Unit 7: Work, Energy and Power

2 – Potential Energy

Potential Energy: Stored energy

Examples:
Chemical: gasoline, food, batteries
elastic: bungee cord, trampoline, bow
electrical: static charges

- In this class we will focus on…
  gravitational potential energy
- This is stored energy due to…
  an object's position (height)
- Remember:
  energy can be converted into different forms by doing work

Gravitational Potential Energy:

$E_p = mgh$

Where:
m = mass
g = accel. due to gravity
h = height

Gravitational energy is always measured…
relative to a reference point

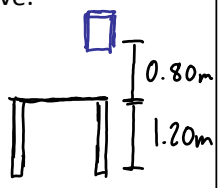
Ex. A 15.0 kg textbook is sitting on a 1.20 m tall table. If the book is lifted 0.80 m above the table, how much gravitational potential energy does it have:

a. with respect to the table?

$E_p = mgh = (15.0)(9.80)(0.80)$
$= 120\ J$

b. with respect to the floor?

$E_p = mgh = (15.0)(9.80)(2.00)$
$= 294\ J$



Ex 2. An archer pulls on a bow string with an average force of 240 N while drawing the arrow back a distance of 0.200 m. Calculate the potential energy of the bow-arrow system.

HINT: The **work** done to the bow is all being stored as *potential energy*.

$W = \Delta E_p = Fd = (240N)(0.200m)$
$= 48\ J$

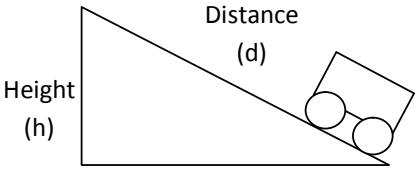
all work done is being stored as potential

Ramp It Up!

Procedure: Measure the work done on a cart and its Ep at the top of the ramp.

W = Fd

$E_p = mgh$



Trial 1:
F = 3.3 N m = 1.1 kg
d = 0.26 m g =
h = 0.08 m
W = Ep =

Trial 2:
F = 5.0 N m = 1.1 kg
d = 0.26 m g =
h = 0.12 m
W = Ep =

Trial 3:
F = 6.2 N m = 1.1 kg
d = 0.26 m g =
h = 0.15 m
W = Ep =

How does the work done on the cart compare to its gain in potential energy?

Using all the words ***work, height, force*** and ***distance*** explain why ramps can be useful machines.