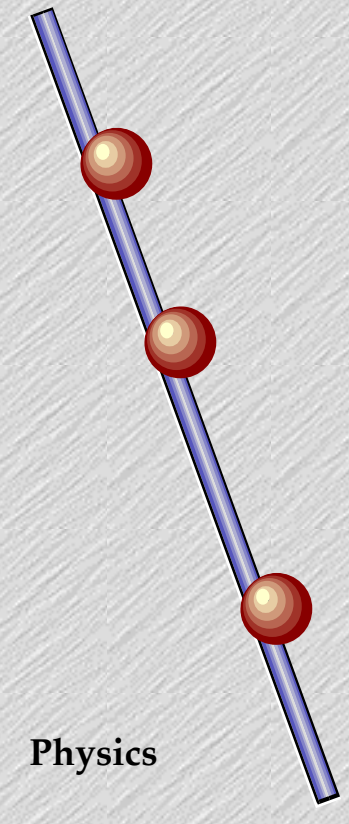
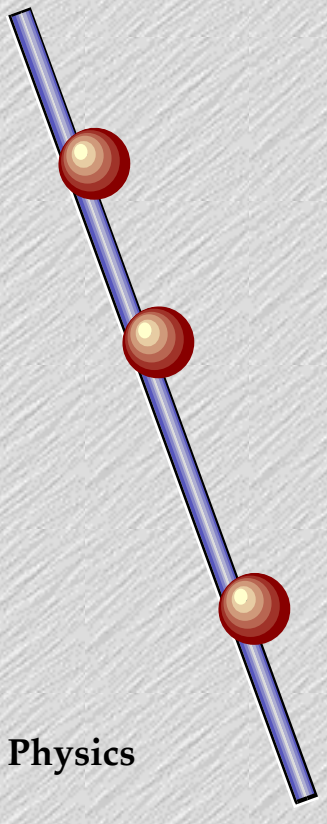
Trampoline Problem (#50)



Two Students, Anne And Joan, are bouncing straight up and down on a trampoline. Anne bounces twice as high as Joan. Assuming both are in free fall, find the ratio of the time Anne spends between bounces to the time Joan spends.

Key Phrases



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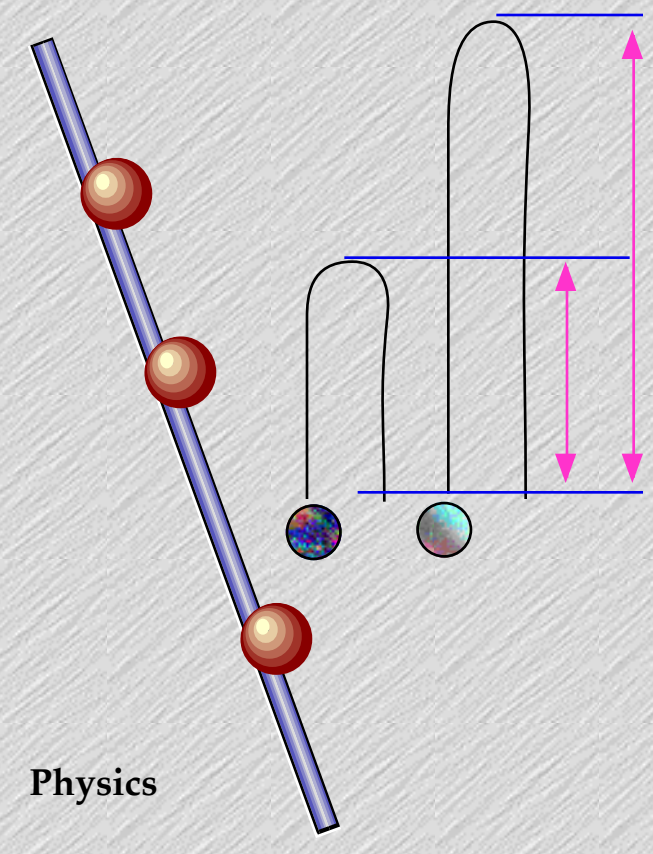

