SELF ASSESSMENT QUESTIONS:

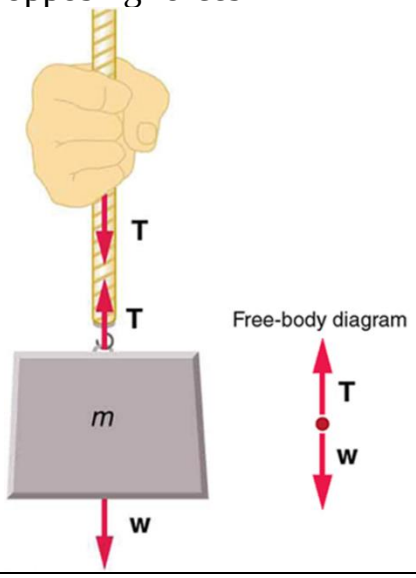
Q1: what is meant by like and unlike forces?
ANS:

In physics, **like and unlike forces** usually refer to **parallel forces** :

Like forces : Forces that act **parallel to each other in the same direction** .

Unlike forces : Forces that act **parallel to each other but in opposite directions** .

Q2: Differentiate like and unlike forces using examples

LIKE FORCES	UNLIKE FORCES
Two Boys pushing a car forward 	One person pushing a box to the right and another pushing it to the left 
Two weights hanging downward from different points on a rod 	Pulling both ends of a rope in opposite directions 
Pushing a physics book on a table with students in the same direction 	Tension in a rope, lifting an object with opposing forces 

Q3: Define resultant of a forces.

ANS:

The **resultant of forces** is the **single force** that has the same effect on an object as two or more forces acting together.

In simple words, it is the **overall or combined force** acting on an object.

Example:

If two students push a box in the same direction with forces of **7 N** and **8 N** , the resultant force is:

7 N + 8 N = 15 N

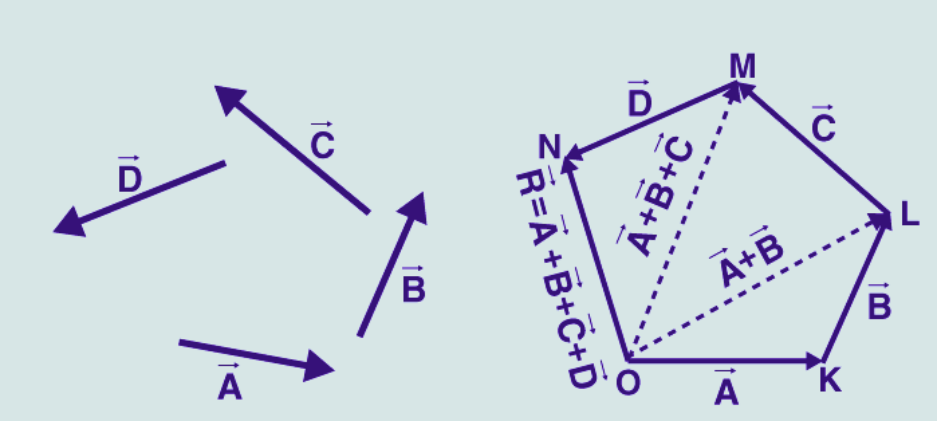
So, the box experiences a resultant force of **15 N** in that direction.

Q4: which rule is used to find the resultant of more than two forces?

ANS:

The **polygon law of forces** is used to find the resultant of **more than two forces.**

Polygon Rule (Head-to-Tail): Forces are arranged sequentially, with the tail of the next vector placed at the head of the previous one. The resultant is the vector connecting the tail of the first force to the head of the last force.



Q5: What is meant by resolution of forces?

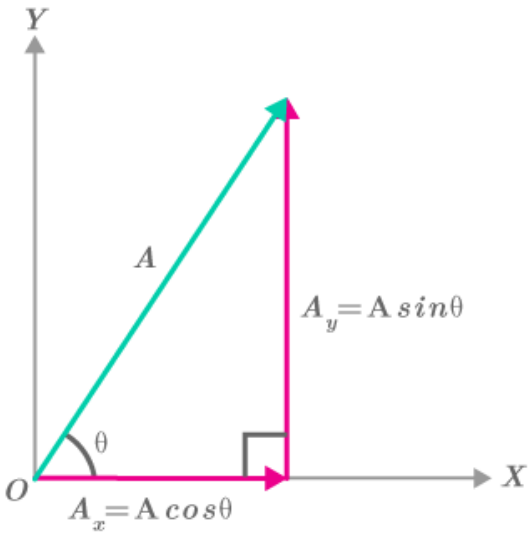
ANS:

Resolution of forces means splitting a single force into two component forces that have the same effect as the original force.

Usually, a force is resolved into two perpendicular components:

Horizontal component

Vertical component



Q6: How the direction of a vector is obtained from its components?

ANS:

The direction of a vector from its components is found using trigonometry.

