Guruthwakarshanam

Que.1. Imagine a spring balance is dropped from the top of a building along with a mass of 1 Kg. [Marks :(4)]

1. **What will be reading of the spring balance while falling down? Why ?**
2. **If the mass takes 5s to reach ground, find out height of the building.**
3. **What is the velocity of the mass just before it touches the ground ?**

Ans. a) Zero. The weight of a freely falling object is fully utilized for it acceleration.

b) $S = ut + 1/2\ at^2$

$= 0 \times 5 + 1/2 \times 10 \times 5^2$

$= 125$ m (value of g is rounded to 10 m/s^2

c) $v = u + at$

$= 0+10 \times 5$

$= 50$ m/s

Que.2. The resultant gravitation force at the centre of the Earth is zero. Give reason. [Marks :(2)]

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Que.3. Will the value of g be the same everywhere on the Earth ? Why ?

[Marks :(2)]

Ans. No. As Earth is not a perfect sphere, the distance from the centre of the Earth to its surface is not the same at different places.greater the distance, the lower the value of g.

Que.4. An iron block of mass 1 Kg falls freely from the top of a building in 2 s.

[Marks :(3)]

1. **calculate height of the building. (g = 10 m/s^2)**
2. **If the experiment was repeated at the same altitude as the moon, how long would it take for the iron block to reach the lunar surface? (g on moon = 1.62 m/s^2)**

Ans. a) $S= ut + 1/2\ at^2 = 0+ 1/2 \times 10 \times 2^2 = 20$ m

b) $S = ut + 1/2\ at^2$

$20 = 0 + 1/2 \times 1.62 \times t^2$

$20 = 0.81\ t^2$

$t^2 = 20 / 0.81 = 24.69 \sim 25$

$t^2 = 25$

$t = 5$ s

Que.5. If the distance between two objects attracting each other is increased by 4 times, what will be the force of attraction between them ? [Marks :(2)]

Ans. $F = G\ m_1\ m_2 / d^2$

$d = 4\ d$

$F = G\ m_1\ m_2 / (4d^2)$

$= 1/16\ (G\ m_1\ m_2 / d^2)$

The force of attraction will be decreased by 1/16

Que.6. Calculate the weight of an object of mass 40 Kg. [Marks :(2)]

Ans. $W = mg = 40 \times 9.8 = 392$ N

Que.7. a. Calculate the mass of a man on moon whose mass on the Earth is 60 Kg. [Marks :(3)]

b. What will be his weight on the Earth ? Will his weight differ on the moon ? If so why ?

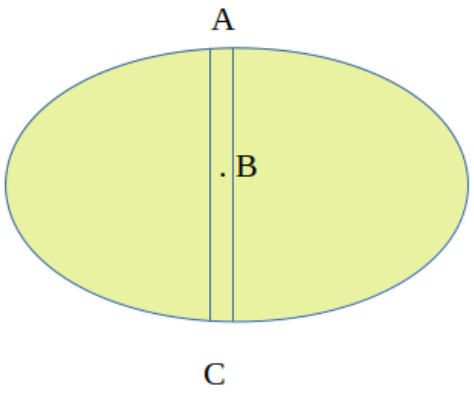
Ans. 1. 60 Kg (Mass of an object remains the same everywhere in the Universe)

2. His weight on the Earth, $W = mg = 60 \times 9.8 = 588$ N

weight of the man on the surface of moon will be lesser than that on the Earth, because acceleration due to gravity on the moon surface is less.

$W = mg = 60 \times 1.62 = 97.2$ N

Que.8. Imagine that a pipe is fixed through centre of the Earth (B) from the north pole (A) to the south pole (C). [Marks :(3)]



1. **If a ball rolls from A to B, what change will happen in the force of gravity experienced by the ball ?**
2. **What will be the weight of the ball at B ?**
3. **How will the weight of the ball change when it rolls from B to C ?**

Ans.

1. Force of gravity will decrease.
2. Zero
3. Weight increases because value of acceleration due to gravity increases as we go outside the centre to the surface of the Earth.

Que.9. At which place on the surface of Earth does an object experiences the maximum force of gravity ? Give reason. [Marks :(2)]

Ans. At poles. That is,

Force of gravity, $F = G\ Mm/R^2$

The radius of the Earth at the poles is less and hence the force of gravity is high.

Que.10. Two objects of mass 35 Kg and 45 Kg are placed 2 m apart. Find out the force of attraction between them. [Marks :(2)]

Ans. $F = G\ m_1\ m_2 / d^2$

$= (6.67 \times 10^{-11} \times 35 \times 45) / 4$

$= 2626.31 \times 10^{-11}$ N

Que.11. Give reason -

Even though there is a force of attraction between two adjacent objects, they do not come closer attracting each other. [Marks :(2)]

Ans. Gravitational force is a very weak force and hence it is unable to overcome the frictional and other force. Therefore two adjacent objects do not come closer attracting each other.

Que.12. Consider two stones of mass 5 Kg and 50 Kg placed somewhere 500 m above the Earth's surface. [Marks :(4)]

1. **Which stone will experience more force of attraction by the Earth ? Why?**
2. **If both the stones are allowed to fall freely at the same time, which one will reach the Earth's surface first ? Give reason.**
3. **Compare the weight of the stones while falling down.**

Ans. a. 50 g

$F = GMm / R^2$, the force of gravitation is directly proportion to the mass of object.

b. Both the stones will fall at the same time. Weight of objects falling down will be utilized for acceleration or in other words, the force of gravity does not depend upon the mass of objects.

Que.13. What do you mean by Gravitational force of attraction ? On what factors does the force of gravity depend ? [Marks :(2)]

Ans. The Earth attracts all objects towards its centre. This force of attraction is called Gravitational force. The force of gravity depends upon the mass of objects, mass of the Earth and the distance between the Earth and the object.