Gravitation

Assertion & Reason Type Questions

Directions : Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

c. Assertion (A) is true but Reason (R) is false.

d. Assertion (A) is false but Reason (R) is true.

Q1. Assertion (A): When the distance between the two bodies is doubled and also the mass of each body is also doubled, the gravitational force between them remains the same.

Reason (R): According to Newton's law of gravitation, force is directly proportional to the mass of bodies and inversely proportional to the square of distance between them.

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q2. Assertion (A): The Earth is acted upon by gravitation of the Sun, even though it does not fall into the Sun.

Reason (R): The gravitational pull of the Sun on the earth provides the required centripetal force on earth due to which it revolves around the Sun.

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q3. Assertion (A): The value of acceleration due to gravity does not depend upon mass of the body on which force is applied.

Reason (R): Acceleration due to gravity is a constant quantity.

Answer : (c) Assertion (A) is true but Reason (R) is false.

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Reason (R) is false because acceleration due to gravity changes with respect to height above the Earth surface, depth below the Earth surface or due to shape of Earth (g is greater at poles than at equator).

Q4. Assertion (A): A body becomes weightless at the centre of Earth.

Reason (R): As the distance from centre of Earth decreases, acceleration due to gravity increases.

Answer : (c) Assertion (A) is true but Reason (R) is false.

Reason (R) is false because, as distance from centre of Earth decreases, the acceleration due to gravity also decreases.

Q5. Assertion (A): The universal gravitational constant is same as acceleration due to gravity.

Reason (R): Gravitational constant and acceleration due to gravity do not have same SI unit.

Answer : (d) Assertion is false because universal gravitational constant (G) and acceleration due to gravity (g) are different.

G is a scalar quantity whereas g is a vector quantity. SI unit of G is Nm² Kg⁻² and SI unit of g is m s⁻².

Q6. Assertion (A): Pins and nails are made to have pointed ends in order to have a minimum area of contact between the pointed ends and the given surface.

Reason (R): Minimal area of contact means that the pressure applied on the surface by the pin is greater.

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q7. Assertion (A): An object will sink in water when the downward force acting on that object is greater than the upthrust of water on that object.

Reason (R): An object will sink in water when upthrust of water on that object is greater than the weight of that object.

Answer : (c) Assertion (A) is true but Reason (R) is false.

Reason (R) is false because an object will sink in water when upthrust of water on that object is less than the weight of that object.



Q8. Assertion (A): An object floats if it displaces an amount of liquid whose weight is greater than the actual weight of the object.

Reason (R): During flotation an object experiences no net force in the downward direction.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Q9. Assertion (A): Archimedes' principle gives relationship between buoyant force exerted by a liquid on an object and the weight of liquid displaced by it.

Reason (R): Hydrometers and lactometers are based on Archimedes' principle.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

