

Answer on Question #39840, Physics, Other

Question:

A body of mass m is moving in a horizontal circle of radius r with constant speed v . The force on the body is mv^2/r and is directed towards centre.

Calculate the work done on the object when it moves through a distance which is:

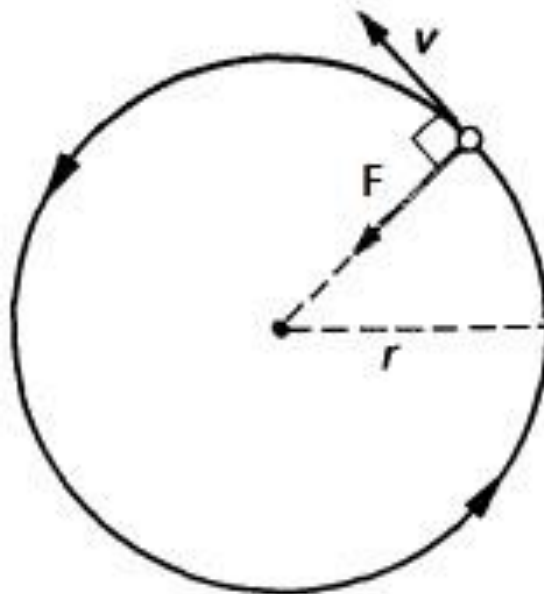
1. $1/2$ The circumference of the circle
2. $1/4$ the circumference of the circle
3. $3/4$ the circumference of the circle
4. complete circumference of the circle.

Answer:

Mathematically, work can be expressed by the following equation:

$$W = \int \vec{F} \cdot d\vec{l} = \int \vec{F} \cdot \vec{v} dt$$

where \vec{F} is the force, $d\vec{l}$ is the displacement, \vec{v} is velocity.



But force and velocity are perpendicular, therefore $\vec{F} \cdot \vec{v} = Fv \cos 90^\circ = 0$. So, work equals 0 for all distances.

Answer: 1,2,3,4: 0