

Circular Motion

Name

1. A particle of mass m moves in a circle of radius r at uniform speed, taking time T for each revolution. What is the kinetic energy of the particle?

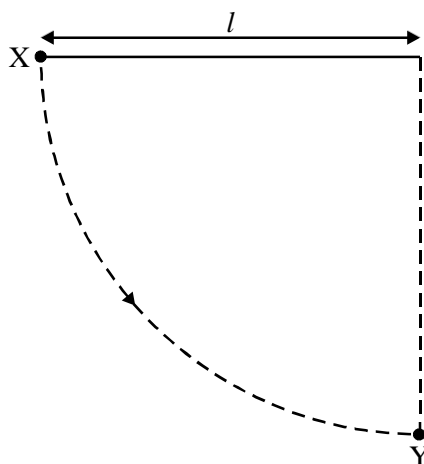
A $\frac{\pi^2 m r}{T^2}$

B $\frac{\pi^2 m r^2}{T^2}$

C $\frac{2\pi^2 m r^2}{T}$

D $\frac{2\pi^2 m r^2}{T^2}$

- 2.



A simple pendulum consists of a bob of mass m on the end of a light string of length l . The bob is released from rest at X when the string is horizontal. When the bob passes through Y its velocity is v and the tension in the string is T . Which one of the following equations gives the correct value of T ?

A $T = mg$

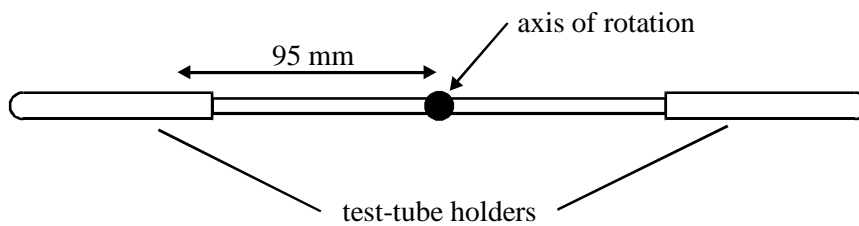
B $T = \frac{mv^2}{l}$

C $T + mg = \frac{mv^2}{l}$

D $T - mg = \frac{mv^2}{l}$

3. A girl of mass 40 kg stands on a roundabout 2.0 m from the vertical axis as the roundabout rotates uniformly with a period of 3.0 s. The horizontal force acting on the girl is approximately
- A zero.
 - B 3.5×10^2 N.
 - C 7.2×10^2 N.
 - D 2.8×10^4 N.

4. A chemical centrifuge consists of two test-tube holders which can be spun round in a horizontal circular path at very high speed as shown. The centrifuge runs at a steady speed of 3000 revolutions per minute and the test-tube holders are horizontal.



- (i) Calculate the angular speed of the centrifuge in rad s^{-1}

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- (ii) Calculate the magnitude of the acceleration at a point on the centrifuge 95 mm from the axis of rotation.

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- (iii) State the direction of the acceleration in part (ii).

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(Total 5 marks)

5. A satellite moves in a circular orbit at constant speed. Explain why its speed does not change even though it is acted on by a force.

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(Total 3 marks)