Lecture 3: Watch out for falling objects

- Near the surface of the earth, freely falling objects accelerate downward with constant acceleration. We considered the simplest case of purely one-dimensional (vertical) motion.

- To adapt the kinematic equations to this case, it is conventional to switch notation:

\[ x \rightarrow y \quad a_0 \rightarrow -g \]

- This corresponds to using \( y \) as the coordinate which measures vertical displacement, increasing upwards. Thus \( v > 0 \) for objects moving upward, and \( v < 0 \) for objects moving downward.

- With these conventions, the one dimensional kinematic equations are:

\[ v = v_0 - gt \] (1)

\[ y - y_0 = \frac{1}{2} (v + v_0) t \] (2)

\[ y - y_0 = v_0 t - \frac{1}{2} gt^2 \] (3)

\[ v^2 = v_0^2 - 2g(y - y_0) \] (4)

- The constant \( g = 9.80 \text{ m/s}^2 \)

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