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 $a_{cp} = \frac{v^2}{r}$, 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 $\sum F_{\text{inertial}} = m a_{\text{inertial}}$.

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

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

C) $T + \frac{m v^2}{r} = 0$. 
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 $\frac{mv^2}{r}$ (i.e., the “centrifugal force”), pulling to the left.

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

So $A$ is $\sum F_{\text{non-inertial}} - m a_{\text{non-inertial}} = 0$” 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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