HIBBELER
CIRCULAR PATH

\[ V = 4 \frac{m}{s} \]
\[ R = 50 \text{m} \]
\[ V_B = ? \]
\[ A_B = ? \]

\[ a = \frac{dv}{dt} = \frac{v \, dv}{ds} \]

\[ a \, ds = v \, dv \]
\[ \int_0^{(0.05 \text{s})} ds = \int_0^{V} v \, dv \]
\[ \frac{0.05 \text{s}^2}{2} \text{m} = \frac{V^2}{2} \cdot \frac{4m}{3} \]
\[ 0.025 \text{(10m)} = \frac{V^2}{2} - \frac{(4.583 \frac{m}{s})^2}{2} \]
\[ 2[0.025(10)] + 16 = V^2 \]

\[ V_B = 4.583 \frac{m}{s} \]

\[ A_T = 0.05 \text{s} = 0.05(10 \text{m}) \quad \therefore A_T = 0.5 \frac{m}{s} \checkmark \]

TANGENT TO PATH

You must include \( A^N = \text{PERPENDICULAR TO PATH} \)
\[ A^N = \omega^2 r = \frac{V^2}{r} = \left(4.583 \frac{m}{s}\right)^2 \cdot \frac{50 \text{m}}{3} = 0.42 \frac{m}{s^2} = A^N \]

\[ A_{TOT} = A^N + A^T = \sqrt{(0.42)^2 + (0.5)^2} = 0.653 \frac{m}{s^2} = A_{TOT} \]

NORMAL ACC. = CENTRIPETAL ACC.
Pulling in toward center of rotation to keep mass on the circular path. It is a function of velocity only.

TANGENTIAL ACC. = pulls the mass off the path, tangent to path. It is a function of a change in velocity.