

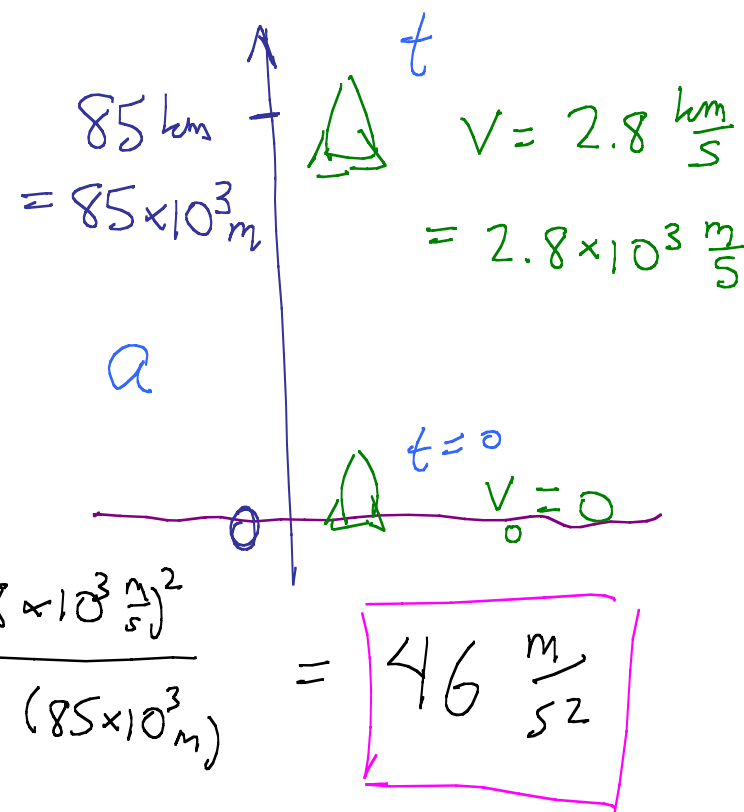
A rocket rises with constant acceleration to an altitude of 85 km, at which point its speed is 2.8 km/s. (a) What's its acceleration? (b) How long does the ascent take?

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$$a) \quad v^2 = v_0^2 + 2a(y - y_0)$$

\nearrow $2.8 \times 10^3 \frac{m}{s}$ \searrow 0 \nearrow $85 \times 10^3 m$

$$v^2 - v_0^2 = 2a(y - y_0) \quad a = \frac{v^2 - v_0^2}{2(y - y_0)} = \frac{(2.8 \times 10^3 \frac{m}{s})^2}{2(85 \times 10^3 m)} = \boxed{46 \frac{m}{s^2}}$$



b) t ? $v = v_0 + at$

$$t = \frac{v - v_0}{a} = \frac{2.8 \times 10^3 \frac{\text{m}}{\text{s}} - 0}{46 \frac{\text{m}}{\text{s}^2}} = 61 \text{ s}$$