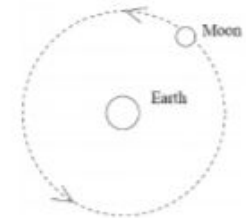


1. The Moon orbits the Earth in a nearly circular orbit at constant speed as shown.



Which of the following diagrams correctly shows the force(s) acting on the Moon in the position shown above?



2. A pendulum, consisting of a heavy bob attached to a rigid rod, is released from rest at point A as shown in the diagram below. When the bob is at point P, the rod is horizontal.



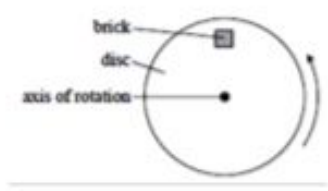
Which arrow best indicates the direction of the acceleration of the bob at point P?

- A. ←
- B. ↘
- C. ↓
- D. →

3. Two satellites of equal mass, S_1 and S_2 , orbit the Earth. S_1 is orbiting at a distance r from the Earth's centre at speed v . S_2 orbits at a distance $2r$ from the Earth's centre at speed $v/2$. The ratio of the centripetal force on S_1 to the centripetal force on S_2 is

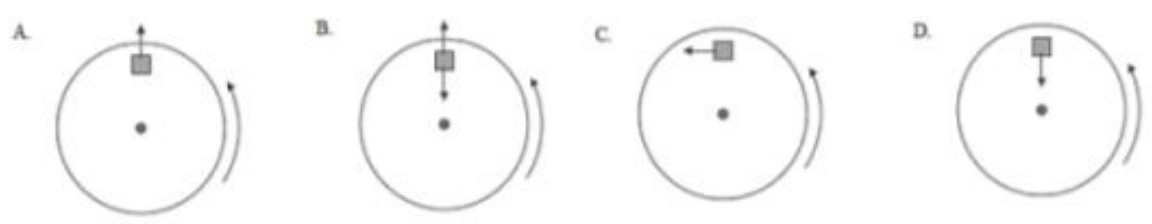
- A. $1/8$.
- B. $1/4$.
- C. 4.
- D. 8.

4. A brick is placed on the surface of a flat horizontal disc as shown in the diagram below.

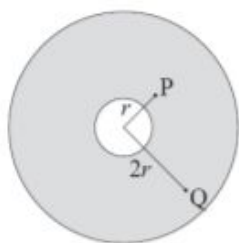


The disc is rotating at constant speed about a vertical axis through its centre. The brick does not move relative to the disc.

Which of the diagrams below correctly represents the **horizontal** force or forces acting on the brick?



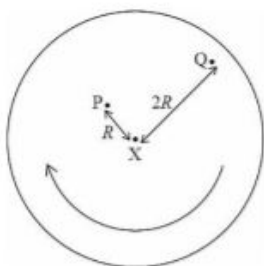
5. Two points P and Q are at distances r and $2r$ respectively from the centre of a compact disc (CD) as shown.



When the disc is rotating about its centre, the ratio of the centripetal accelerations at P and Q is

- A. $1/2$. B. 1. C. $\sqrt{2}$. D. 2.

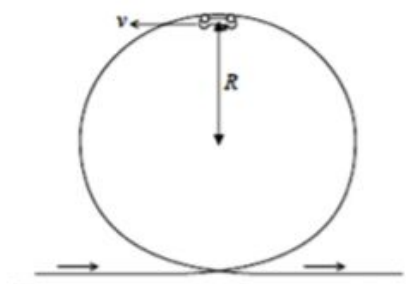
6. Points P and Q are at distances R and $2R$ respectively from the centre X of a disc, as shown below.



The disc is rotating about an axis through X, normal to the plane of the disc. Point P has linear speed v and centripetal acceleration a . Which one of the following is correct for point Q?

	Linear speed	Centripetal acceleration
A.	v	a
B.	v	$2a$
C.	$2v$	$2a$
D.	$2v$	$4a$

7. In a fairground ride, a car of mass M travels on rails around a vertical loop of effective radius R . At the top of the loop, the speed of the car is v . The car stays in contact with the rails, as shown below.



The acceleration of free fall is g .

Which of the following is the correct expression for the force that the rails exert on the car?

- A. $\frac{Mv^2}{R} - Mg$ B. $\frac{Mv^2}{R}$ C. Mg D. $\frac{Mv^2}{R} + Mg$

8. Which of the following can *not* be used as units for the centripetal acceleration of a mass moving in a circular path?

- A. rad s^{-2} B. m s^{-2} C. N kg^{-1} D. km h^{-2}

9. An object is moving in a circle of radius r with an initial (linear) speed v . It then accelerates to $2v$. The ratio of the final centripetal force to the initial centripetal force is

A. 0.25

B. $\sqrt{2}$

C. 2

D. 4