For the counter-clockwise circular motion below, the equation of motion is given by $\vec{T} + m \vec{g} = m \vec{a}_c$. Let $T$, $mg_{\parallel r} = |mg \sin \theta|$, $mg_{\perp r} = |mg \cos \theta|$, and $a_c$ be positive definite quantities.

The tangential equation is

A) $T - mg_{\perp r} = ma_{\text{tangential}}$.  
B) $T + mg_{\perp r} = ma_{\text{tangential}}$.  
C) $mg_{\perp r} - T = ma_{\text{tangential}}$.  
D) $mg_{\perp r} = -ma_{\text{tangential}}$.  
E) $mg_{\perp r} = ma_{\text{tangential}}$.

**Explanation:** By inspection for the tangential equation. This implies that the magnitude of the total acceleration as observed in the inertial frame is $a = \sqrt{a_c^2 + g^2}$.

Answer E.

06.02-02‘Nonuniform Circular Motion 2006-9-14