$$x_A = x_{0A} + v_{0A}t_A + \frac{1}{2}at_A^{\,2}$$

$$x_J = x_{0J} + v_{0J}t_J + \frac{1}{2}at_J^{\,2}$$

$$\Delta x_A = 2\Delta x_J = 2h$$

$$a = g$$

Look at the symmetry of the problem and start at the top of the arc where

$$v_{0A} = v_{0J} = 0$$

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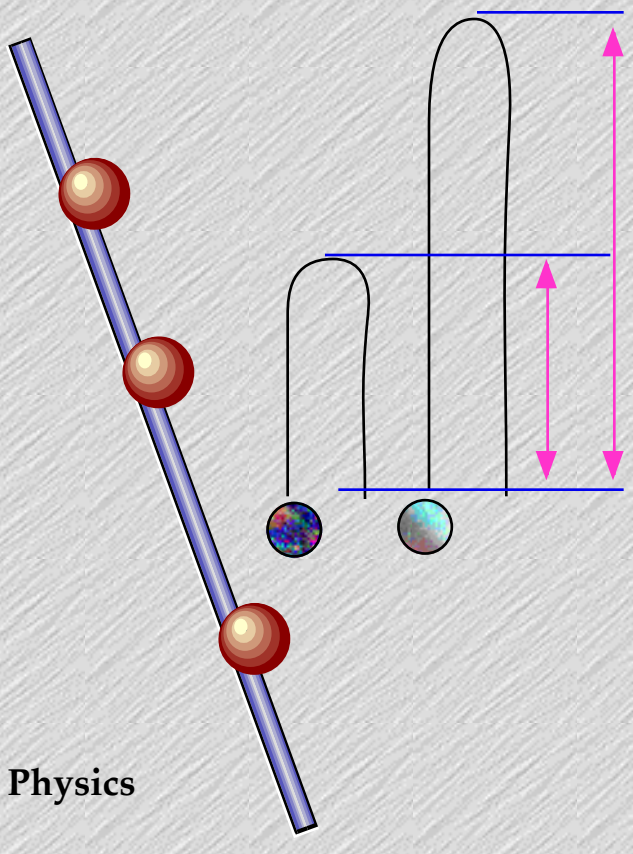

$$x_A - x_{0A} = 2h = v_{0A}t_A + \frac{1}{2}gt_A^2$$

$$x_J - x_{0J} = h = v_{0J}t_J + \frac{1}{2}gt_J^2$$

$$\Delta x_A = 2\Delta x_J = 2h$$

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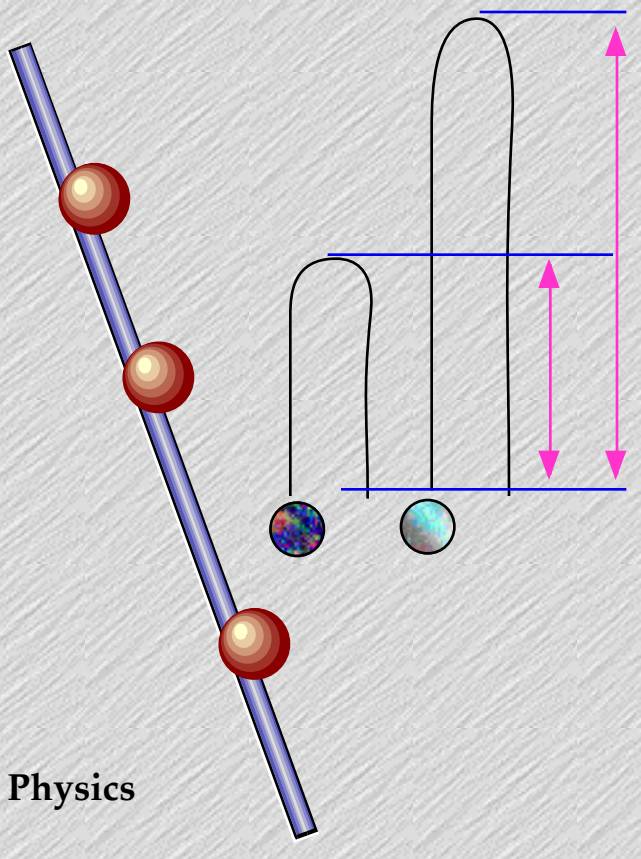

$$\frac{2h = \frac{1}{2} g t_A^{\,2}}{h = \frac{1}{2} g t_J^{\,2}} \Rightarrow \sqrt{2} = \frac{t_A}{t_J}$$