4. (10 pts) Shown below is an object of mass \( m \) (a glider) moving on a frictionless inclined plane (an air track) under the action of gravity.

\[
\begin{align*}
\text{L} & \\
\theta & \\
\text{mg} & \\
\end{align*}
\]

(a) (3 pts) State a trigonometric relation between the quantities \( \theta \), \( H \), and \( L \).

\[
\sin \theta = \frac{H}{L}
\]

(b) (4 pts) What is the net tangential force \( F_{\text{tan}}^{\text{tot}} \) acting on the object?

\[
F_{\text{tan}}^{\text{tot}} = m g \sin \theta = m g \frac{H}{L}
\]

(c) (3 pts) What is the tangential acceleration \( a_{\text{tan}} \) of the object?

\[
a_{\text{tan}} = \frac{F_{\text{tan}}^{\text{tot}}}{m} = g \frac{H}{L}
\]

See Lab III

5. Motion with Constant Acceleration