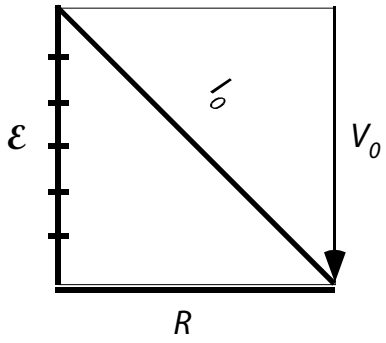
PhyzSpringboard:
A Slippery Affair

1-4: Series Slides

Develop equations for the characteristics of each slide in terms of the elevation $\mathcal{E}$ and run length R of slide 1. Then compare the expressions for the individual inclines (I_1, I_2, etc.) and tota incline of each slide to the original incline I_0 by means of a product (ex: $2I_0$) or quotient (ex: $I_0/3$). Repeat comparisons for power.

1. Yer Basic Slide

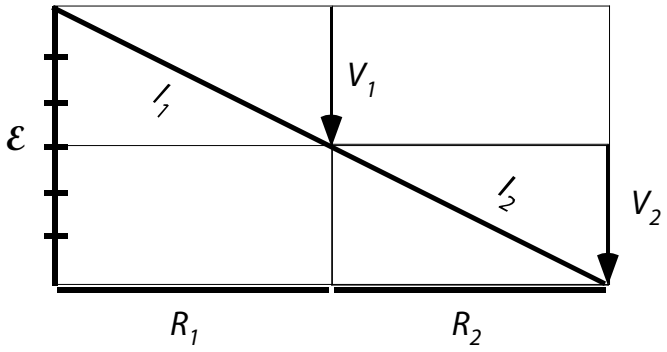


$V_0 = \mathcal{E}$

$I_0 = \mathcal{E}/R$

$P_0 = \mathcal{E}^2/R$

2. Double-Length ($R_1 = R_2 = R$)



$V_{TOT} = \mathcal{E}$

$I_{TOT} = \mathcal{E}/2R = I_0/2$

$V_1 = \mathcal{E}/2$ $\quad V_2 = \mathcal{E}/2$

$P_{TOT} = \mathcal{E}^2/2R = P_0/2$

$I_1 = \mathcal{E}/2R = I_0/2$ $\quad I_2 = \mathcal{E}/2R = I_0/2$

$P_1 = \mathcal{E}^2/4R = P_0/4$ $\quad P_2 = \mathcal{E}^2/4R = P_0/4$ $\quad R_{EQ} = 2R$

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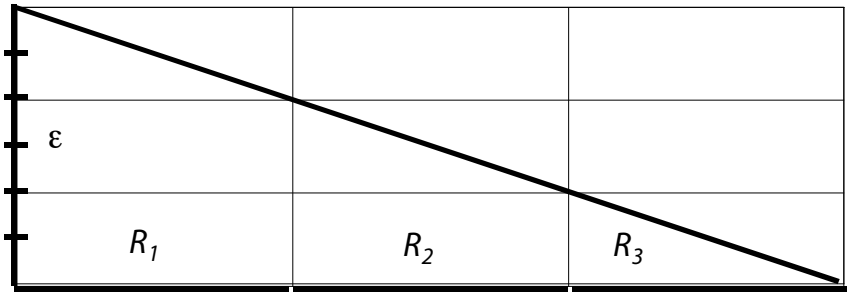
3.Thrice-as-Nice ($R_1 = R_2 = R_3 = R$) (this time, *you* draw in the *V*'s and *I*'s)



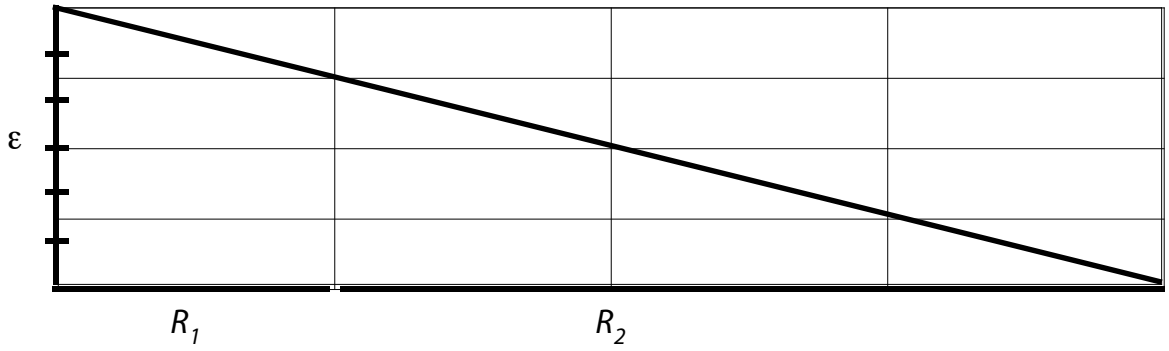
$V_{TOT} = \mathcal{E}$

$V_1 = \mathcal{E}/3$ $V_2 = \mathcal{E}/3$ $V_3 = \mathcal{E}/3$ $I_{TOT} = \mathcal{E}/3R = I_0/3$

$I_1 = \mathcal{E}/3R = I_0/3$ $I_2 = \mathcal{E}/3R = I_0/3$ $I_3 = \mathcal{E}/3R = I_0/3$ $P_{TOT} = \mathcal{E}^2/3R = P_0/3$

$P_1 = \mathcal{E}^2/9R = P_0/9$ $P_2 = \mathcal{E}^2/9R = P_0/9$ $P_3 = \mathcal{E}^2/9R = P_0/9$ $R_{EQ} = 3R$

4. Unequal Runs ($R_2 = 3R_1$; $R_1 = R$) (this time, *you* draw in the *V*'s and *I*'s)



$V_1 = \mathcal{E}/4$ $V_2 = 3\mathcal{E}/4$ $V_{TOT} = \mathcal{E}$

$I_1 = \mathcal{E}/4R = I_0/4$ $I_2 = \mathcal{E}/4R = I_0/4$ $I_{TOT} = \mathcal{E}/4R = I_0/4$

$P_1 = \mathcal{E}^2/16R = P_0/16$ $P_2 = 3\mathcal{E}^2/16R = 3P_0/16$ $P_{TOT} = \mathcal{E}^2/4R = P_0/4$

$R_{EQ} = 4R$

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