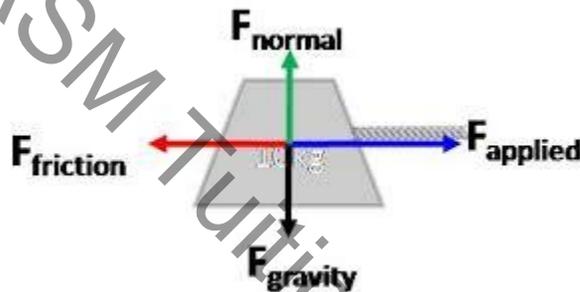


## RESULTANT FORCES

### ➤ Definition:

The total amount of force acting on the object or body along with the direction of the body is known as resultant forces. Here is the diagrammatic representation of resultant force.



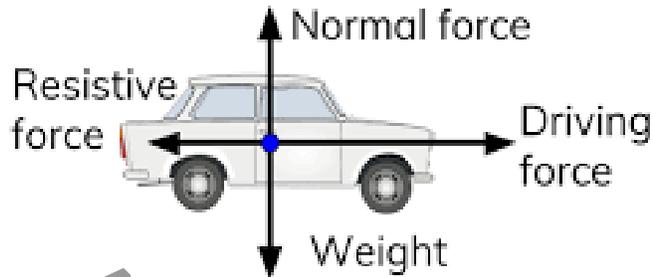
### ➤ Example:

Free diagram shows the all forces action on the body.

- 1- **Sky Driver:** Sky driver **weight** pulling her on the ground but **Air resistance** also acting on the body in opposite direction which causes **stabilization** of sky driver in the sky.



2- **Car:** Another example of resultant force is car. There are 4 total forces that act on Car as shown in picture

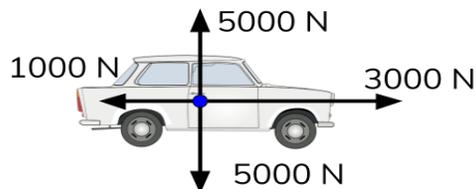


➤ **How we Find resultant Force:**

- In real situation only 2 forces acting on the object like sky driver so overall we can say **Downward Resultant force**.
- But in some cases there are many types of forces acting on the object like car, if forces in the **same direction** we **add these forces** but if forces are in **different direction** we **subtract** these forces and find out the resultant forces.

**Example:**

**Q: For free body diagram as shown in picture below, Find out the resultant force acting on a car.**



**Solution:**

Consider horizontal and vertical Directions separately

For Vertical Directions:  $5000-5000= 0\text{N}$

For Horizontal Direction:  $3000-1000= 2000\text{N}$

The resultant force is  $2000\text{N}$  to the right.

➤ **If resultant forces move an object it means Work is done:**

- When force move an object through a distance it means **energy is transferred** and **work is done**.

- Example :

If we move something the friction force acting on the object, a force is applied which need a source (food or fuel). The force does work and energy transferred from one store to another. E.g lifting of load.

- Formula:

$$\text{Work done} = \text{Force} * \text{Distance}$$

**Question 1**

How much work is done by a force of  $10\text{ N}$  in moving an object through a distance of  $1\text{ m}$  in the direction of the force?

Force =  $10\text{ N}$

Distance =  $1\text{ m}$

Work done = Force  $\times$  Distance

$$= 10 \times 1$$

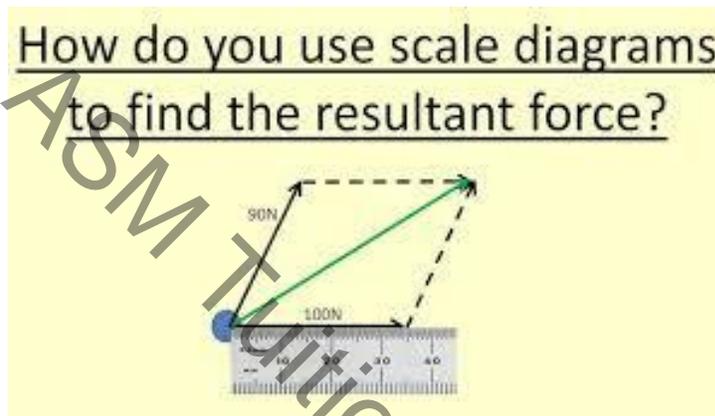
$$= 10\text{ J}$$

Work done is  **$10\text{ J}$**

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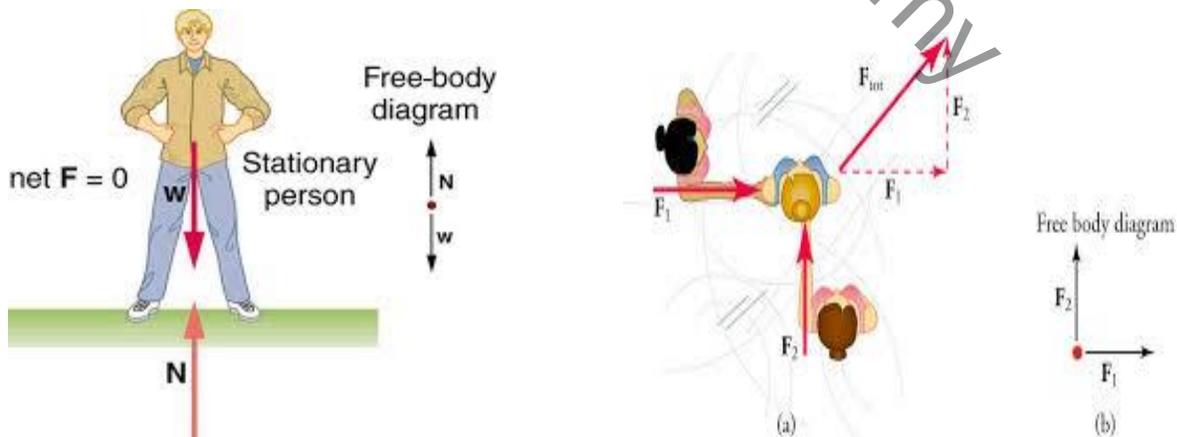
➤ Use Scale drawing to fine out the resultant force

- Draw all force using scale (tip to tail)
- Draw a straight line from the start line of force to end line of force which is called Resultant force.
- Measure the length of Resultant force which show the magnitude and direction of the force.



**An object is in Equilibrium if the forces on it are balanced.**

- If all the forces acting on the object combine to give a resultant force of zero → means object is in equilibrium state.
- **Force<sub>1</sub> + force<sub>2</sub> = resultant force = 0 = equilibrium state**



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