \vec{c}$



Example of Vector addition and subtraction-

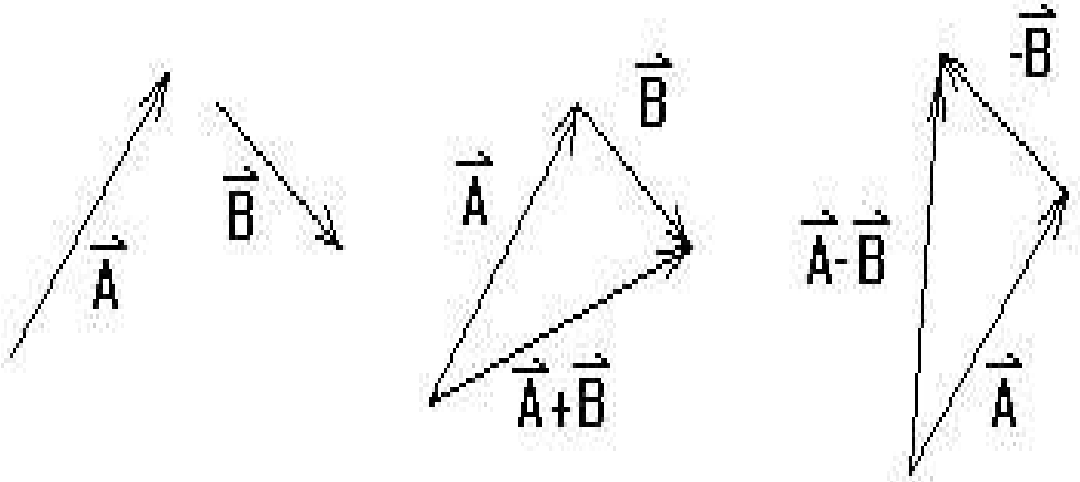


Figure 1. Addition and Subtraction of Vectors $\vec{A}$ and $\vec{B}$