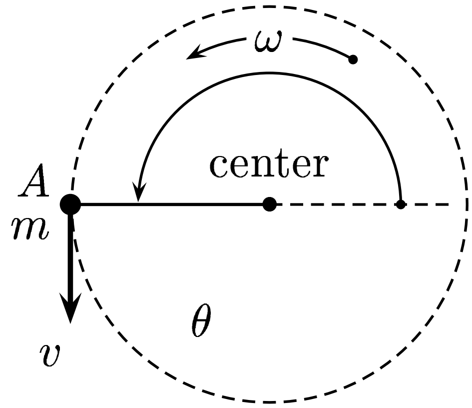
A mass m is moving along a circular path at a fixed radius r . The motion is on the surface of a horizontal frictionless table. So gravity may be ignored.



As m curves around the point A, to an inertial frame observer there is a centripetal acceleration $a_{cp} = \dfrac{v^2}{r}$, which is pointing to right.

Consider a specific non-inertial frame; *i.e.*, "the rest frame of m, where m is at rest".

To an observer in this "non-inertial frame", which one of the choices is equivalent to inertial frame equation $\sum F_{inertial} = m\, a_{inertial}$.

A) $T - \dfrac{m\, v^2}{r} = 0$.

B) $T = \dfrac{m\, v^2}{r}$.

C) $T + \dfrac{m\, v^2}{r} = 0$.

As m passes the point A, the rest frame observer perceives that

• there is a tension T pulling to the right, and

• there is the inertial force with a magnitude $\dfrac{m\, v^2}{r}$ (*i.e.*, the "centrifugal force"), pulling to the left.

To this observer there is no acceleration along the radial direction.

So **A** is "$\sum F_{non-inertial} - m\, a_{non-inertial} = 0$" and describes the situation equivalent to the rest frame.

B is an equation in the inertial frame (not the equation in the non-inertial frame), where there is the centripetal acceleration and a force $F = m\, a_{cp}$.

Note: The mathematical content of the force equation of **A** and **B** is the same.

C is incorrect.

Answer**A**.

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