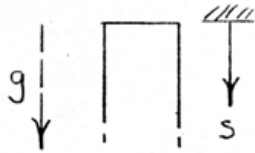


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$$a = g - kv^2 = -\frac{dv}{dt}$$



$$\int_0^t dt = \int_0^v \frac{dv}{g - kv^2}$$

$$\begin{aligned} \text{(see Art. C/10): } t &= \frac{1}{\sqrt{gk}} \tanh^{-1} \sqrt{\frac{k}{g}} v \Big|_0^v \\ &= \frac{1}{\sqrt{gk}} \tanh^{-1} \sqrt{\frac{k}{g}} v \end{aligned}$$

$$\Rightarrow v = \frac{ds}{dt} = \sqrt{\frac{g}{k}} \tanh(\sqrt{gk} t)$$

$$\int_0^s ds = \sqrt{\frac{g}{k}} \int_0^t \tanh(\sqrt{gk} t) dt$$

$$s = \frac{1}{k} \ln \cosh \sqrt{gk} t$$

$$\text{or } t = \frac{\cosh^{-1}(e^{sk})}{\sqrt{gk}} = \frac{\cosh^{-1}(e^{0.005s})}{0.401}$$

s, ft	t, sec
0	0
10	0.795
90	2.54
100	2.70
990	14.06
1000	14.19

The time t_1 to pass first story

$$\text{is } t_1 = t_{10} - t_0 = 0.795 - 0 = \underline{0.795 \text{ sec}}$$

Similarly,

$$t_{10} = 0.1592 \text{ sec}$$

$$t_{100} = 0.1246 \text{ sec}$$