**Description:** This problem provides practice with basic geometry and velocity using the example of the motion of a shadow on a wall relative to motion of an obstacle. Involves simple differentiation.

A small source of light S is located at a distance L from a vertical wall. An opaque object with a height of h moves toward the wall with constant velocity $\vec{v}$ of magnitude v. At time $t = 0$, the object is located at the source S.
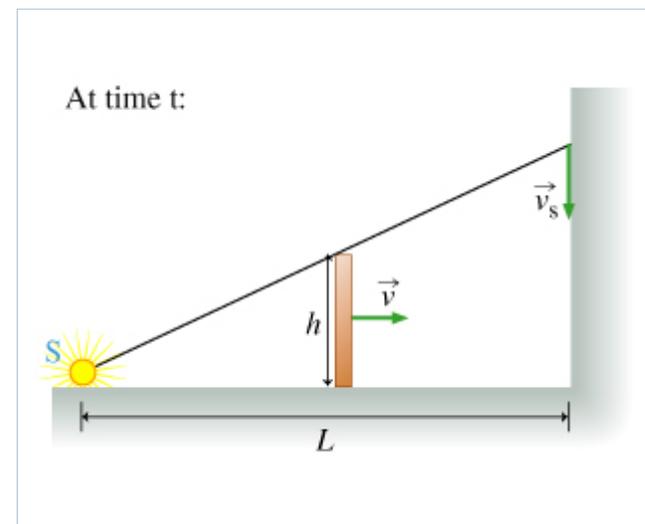
At time t:

Part A

Find an expression for $v_{\rm s}$, the magnitude of the velocity $\vec{v}_{\rm s}$ of the top of the object's shadow, at time t.

Express the speed of the top of the object's shadow in terms of t, v, L, and h.

▶ **View Available Hint(s)** (4)

ANSWER:

$$v_{\rm s} = \frac{hL}{vt^2}$$