Name:

Forces Part 2

DISCUSSION

In this experiment you will investigate the quantitative relationship between the mass of an object and the resulting acceleration produced by a constant force. To complete this investigation you will make changes in the mass of an object and measure the resulting distance traveled, average velocity and acceleration. A hanging mass will produce the constant force and the CBL will record the velocity of the cart as a function of time. The acceleration is found by taking the slope of a velocity versus time graph.

PROCEDURE

1. Attach a hanging mass of 0.1 kg to the end of the string to the dynamics cart. Place no mass in the cart. Allow the hanging mass to fall freely to the ground. Check the path of the cart. Make sure the cart will travel the length of the table without any obstructions, and the string is on the pulley.

2. Attach a spark sensitive tape to the back of the dynamics cart.

3. With the .1 kg mass attached to the string, start the spark timer and then let the cart travel the length of the table. Stop the cart before it strikes the pulley support. Clearly label the tape as 0 kg.

4. Repeat the above experiment with four additional masses in the cart of .5 kg, 1.0 kg, 1.5 kg, and 2.0 kg.

INTERPRETATION OF DATA

1. Stretch the tape out on a lab table and count a series of six dots. Place a line through every sixth dot for each run for the first twelve sets of six. Record, in a data table, the distance traveled by the cart during each six dot time interval. Calculate the average velocity for each six dot section of the tape and record in the data table. (Remember Δt=.1s)

2. Using Excel, plot a graph of average velocity versus time for each force on the same set of axis.

3. Plot a graph of the acceleration versus added mass. What type of relationship exists between mass and acceleration?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| added mass | 0 kg | | 0.5 kg | | 1.0 kg | | 1.5 kg | | 2.0 kg | |
| Time(s) | d | v | d | v | d | v | d | v | d | v |
| 0.1 |  |  |  |  |  |  |  |  |  |  |
| 0.2 |  |  |  |  |  |  |  |  |  |  |
| 0.3 |  |  |  |  |  |  |  |  |  |  |
| 0.4 |  |  |  |  |  |  |  |  |  |  |
| 0.5 |  |  |  |  |  |  |  |  |  |  |
| 0.6 |  |  |  |  |  |  |  |  |  |  |
| 0.7 |  |  |  |  |  |  |  |  |  |  |
| 0.8 |  |  |  |  |  |  |  |  |  |  |
| 0.9 |  |  |  |  |  |  |  |  |  |  |
| 1.0 |  |  |  |  |  |  |  |  |  |  |

Conclusion:

State the relationship between mass and acceleration for a system under a constant net force.

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