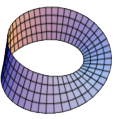
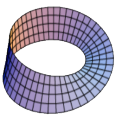


Simple Harmonic and Circular Motion – Circular Motion

- * A particle describes a horizontal circle of radius 2 metres with uniform angular velocity ω radians per second. Its speed is 6 m/s and its mass is 4 kg. Find the value of
 - the angular velocity ω
 - and the centripetal force on the particle.
- * A particle describes a horizontal circle of radius 2 m with uniform angular velocity ω rad/sec. Its speed is 8 m/s. Find
 - the acceleration of the particle
 - the time taken to complete one revolution.
- * A particle describes a horizontal circle of radius r metres with uniform angular velocity ω radians per second. Its speed and acceleration are 6 m/s and 12 m/s^2 respectively. Find the value of
 - the radius r
 - the angular velocity ω
- * A particle describes a horizontal circle of radius 0.5 m with uniform angular velocity ω rad/s. Its acceleration is 8 m/s^2 .
 - the value of ω
 - the time taken to complete one revolution.
- * A particle describes a horizontal circle of radius 2 metres with constant angular velocity ω radians per second. Its speed is 5 m/s and its mass is 3 kg.
 - the value of ω
 - the centripetal force on the particle.
- * A hemispherical bowl of diameter 20 cm is fixed to a horizontal surface. A smooth particle of mass 1 kg describes a horizontal circle of radius r cm on the smooth inside surface of the bowl. The plane of the circular motion is 4 cm above the horizontal surface. Find the value of the
 - radius r
 - reaction force (particle & the bowl)
 - angular velocity ω .
- * A smooth particle of mass 3 kg is attached by a light inelastic string to a fixed point P. The particle describes a horizontal circle of radius 0.5 m on the smooth surface of a horizontal table. The centre of the circle is vertically below P. The string makes an angle with the vertical, where $\tan \alpha = \frac{4}{3}$. The speed of the particle is 2 m/s. Find
 - the tension in the string
 - the reaction force between the particle and the table.
- * A conical pendulum consists of a particle of mass 3 kg attached by a light inelastic string of length 1 metre to a fixed point P. The particle describes a horizontal circle of radius r . The centre of the circle is vertically below P. The string makes an angle of with the vertical where $\tan \alpha = \frac{4}{3}$. Find the
 - value of r
 - tension in the string
 - angular velocity of the particle.
- * A right circular hollow cone is fixed to a horizontal surface. Its semi-vertical angle is 30° and its axis is vertical. A smooth particle of mass 2 kg describes a horizontal circle of radius r cm on the smooth inside surface of the cone. The plane of the circular motion is 5 cm above the horizontal surface. Find the
 - value of r in surd form.
 - reaction force between the particle and the cone
 - angular velocity ω .
- * A hemispherical bowl of diameter 10 cm is fixed to a horizontal surface. A smooth particle of mass 2 kg describes a horizontal circle of radius r cm on the smooth inside surface of the bowl. The plane of the circular motion is 2 cm above the horizontal surface. Find the value of the
 - radius r
 - reaction force (particle & the bowl)
 - angular velocity ω .



Source(s):

- <http://www.MathsGrinds.ie/>
- <http://www.examinations.ie/>

Further Information:

- Questions marked with an asterisk * are past Leaving Cert Exam questions.

Answers:

- 3 rad/sec
 - 72 N
 - 12.8 rad/sec
- 32 m/s²
 - $\frac{\pi}{2}$ Seconds
 - 30 N
- 3 m
 - 2 rad/sec
 - 11.4 N
- 4 rad/sec
 - $\frac{\pi}{2}$ Seconds
 - 0.8 m
- 2.5 rad/sec
 - 37.5 N
 - 49 N
- 8 cm
 - 16.3 N
 - 4.04 rad/sec
- 3 rad/sec
 - 72 N
 - 12.8 rad/sec
- 32 m/s²
 - $\frac{\pi}{2}$ Seconds
 - 30 N
- 3 m
 - 2 rad/sec
 - 11.4 N
- 4 rad/sec
 - $\frac{\pi}{2}$ Seconds
 - 0.8 m
- 2.5 rad/sec
 - 37.5 N
 - 49 N
- 8 cm
 - 16.3 N
 - 4.04 rad/sec
- $\frac{5}{3}\sqrt{3}$ cm
 - 39.2 N
 - $\sqrt{600}$ rad/sec
- 4
 - $\frac{10g}{3}$ N
 - 1.81 rad/sec