p201, Problem #7

$g = 0.5$

$a = \frac{v^2}{2h}$

$V_f^2 = V_0^2 + 2a(\text{displacement})$ (Δh)

physics: $V_f = 0$

if $V_i = -0.5$ and $h = 50$, $a = .0025$

$h = 45\text{ft}$, $V_0 = ?$

$$.0025 = \frac{V^2}{90} \rightarrow V^2 = 0.225$$

$$V = \pm .47$$

$h = 40\text{ft}$

$$V^2 = .0025(2.40) = .2$$

$$V = \pm 0.45 \text{ km/s}$$

$\frac{.25}{100} = .0025$

$0 = V_0^2 + 2(.0025)50$

$-(V_0^2) = \sqrt{.25}$

$-V_0 = \pm 0.5 \text{ km/s}$

$h = 30 \text{ ft}$

$0 = V_0^2 + 2(0.0025)30$

$-(V_0^2) = 60(.0025) = .15$

$-V_0 = -\sqrt{.15} = -0.39 \text{ km/s}$

Original velocity, as height gets lower, must be smaller + smaller for V_f to be zero & the ship to land. So the maximum velocity must be kept between ± 0.5 km/s if the height goes from

SO → O_2 and we want the ship to land safely.