Unit 3 Project Mathematical Thinking

You need to show all known and unknown variables with units, equation you used, plugging in

Height Information

- Track to the wall: 0.5 meters
- Length of the track: 1 m
- Heights of the ramp…
  - 0.2 m
  - 0.35 m
  - 0.5 m

Mass

- Measure the mass of your device with the cart
- Convert to kg- move the decimal three to the left
  - 301 grams = 0.301 kg

Motion

- Initial velocity of cart (v0)
  - Think about what it is before the car is released
- Total distance traveled by the car in meters
  - Information posted in the lab
- Time it took for the car to travel down the ramp
  - You will need to time this
- The acceleration of the cart
  - Use a kinematic equation
- The final velocity of the cart (vf)
  - Use a kinematic equation (it’s not zero)

$$v = v_0 + at$$

$$\Delta x = v_0 t + \frac{1}{2} a t^2$$

$$v^2 = v_0^2 + 2a\Delta x$$

Forces

- The force of the crash (F=ma)
  - Mass of your cart and helmet in kg * acceleration of the crash in m/s^2
- A free body diagram of the cart going down the ramp and when it hits the wall

Energy

- Type of energy at the top before the cart goes at the top, middle and end and why
- Height of ramp in meters
  - Check the board
- Determine the initial potential energy
  - PE = m*g*h (mass of cart and helmet in kg, gravity = 9.81 m/s/s and height in meters)
- Kinetic and potential energy halfway down the rmap
- Total energy at the end of the ramp
- Velocity at the end of the ramp- use the kinetic energy equation (K= ½ m v^2)

Conservation of Momentum

- Type of collision and why
- The amount of force that your cart experienced
  - See forces section
- Momentum at the end
  - p = m*v
- Impulse (using the impulse equation) to find t
  - p = I = F*t