Transformation of Mechanical Energy

LBYENVP A54

Class Schedule: Friday

1:00-3:00 P.M, Room J410

Objectives

- Learn: moving cart along an inclined plane
  1. Gravitational potential energy
  2. Kinetic energy
- Show: Gravitational potential energy transform to Kinetic energy
- Investigate: moving cart along an inclined plane
  1. Gravitational potential energy and kinetic energy is affected by increasing height, mass constant
  2. Conservation of mechanical energy

Definition

- Work: done when a force acts on an object to cause it to move, displace or do something physical.
- What kind of force? Here's where Mechanical energy comes in..
- Mechanical energy:
  - Sum of kinetic and potential energy in an object used to do work
  - Energy in an object due to its motion or position

Example: Mechanical Energy

(1) The iron hammer on its own has no kinetic energy, but it has some potential energy (because of its weight).

(2) To drive a nail into the piece of wood (which is work), he has to lift the iron hammer up, (this increases its potential energy because if its high position).

(3) And force it to move at great speed downwards (now has kinetic energy) to hit the nail.

The sum of the potential and kinetic energy that the hammer acquired to drive in the nail is called the Mechanical energy, which resulted in the work done.

http://www.eschooltoday.com/energy/kinds-of-energy/what-is-mechanical-energy.html

Example: Mechanical Energy

$$g = gravity\ earth = 9.81\ \frac{m}{s^2}$$

$$KE = \frac{1}{2} M_{hammer} v^2$$

- Units M = mass: kg
- v = velocity: $\frac{m}{s}$

kinetic energy

mechanical energy

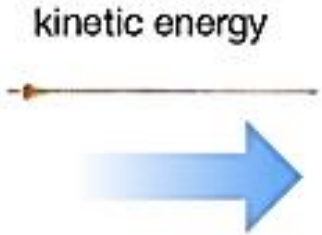
Units: Joules

Gravitational

$$PE = M_{hammer} g H$$

Elastic potential energy

kinetic energy



Example: Mechanical Energy

$$PE = M_{hammer} g H$$

Gravitational Potential Energy

$$g = gravity\ earth = 9.81\ \frac{m}{s^2}$$

$$KE = \frac{1}{2} M_{hammer} v^2$$

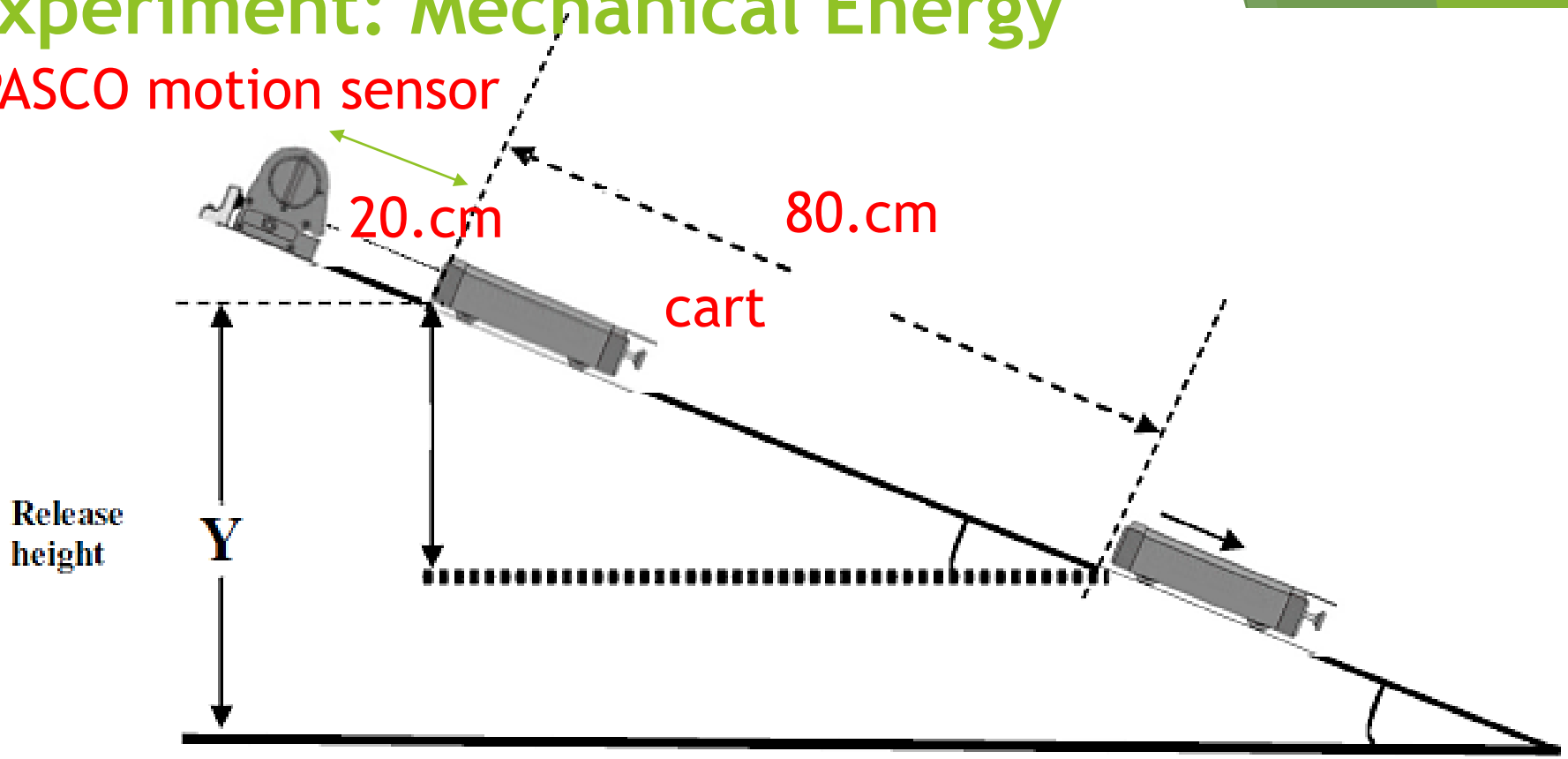
Kinetic Energy

Mechanical Energy = Gravitational Potential Energy + Kinetic Energy

$$ME = PE + KE$$

$$ME = M_{hammer} g H + \frac{1}{2} M_{hammer} v^2$$

Experiment: Mechanical Energy



$$ME = PE + KE$$

$$ME = M_{cart}gH + \frac{1}{2}M_{cart}v^2$$

Experiment: Mechanical Energy

From the digital display, record the following information on your data sheet

a. The final position = maximum position = X_f

b. The final velocity = maximum velocity = v_f

c. The mean acceleration = average acceleration = a

Calculate the following

a. X = distance covered = $X_f - X_i$

b. H = initial height of the cart from the reference level = aX/g where a is the average acceleration.

c. PE = potential energy = MgH

d. KE = kinetic energy = $\frac{1}{2} Mv_f^2$

e. Plot PE vs. H

f. Plot KE vs. H