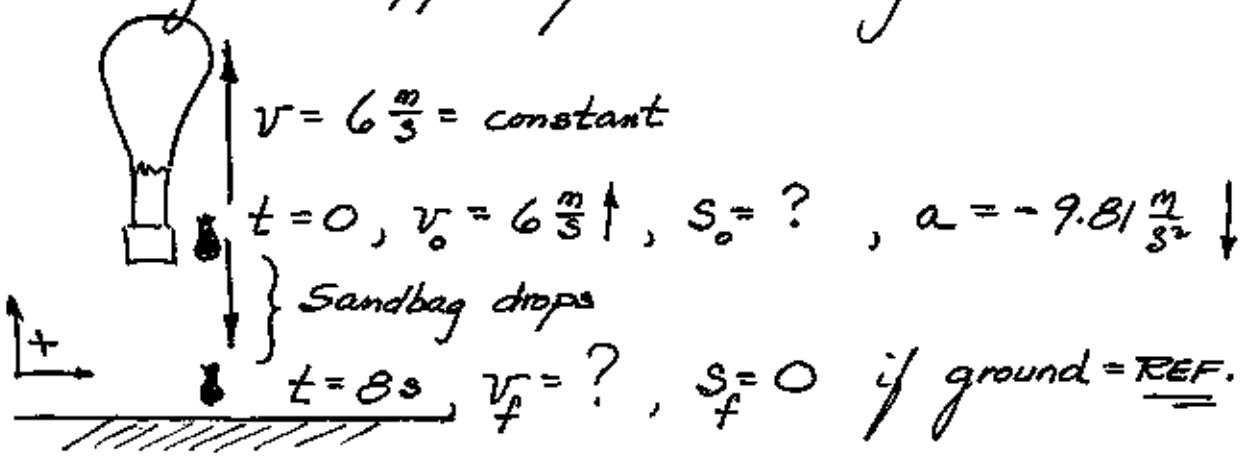
HIBBELER

12.26

Sandbag is dropped from a rising balloon.



$s = s_0 + v_0 t + \frac{1}{2} a t^2$ for the sandbag

$0 = s_0 + 6\frac{m}{s}(8s) + \frac{1}{2}\left(-9.81\frac{m}{s^2}\right)(8s)^2$

$s_0 = -48 + 313.92 \ldots =$ $\boxed{s_0 = 265.92\,m \text{ above ground}}$

But during those 8 seconds, the balloon continues to rise,

$\therefore \quad s_{f_{balloon}} = v_0 t - s_0 = \left(6\frac{m}{s}\right)(8s) + 265.92\,m$

$\boxed{s_{f_{balloon}} = 313.92\,m \text{ above ground}}$

Sandbag hits ground with final velocity

$v_f = v_0 + at$

$= 6\frac{m}{s} + \left(-9.81\frac{m}{s^2}\right)(8s) = -72.48\frac{m}{s}$

$\boxed{v_f \doteq 72.5\frac{m}{s} \downarrow}$

NOTE: negative sign indicates direction.