Question #123

Here is a follow-up question to Question #119.

A mass \( M \) on a level air track is connected by a string passing over a pulley to a much smaller mass \( m \ll M \), as seen in the photograph at the left below.

Releasing \( M \) allows \( m \) to accelerate it along the air track. The timer measures the time taken for a flag on the top of the air track glider to travel from photocell gate "A" to gate "B," which turns out to be exactly 2.00 seconds. See a video of the action by clicking your mouse on the photograph at the left above.

We have two small problems for you this week.

Part 1:

Suppose that the same experiment is performed with distance \( D \) being decreased to \( D/2 \), as seen in the photograph at the center above. How long will the glider take to travel from photocell gate "A" to gate "B"?

The time taken for mass \( m \) to accelerate mass \( M \) a distance \( D/2 \) from A to B will be:
• (a) 4 seconds.
• (b) 2.83 seconds
• (c) 2 seconds (the same).
• (d) 1.41 seconds.
• (e) 1 second.

Part 2:

Now suppose that the same experiment is performed with mass $m$ being increased to $2m$, as seen in the photograph at the right above. How long will the glider take to travel from photocell gate "A" to gate "B"?

The time taken for mass $2m$ to accelerate mass $M$ a distance of $D$ from A to B will be:

• (a) 4 seconds.
• (b) 2.83 seconds
• (c) 2 seconds (the same).
• (d) 1.41 seconds.
• (e) 1 second.

Click here for Answer #123 after October 7, 2002.