Brain International School

Vikas Puri, New Delhi

ASSIGNMENT NO. 4

SUBJECT: PHYSICS **CLASS-IX** **OCTOBER'2025**

Chapter-9 Gravitation

1. **Choose the correct option:**

i. The gravitational force between two bodies does not depend on:

a) their separation b) their masses

c) the product of their masses d) the medium between two bodies

ii. If the radius of the Earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on Earth surface would.

a) increase b) decrease c) remains unchanged d) none of these

2. **In each of the following questions, two statements are given one labelled. Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions the codes (a), (b), (c) and (d) as given below:**

a) Both A and R are true, and R is correct explanation of the assertion.

b) Both A and R are true, but R is not the correct explanation of the assertion

c) A is true, but R is false

d) A is false, but R is true.

(i) Assertion: The value of acceleration due to gravity on moon is about one-sixth of the value of g on Earth.

Reason: Both the mass and the radius of the Moon are smaller than that of the Earth.

(ii) Assertion: A freely falling object on Earth experiences a uniform acceleration.

Reason: The acceleration due to gravity remains constant near the Earth's surface.

3. Answer the following question.

1. What do you mean by free fall?
2. Differentiate between acceleration due to gravity and universal gravitational constant. Derive a relation between 'g' and 'G'.
3. How does weight of an object change on moving from equator to poles? When can the weight of an object be zero?

4. State universal law of gravitation. How the force between the two bodies is affected if the distance between them is tripled?
5. A cricket ball is robbed from a height of 20 meters.
   a) Calculate the speed of the ball when it hits the ground.
   b) Calculate the time it takes to fall through this height. (g= 10m/s^2)

4. Answer the following case study-based questions

Riya was doing an experiment. She placed a wooden block, a coin, and a plastic ball in a bucket of water. The wooden block and plastic ball floated, while the coin sank. Her teacher explained that floating and sinking depend on density and buoyant force. If the object's density is less than that of water, or if the buoyant force is greater than the object's weight, the object floats.

(i) Why did the wooden block and plastic ball float while the coin sank?

(ii) What is buoyant force? On what factors does it depend?

(iii) A ball weighing 4kg of density 4000 kg/m^3 is completely immersed in water of density 1000 kg/m^3. Find the force of buoyancy on it. [g=10m/s^2]

Chapter-10 Work and energy

1. **Choose the correct option:**

i. A person a 500 J of work in 10 minutes. Another person readers 600 J of work in 20 min. Let the power delivered by A and B is P_A and P_B, then.

a) $P_A = P_B$ b) $P_A > P_B$

c) $Pa < P_B$ d) P_A and P_B are undefined

ii. Two bodies of equal weight are kept at heights of h and 1.5 h. The ratio of their potential energy is.

a) 3:2 b) 2:3 c) 1:1 d) 4:3

2. **In each of the following questions, two statements are given one labelled. Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions the codes (a), (b), (c) and (d) as given below:**

a) Both A and R are true, and R is correct explanation of the assertion.

b) Both A and R are true, but R is not the correct explanation of the assertion

c) A is true, but R is false

d) A is false, but R is true.

(i) Assertion: A moving hammer drives a nail into wood.

Reason: A moving hammer has potential energy in it.

(ii) Assertion: If momentum of a body is doubled, its kinetic energy becomes 4 fold.

Reason: Kinetic energy is proportional to square of momentum.

3. Answer the following question.

1. Explain the following terms with one example each:
   (a) Positive work
   (b) Zero work
2. A man of 60kg runs up of flight of 30 steps in 15 seconds. If each step is 20cm high, calculate the power developed by the man.
3. The speed of a vehicle of mass 500 kg increases from 36 km/h to 72 km/h. Calculate the increase in kinetic energy.
4. a) Define potential energy.
   b) 60000 J of energy is utilized in lifting a mass of 50kg. Calculate the height to which the mass is lifted.
5. A body of mass 10kg is moving with a speed of 50m/s.
   a) What is its kinetic energy?
   b) Calculate the K.E. if (i) velocity is doubled (ii) mass is doubled.

4. Answer the following case study-based questions

When an object is allowed to fall from a high level to a lower level, it gains speed due to the gravitational pull. Therefore, possessing height, a body has the ability to convert its height into kinetic energy. The magnitude of its gravitational potential energy is equivalent to the amount of work done by the weight of the body in causing the descent. The chosen level from which height is measured has no absolute position. It is important to indicate clearly the zero potential energy level in any problem in which its potential energy is to be calculated. The potential energy of body will be positive or negative.

(i) What is the potential energy of stone of a mass 5kg placed at a height of 2m above the ground?

(ii) A cement bag of weight 50kg has potential energy of 490 J. To what height should it be raised?

(iii) When an arrow is shot from its bow, it has kinetic energy. From where does it get this kinetic energy?