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:

\[ x = \frac{1}{2}a t^2. \]

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:

\[ t = \sqrt{\frac{2Dm}{mg}} = t_0, \]

where \( g \) is the acceleration of gravity. Substituting \( D/2 \) for \( D \) yields \( t = t_0/\sqrt{2} \) 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:

\[ x = \frac{1}{2}a t^2. \]

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:

\[ t = \sqrt{\frac{2DM}{mg}} = t_0, \]

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

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.