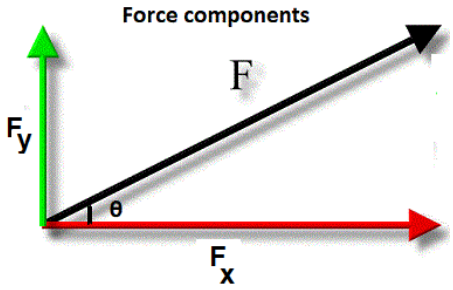
If a vector has:

Horizontal component = F_x

Vertical component = F_y

Then the angle **θ** it makes with the horizontal direction is:

$$\theta = \tan^{-1}\left(\frac{F_y}{F_x}\right)$$



Q7: List the factors on which moment of force depends.

ANS:

The **moment of force** depends on two factors:

Magnitude of the force

Greater force produces a greater moment.

Perpendicular distance from the pivot or axis of rotation

Greater distance from the pivot produces a greater moment.

Q8: What will be moment of force? When 500N force is applied on a 40cm long spanner to tighten a nut.

Ans:

DATA

F = 500 N

d = 40 cm = 0.4 m

Moment of force is given as

$$\boldsymbol{moment\ of\ force = F\ d}$$

$$\boldsymbol{moment\ of\ force = (500)\ (0.4)}$$

$$\boldsymbol{moment\ of\ force = 200\ N\ m}$$

Q9: How is the see- saw balanced?

ANS:

A **see-saw is balanced** when the **clockwise moment** equals the **anticlockwise moment** about the pivot.

Clockwise moment = Anticlockwise moment

Q10: Give three examples in which principle of moment is observed.

ANS:

Three examples where the **principle of moments** is observed are:

See-saw

It balances when the clockwise moment equals the anticlockwise moment.

Beam balance

Used to compare masses by balancing moments on both sides.

Opening a door

A door opens more easily when force is applied farther from the hinge because the moment is greater.

Q11: Write three necessary conditions for two forces to form a couple.

ANS:

Three necessary conditions for two forces to form a **couple** are:

1. **The two forces must be equal in magnitude.**
2. **The two forces must be opposite in direction.**
3. **The two forces must act along different parallel lines of action.**

Q12: If two forces 5N each form a couple and the moment arm is 0.5m .Then what will be torque of the couple?

$$\textbf{torque of the couple} = \mathbf{F\ d}$$

$$\textbf{torque of the couple} = (5)\ (0.5)$$

$$\textbf{torque of the couple} = 2.5\ \boldsymbol{N\ m}$$

Q13: List three states of equilibrium.

ANS:

The three states of equilibrium are:

Stable equilibrium

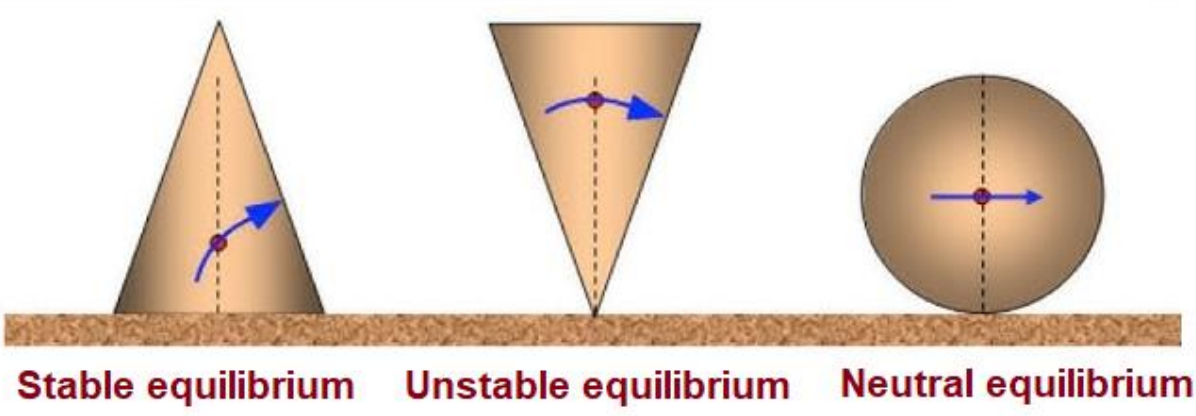
When an object returns to its original position after being slightly displaced.

Unstable equilibrium

When an object moves farther away from its original position after being slightly displaced.

Neutral equilibrium

When an object stays in its new position after being slightly displaced.



Q14: Why a body in unstable equilibrium does not return back to it original position when given a small tilt?

ANS:

A body in **unstable equilibrium** does not return to its original position after a small tilt because its **centre of gravity moves downward** .

When it is slightly tilted:

- The line of action of its weight falls **outside the base** .
- This produces a **turning effect** that makes the body move farther away from its original position.
- So, it topples instead of returning back

Q15: Why racing cars are made heavy at bottom?

ANS:

Racing cars are made **heavy at the bottom** to keep their **centre of gravity low** .

A low centre of gravity makes the car:

- **More stable**
- Less likely to **topple or roll over**
- Better at taking **sharp turns at high speed**

Q16: Why the base area of Bunsen burner is made large?

ANS:

The base area of a **Bunsen burner** is made large to increase its **stability** .

A large base:

- Provides better support
- Keeps the line of action of weight within the base
- Reduces the chance of the burner toppling over