Car Ramp Physics Activity

Purpose

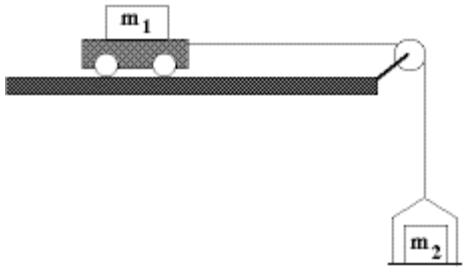
1. Learn about the relationship between force, mass, and linear acceleration.
2. Gain familiarity using mobile computing devices for data collection.
3. Measure and record the acceleration of an object acted on by a constant force.
4. Based on the measured acceleration, calculate the unknown mass of an object acted on by a known force.
5. Use iSENSE to visualize the data and draw conclusions.

Materials

Android phone or tablet
Cart for mobile device
String, pulley, and weights

Method

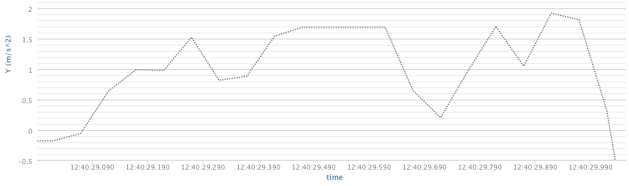
1. Download and install the Car Ramp Physics app.
2. Log in using your iSENSE account.
3. Set up the cart, pulley, and weight as shown in the figure below.



4. Place the mobile device on the cart.
5. Secure the device to the cart.
6. Launch the Car Ramp Physics app.
7. Start recording data.
8. Release the weight. Catch the car before it rolls off the table.
9. Wait for the data recording to stop (10 seconds from the start).
10. Contribute the data to iSENSE.

iSENSE Analysis

1. Find your data set in the Car Ramp Physics project.
2. Use the Timeline and other visualizations to examine your data.
3. Identify the portion of the timeline when the weight was falling.
4. Determine the acceleration of the cart and mobile device during that period.



Discussion Questions

1. How long was the cart in motion?
2. What is your best estimate of the cart's acceleration during that period?
3. Determine the mass of m_2
4. Using the information shown below, calculate the mass of the cart and the tablet (m_1):

$g = 9.8\ m/s^2$
$F_g = m_2 \times g$
$F_g = m_1 \times a_1$
$m_1 = m_2 \times (g / a_1)$

m_1 = _____

5. Use a scale to determine the mass of cart and mobile device (m_1).
6. How does your calculated value for compare to the actual mass?
7. Can you think of any other applications for the Car Ramp app?

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