



IN - TEXT QUESTIONS SOLVED

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Question 1. Why is it difficult to hold a school bag having a strap made of a thin and strong string?

Answer: The force exerted by a thin and strong string is distributed to very less area and hence the force applied due to the bag is more, the pressure exerted on the body by thin straps will be more and hence will be more painful.

As pressure is inversely proportional to area, if the area is reduced pressure.

$$\text{increases} \left(\text{pressure} \propto \frac{1}{\text{Area}} \right)$$

Question 2. What do you mean by buoyancy?

Answer: The upward force exerted by any fluid (liquid, gas) on an object is known as upthrust or buoyancy.

Question 3. Why does an object float or sink when placed on the surface of water?

Answer: The density of the objects and water decides the floating or sinking of the object in water.

The density of water is 1 gm/cm^3 .

- If the density of an object is less than the density of water then the object will float.
- If the density of an object is more than the density of water then the object will sink.

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Question 1. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg?

Answer: The weighing machine actually measures the weight of the body as the acceleration due to gravity 'g' is acting on the body. Hence the mass reading of 42 kg given by a weighing machine is same as the actual mass of the body. As mass is the quantity of inertia, it remains the same.

Question 2. You have a bag of cotton and an iron bar, each indicating a mass of 100 kg when measured on a weighing machine. In reality, one is heavier than other. Can you say which one is heavier and why?

Answer: The heaviness of the bag can be given by density

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

Mass of both cotton bag and iron bag is same. But the volume of cotton bag is more than the iron bag.

Hence density is inversely proportional to volume. The bag of iron will be heavier.

QUESTIONS FROM NCERT TEXT BOOK

Question 1. How does the force of gravitation between two objects change when the distance between them is reduced to half?

Answer: According to Universal Law of gravitation, the gravitational force of attraction between any two objects of mass M and m is proportional to the product of their masses, and inversely proportional to the square of distance r between them. So, force F is given by

$$F = G \frac{M \times m}{r^2}$$

Now when the distance r is reduced to half then force between two masses becomes

$$F' = G \frac{M \times m}{\left(\frac{r}{2}\right)^2}$$

Or,

$$F' = 4F$$

Hence, if the distance is reduced to half, then the gravitational force becomes four times larger than the previous value.

Question 2. Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object?

Answer: All objects fall on ground with constant acceleration, called acceleration due to gravity (in the absence of air resistances). It is constant and does not depend upon the mass of an object. Hence, heavy objects do not fall faster than light objects.

Question 3. What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface? (Mass of the earth is 6×10^{24} kg and radius of the earth is 6.4×10^6 m).

Answer: Given that,

Mass of the body, $m = 1$ kg

Mass of the Earth, $M = 6 \times 10^{24}$ kg

Radius of the earth, $R = 6.4 \times 10^6$ m

Now magnitude of the gravitational force (F) between the earth and the body can be given as,

$$\begin{aligned} F &= G \frac{M \times m}{r^2} = \frac{6.67 \times 10 \times 6 \times 10 \times 1}{(6.4 \times 10^6)^2} \\ &= \frac{6.67 \times 6 \times 10}{6.4 \times 6.4} = 9.8 \text{ N (approx.)} \end{aligned}$$

Question 4. The earth and the moon are attracted to each other by gravitational force. Does the earth attract the moon with a force that is greater or smaller or the same as the force with which the moon attracts the earth? Why?

Answer: According to the universal law of gravitation, two objects attract each other with equal force, but in opposite directions. The Earth attracts the moon with an equal force with which the moon attracts the earth.

Question 5. If the moon attracts the earth, why does the earth not move towards the moon?

Answer: The Earth and the moon experience equal gravitational forces from each other. However, the mass of the Earth is much larger than the mass of the moon. Hence, it accelerates at a rate lesser than the acceleration rate of the moon towards the Earth. For this reason, the Earth does not move towards the moon.

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