Answer on Question#64970, Physics / Molecular Physics | Thermodynamics
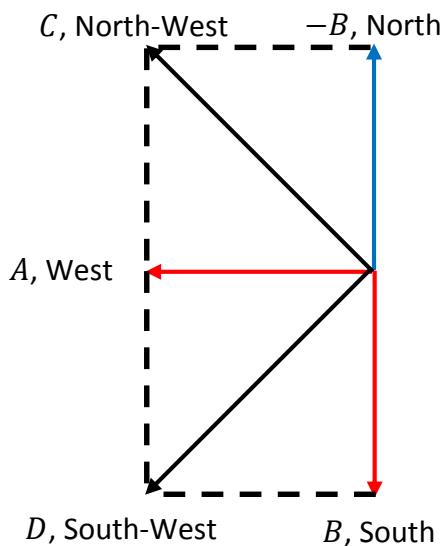
$$A + B, \qquad 63\sqrt{2}\ units, \qquad south - west$$

$$A - B, \qquad 63\sqrt{2}\ units, \qquad north - west$$

Question

Vector A has a magnitude of 63 units and points due west, while vector B has the same magnitude and points due south. Find the magnitude and direction of $A + B$ and $A - B$.

Solution

$$C = A - B, \qquad D = A + B$$

C points due north-west and D points due south-west, which can be clearly seen on the picture above. It follows from directions of A and B, and from equality of their magnitudes.

In order to find magnitudes of C and D we use Pythagorean theorem:

$$|C| = |D| = \sqrt{|A|^2 + |\pm B|^2}$$

$$|A| = |+B| = |-B| = 63$$

$$|C| = |D| = \sqrt{63^2 + 63^2} = 63\sqrt{2}\ (units)$$