

SCALARS AND VECTORS

Scalar quantity: It has magnitude (size) only. Examples of scalars include distance, speed, time, mass, energy and temperature

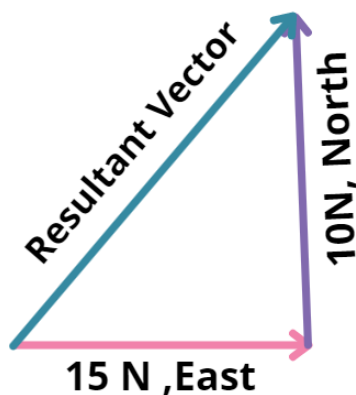
Vector quantity: It has magnitude and direction. Examples of vectors include force, weight, velocity, acceleration, momentum, electric field strength and gravitational field strength

Determine, by calculation or graphically, the resultant of two vectors at right angles:

Note that vectors have magnitude as well as direction. Hence the resultant of the two perpendicular vectors must include the magnitude as well as the direction.

The magnitude of perpendicular vectors can be found by using the Pythagoras theorem.

- Addition of forces:



Imagine a box being pushed with a force of 15N, in the East direction and then with a force of 10N in the North direction, Then their resultant will be in the North-East direction.

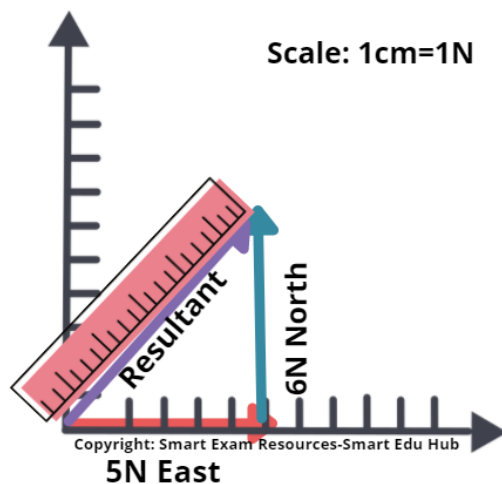
Since force is a vector, and we know that vectors are quantities that have a magnitude as well direction, we will need to find the magnitude of the resultant vector.

Since the vectors are mutually perpendicular to each other, their resultant magnitude is found by using the Pythagoras theorem.

The magnitude then becomes: $\sqrt{15^2 + 10^2} = \sqrt{225 + 100} = \sqrt{325} = 18\text{N}$

Thus the resultant force is 18N , North-East

Graphically we can find the resultant of the given vectors in the following way:



- The head-tail method is the graphical method of adding the two given vectors.
 - Every vector has a head and a tail.
 - The tail of the vector is the starting point of the vector (without the arrowhead)
 - The head (or the tip) of a vector is the end point of the vector, that has an arrow.
- The tail of this vector should originate from the head of the first
 - In this method, an exact scale is chosen.
 - Then the given vectors are drawn to scale.
 - The magnitude of the resultant is found by measuring the length using a ruler and then converting it back into the desired units
 - The direction is based on the directions of the two given vectors