QUIZ CUBES

Class 11/12 | AP Physics | IIT JEE | NEET

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Torque

The following questions are concept based. For questions with higher level difficulty, watch videos in the course.

Q1. Which of the following statements best describes the concept of torque?

A. Torque is a measure of the force applied to an object.
B. Torque is a measure of the tendency of a force to rotate an object about an axis.
C. Torque is the same as force but applied to rotating objects.
D. Torque is the distance over which a force is applied.

Answer: B. Torque is a measure of the tendency of a force to rotate an object about an axis.

Explanation: Torque is not just a measure of force but specifically how that force causes rotation around a pivot or axis.

Q2. If a force acts on an object at its center of mass, what will be the resulting torque *about that point*?

A. Maximum
B. Zero
C. Minimum but non-zero
D. It depends on the force applied

Answer: B. Zero

Explanation: Torque depends on the distance from the axis of rotation. If the force acts at the centre of mass, the distance is zero, hence the torque is zero. As a thumb rule, if the force passes through the axis of rotation the torque due to that force will be zero.

Q3. A door is being pushed by a force of 25 N (perpendicular to the door plane) at a distance of 0.8 m from its hinge. What is the torque exerted on the door?

A. 10 Nm
B. 15 Nm
C. 20 Nm
D. 25 Nm

Answer: C. 20 Nm

Explanation: Torque (τ) is calculated as the product of force (F) and the perpendicular distance from the axis of rotation (r). Here, τ = F r = 25 N × 0.8 m = 20 Nm.

Q4. A horizontal force of 10 N is applied at the edge of a wheel of radius 0.2 m, making an angle of 30° with the extended radius. What is the torque about the center of the wheel?

A. 1 Nm
B. 1.73 Nm
C. 2 Nm
D. 2.5 Nm

Answer: A. 1 Nm

Explanation: Torque τ = r × F × sin(θ). Here, τ = 0.2 m × 10 N × sin(30°) = 2 × 0.5 = 1 Nm.

Q5. Which of the following statements is true about torque and rotational equilibrium?

A. An object in rotational equilibrium has no forces acting on it.
B. An object in rotational equilibrium has no net torque acting on it.
C. An object in rotational equilibrium must be stationary.
D. An object in rotational equilibrium has equal torques in all directions.

Answer: B. An object in rotational equilibrium has no net torque acting on it.

Explanation: Rotational equilibrium occurs when the sum of all torques acting on an object is zero, leading to no rotational acceleration.

Q6. If the torque required to open a door is 15 Nm and the force applied is 25 N (perpendicular to the plane of the door), what is the minimum distance from the hinge at which the force should be applied?

A. 0.3 m
B. 0.4 m
C. 0.5 m
D. 0.6 m

Answer: D. 0.6 m

Explanation: Distance r = τ / F. Substituting the values, r = 15 Nm / 25 N = 0.6 m.

Q7. A seesaw is balanced with a child of mass 30 kg sitting 2 m from the pivot on one side. If another child of mass 40 kg sits on the other side, how far from the pivot should they sit to balance the seesaw?

A. 1 m
B. 1.5 m
C. 2 m
D. 2.5 m

Answer: B. 1.5 m

Explanation: To balance the seesaw, the torques must be equal. Let d be the distance from the pivot for the second child: 30 kg × 2 m × 9.8 m/s² = 40 kg × d × 9.8 m/s², giving d = (30 × 2) / 40 = 1.5 m.

Q8. Which of the following does not affect the magnitude of torque?

A. The magnitude of the force applied
B. The distance from the axis of rotation
C. The angle between the force and the lever arm
D. The mass of the object

Answer: D. The mass of the object

Explanation: Torque is independent of the mass of the object; it only depends on the force, distance from the axis, and the angle of application.

Q9. A disk is subjected to two forces, 20 N (anti-clockwise) and 30 N (clock-wise), applied at distances of 0.3 m and 0.2 m from the center, respectively, both perpendicular to the radius but in opposite directions. What is the net torque on the disk?

A. 0 Nm
B. 1 Nm
C. 2 Nm
D. 3 Nm

Answer: A. 0 Nm

Explanation: Net torque τ_net = τ1 - τ2 = (20 N × 0.3 m) - (30 N × 0.2 m) = 6 Nm - 6 Nm = 0 Nm.

Q10. How does the concept of torque explain why a longer wrench makes it easier to loosen a bolt?

A. A longer wrench reduces the friction between the bolt and the surface.
B. A longer wrench increases the force applied.
C. A longer wrench increases the distance from the axis of rotation, thus increasing the torque.
D. A longer wrench decreases the distance from the axis of rotation, thus reducing the effort needed.

Answer: C. A longer wrench increases the distance from the axis of rotation, thus increasing the torque.

Explanation: A longer wrench provides a greater lever arm, which increases the torque for the same amount of applied force, making it easier to loosen the bolt.