

Force Diagrams

Lesson Notes

Force is a **vector quantity**.

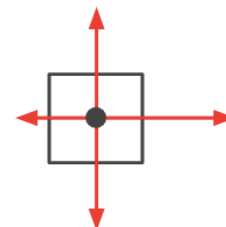
Has a **magnitude** (numerical value) expressed in Newtons (N).

Has a **direction** ... like right, up, east, down, left, north, etc.

Force Diagrams are diagrams that show the relative magnitude and direction of all the individual forces that act upon an object. An arrow is used to represent each force.

Length of arrow → Magnitude of force

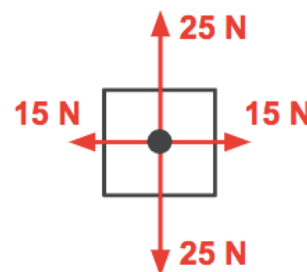
Direction of arrow → Direction of force



Force diagrams show whether the forces are balanced or unbalanced. This in turn affects how the object moves.

Balanced Forces:

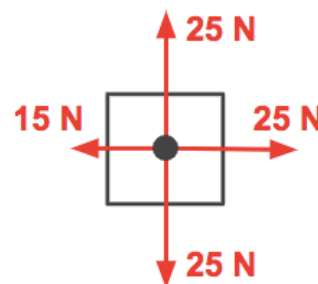
Every individual force is accompanied by an opposing force with the same strength.



Unbalanced Forces:

One or more of the individual forces is not fully counteracted by an opposing force.

When forces are unbalanced, there is said to be a **net force**, represented by the symbol F_{net} .



Net Force (F_{net}):

- The result of adding up all the forces as vectors
- The vector sum of all the forces
- The net force is a vector with a magnitude (number) and a direction
- For the Force Diagram above on the right, the net force is 10 N, right

Net Force TIP:

Think of a force diagram as depicting a Tug of War between forces. The net force indicates the **winner** of the Tug of War (e.g., rightward force wins) and the **winning margin** (10 N).