

Applied Physics

Mousetrap Vehicle

Mousetrap Vehicle

- You will be creating a mousetrap vehicle with the supplied materials
- You will be testing how different variables impact the speed, acceleration, and how far the vehicle travels
- Required Variables
 - Mousetrap Location
 - Length of Lever Arm
 - Diameter of axel

Mousetrap Vehicle

- You **MUST** test all the required variables
- Remember, you can only change **1** variable at a time for it to be a valid experiment
 - Only change the axel size, not the axel size and lever arm length

Distance and Displacement

- _____ is how far something has moved
- You drive 30 miles north, 20 miles south, and then 40 miles north
- Your distance is _____

Distance and Displacement

- _____ is the distance and direction of an object's change in position from the starting point
- You drive 30 miles north, 20 miles south, and then 40 miles north
- Your displacement is _____

Speed

- _____ is the distance an object travels per unit of time

$$Speed\left(\frac{m}{s}\right) =$$

- You travel 30 cm north in 2 seconds. What is your average speed?

Velocity

- **Velocity** is the _____

$$Velocity\left(\frac{m}{s}\right) =$$

- You travel 30 cm north in 2 seconds. What is your average velocity?

Practice

1. What is the velocity (m/s) for an object moving 30 m North in 4 seconds?
2. How far does an object travel in 5 seconds if it has a speed of 2.5 m/s?
3. How long does it take an object to travel 100 m if it has a speed of 1.25 cm/s?

Manipulated Speed/Velocity Equations

Acceleration

- **Acceleration** is the _____

$$\text{Acceleration } \left(\frac{m}{s^2}\right) =$$

$$a \left(\frac{m}{s^2}\right) =$$

$$\Delta v =$$

Acceleration Equation Manipulation

Practice

- An object speeds up from a stop to 12 m/s in 22 seconds, what is the objects acceleration?
- An object with an acceleration of 1.2 m/s² travels for 34 seconds. If the object starts with a speed of 2.2 m/s, what is the final speed?
- How long would it take a stationary object to reach a final speed of 50 km/h if it had an acceleration of 3.2 km/h²

Percent Error

- _____ shows you how far away your recorded data is from the actual data.

$$\text{Percent Error (\%)} = \frac{|\text{Guessed} - \text{actual}|}{\text{actual}} * 100$$

Example

- You guess it will take you 13 seconds to run to the end of the block, it actually takes you 17 seconds. What is your percent error?

Practice Problems

1. You measure the density of an unknown object to be 1.23 g/ml. The actual density is 1.55 g/ml. What is your percent error?
2. What if the actual density was 1.20 g/ml?
