A simple pendulum consists of a string of a length \( r \) and a ball attached to its end. Consider the case where the string is making an angle \( \theta \) with the vertical and the tangential velocity is pointing toward the vertical line.

![Diagram of a pendulum](image)

The tangential acceleration is given by

A) \( a_{tangent} = g \sin \theta \).

B) \( a_{tangent} = g \cos \theta \).

C) \( a_{tangent} = -g \sin \theta \).

D) \( a_{tangent} = -g \cos \theta \).
The tangential acceleration is opposite to that of \( s = r \theta \). The magnitudes of the tangential acceleration and the radial acceleration are

\[
a_t = a_g \sin \theta = -g \sin \theta \quad \text{and} \quad a_r = \frac{v^2}{r}.
\]

Answer C.

04.05-02 A simple pendulum 2006-2-11