Physics

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2021 Mid term question of phy-122

(1) Explain why mass is constant but weight is variable on the earth and in space. justify the value of 'g'.

Ans :- Mass :- is a measure of the amount of matter and is a scalar quantity. It doesn't depends on gravity, so gt is constant everywhere.

Weight :-

~~The~~ weight is variable because gt depends on mass (m) and gravity (g). Gravity is not constant everywhere. The formula for weight (W) is

$$W = m \times g$$

weight = mass x gravity.

The value of g on Earth 9.8 m/s^2. In space, the value of gravity is much weaker than Earth's surface. In the absence of a significance gravitational force, in space weightlessness and mass remains same.

① justify value of 'g' :- The value of 'g' influenced by several factors, The standard value of g at the Earth is 9.8 m/s². But it is difference geographical location, mass and weigh. $[g = \frac{W}{m}]$

② what is compound pendulum? Write down the equation of it's time period. Why the amplitude of the pendulum is kept small

⇒ Compound pendulum is a rigid (शक्त) body of any shape free to turn about a horizontal axis.

The equation of compound pendulum's Time period

$$T = 2\pi \sqrt{\frac{I}{mgl}}$$

if $I = m(k^2+l^2)$

Then, $T = 2\pi \sqrt{\frac{m(k^2+l^2)}{mgl}}$

$$= 2\pi \sqrt{\frac{k^2+l^2}{gl}}$$

The amplitude of a pendulum is often kept small for few reasons

1) small Angle Approximation
2) period Independence
3) Linear Restoring force
4) Conservation of Energy

3) What is the difference between g and G ? How the value of 'g' changes as we move from the surface towards the C.G of the earth.

⇒ ~~'g' is acce~~

Symbol	Defination	Unit	value
g	Acceleration due to gravity	m/s^2	9.8 m/s^2
G	Universal gravitational Constant	Nm^2/kg^2	6.67×10^{-11}

We move towards the earths center, the value of 'g' would increase. Because the gravitational force is inversely proportional to the square of the distance between the centre of mass of two objects. As you closer to the Earth's centre, distance decreases, (g) increasing gravity ↑ value.