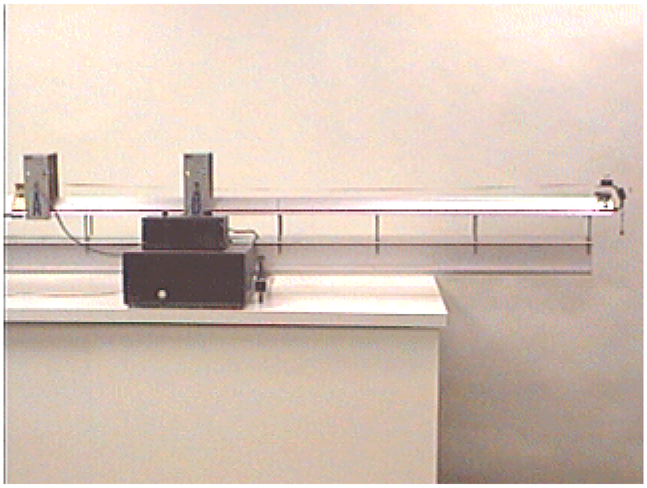
Answer #123

Part 1:

The answer is (b): 1.41 seconds, as can be seen by clicking your mouse on the photograph below. (Pretty good for an old air track!)



The equation to determine how far an accelerated body moves as a function of time is:

$$x = (1/2)a\, t^2.$$

where a is the acceleration.

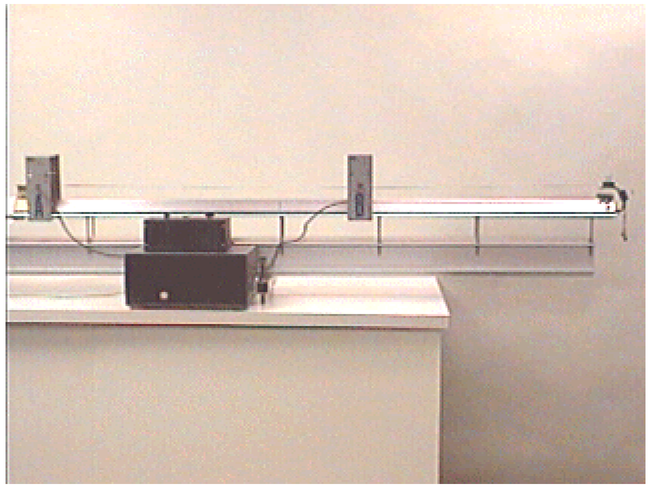
The time for the accelerating body M to move the distance D between the two photocell gates due to the gravitational force on $m \ll M$ is given by:

$$t = \mathrm{sqrt}\,[2\, DM / mg] = t_0,$$

where g is the acceleration of gravity. Substituting $D/2$ for D yields $t = t_0/\mathrm{sqrt}(2)$ or approximately 1.41 seconds.

Part 2:

The answer is (b): 1.41 seconds, as can be seen by clicking your mouse on the photograph below. (Well, it's a bit slow, but that's experimental physics!)



The equation to determine how far an accelerated body moves as a function of time is:

$$x = (1/2)a\,t^2.$$

where a is the acceleration.

The time for the accelerating body *M* to move the distance *D* between the two photocell gates due to the gravitational force on *m* is given by:

$$t = \mathrm{sqrt}\,[2\,DM / mg] = t_0,$$

where g is the acceleration of gravity. Substituting 2*m* for *m* yields t = t_0/sqrt(2) or approximately 1.41 seconds.

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For questions and comments regarding the *Question of the Week* contact
Dr. Richard E. Berg by e-mail or using phone number or regular mail address
given on the Lecture-Demonstration Home Page.