FBISE 9th Class Physics New Book Notes Chapter 5

SHORT RESPONSE QUESTIONS

Q1. While walking on a trampoline. Do you feel more pressure when you stand still or jump up and down? Why does pressure change with movement?

Ans: When standing still on a trampoline (rebound tumbler), you would feel more pressure compared to when jumping up and down. This happens because when standing still, your weight is concentrated over a smaller area, resulting in higher pressure on the trampoline surface beneath your feet. When you jump up and down, your weight is distributed over a larger are while in the air, reducing the pressure on the trampoline.

$$\mathbf{P} = \frac{\mathbf{F}}{\mathrm{A}} \Rightarrow \mathbf{P} \propto \frac{1}{\mathrm{A}}$$

Pressure changes with movement because pressure is defined as force per unit area. When you stand still, your weight (the force) is applied over a smaller area, resulting in higher pressure. When you jump, your weight is spread out over a larger area, decreasing the pressure. Essentially, the pressure felt is to how much force is applied and the area over which it is distributed.

Q2. How does the shape of a thumb pin help it penetrate surfaces easily?

Ans: The shape of a thumb pin, with its sharp pointed tip, helps it penetrate surfaces easly by concentrating the force applied to a small area:

$$\mathbf{P} = \frac{\mathbf{F}}{\mathbf{A}} \Rightarrow \mathbf{P} \propto \frac{1}{\mathbf{A}}$$

This allows the pin to exert a higher pressure at the point of contact, facilitating the insertion of the pin into various materials with minimal resistance. Essentially, the sharp point reduces the area over which the force is distributed, making it easier to overcome the resistance of the material being penetrated.

Q3. If you blow up a balloon and then tie it closed, why does it stay inflated even though you stop blowing? How does pressure play a role here?

Ans: When you blow up a balloon and tie it closed , the air molecules inside the balloon create pressure against the walls of the balloon. This pressure pushes outward in all directions. Including against the walls of the balloon, causing it to stay inflated even though you stop blowing. The pressure inside the balloon is greater than the pressure outside, which prevents the balloon from deflating immediately.

$$P = \frac{F}{A} \Rightarrow P \propto \frac{1}{A}$$

The pressure exerted by the air molecules inside the balloon keeps it inflated by pushing outward against the walls of the balloon.

Q4. Why an inner airtight layer of a space suit is designed to maintain a constant pressure around the astronaut?

Ans: The inner airtight layer of a space suit is designed to maintain a constant pressure around the astronaut to ensure their safety and comfort. Without a constant pressure, the astronaut's body would be exposed to the vacuum of space, which could lead to decompression sickness, tissue damage, and other serious health issues. Therefore, the airtight layer helps regulate the pressure, providing a stable environment for the astronaut to work in. $\Rightarrow P = \rho$**hg**

Q5. If a liquid has density twice the density of mercury, what will be height of liquid column in barometer?

Ans: If the density of the liquid is twice the density of mercury, then the height of the liquid column in the barometer will be half the height of the mercury column. This is because the pressure exerted by the liquid column in the barometer is equal to the pressure exerted by the mercury column, and pressure is proportional to the height of the column of the llquid. Therefore, if the density of the liquid is doubled. the height of the liquid column in the barometer will be halved to maintain the equilibrium of pressure. $\Rightarrow$ **P** $= \rho$**hg**

Q6. Why we wouldn't be able to sip water with a straw on the moon?

Ans: We wouldn't be able to sip water with a straw on the moon because there is no atmosphere on the moon to create the necessary pressure difference for suction to work. Suction relies on atmospheric pressure to push the liquid up the straw, but since there is no. significant atmosphere on the moon, there is no pressure difference to create suction, making it impossible to sip water with a straw.

Q7. How are we able to break a metal wire by bending it repeatedly?

Ans: When the substance is subjected to repeated strain, the elastic properties of the material get greatly impaired. This property is called elastic fatigue. Thus, we are able to break the wire by repeated bending. Repeated bending of a metal wire causes fatigue in its structure, leading to the formation and propagation of microscopic cracks. Over time, these cracks grow larger and eventually cause the wire to break. The repeated bending causes the metal's crystal structure to weaken and deform, making it more susceptible to fracture.

Q8. A spring, having spring constant ' k ' when loaded with mass ' m ', is cut into two equal parts. One of the pars is loaded with the same mass ' m ' again. What will be its spring constant now?

Ans: Spring constant $(k) \propto \frac{1}{\text{Length of the spring}}$

As length becomes half, spring constant k becomes twice. i.e., **2k**.

So when it is cut into two equal parts its length decreases to half and simultaneously spring constant increases to **2k**.

Q9. Why do static fluids always exert a force perpendicular to the surface?

Ans: Parallel components of force cause flow of the fluid. Therefore only perpendicular component of force exist. A force exerted by a static fluid on a surface is always perpendicular to the surface because the hydrostatic pressure in the fluid acts equally in all directions (Pascal's principle). In this case, the pressure acting on the surface results in a net force acting perpendicular to the surface, ensuring the fluid remains at rest (in equilibrium) within the fluid. If the pressure were to act at an angle or tangentially, it would cause the fluid to move or flow.

Q10. How can a small car lifter can lifts load heavier than itself?

APP11-16
LAHORE: October 16 – A traffic warden moving a wrong parked car by the help of lifter at Feroz-pur Road. APP photo by Tabasam Naveed

Ans: A forklift is able to lift cars heavier than itself because the counter torque it produces is greater than the torque produced by weight of the cars.

The center of gravity of a forklift is much close to the back of the forklift than the center because the back includes a large molded piece of iron to move the center of balance back. This feature allows the forks to lift a heavier load than if the center of gravity was at the geometric center. If possible, the heaviest part of the load to be lifted and / or

moved should be placed closest to the front of the forklift to minimize tipping force on the lift.