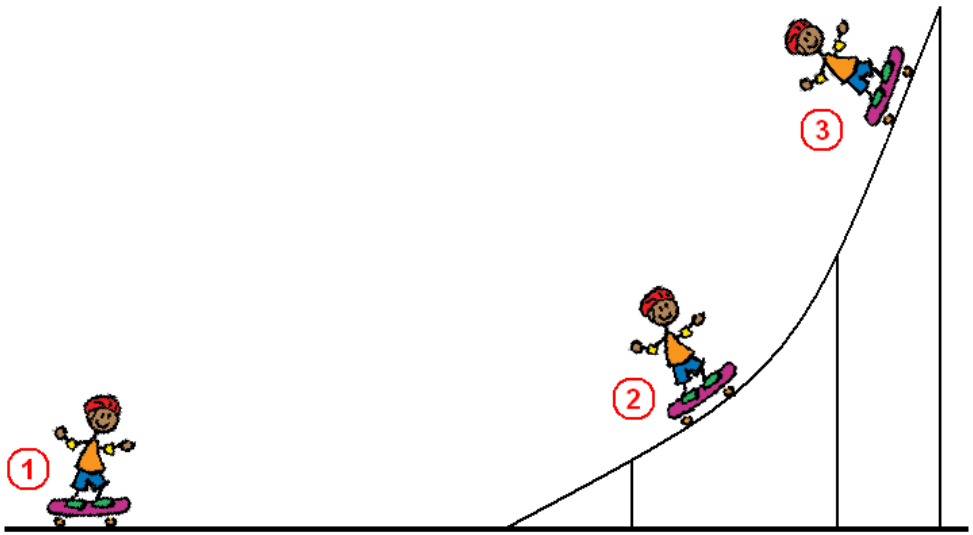
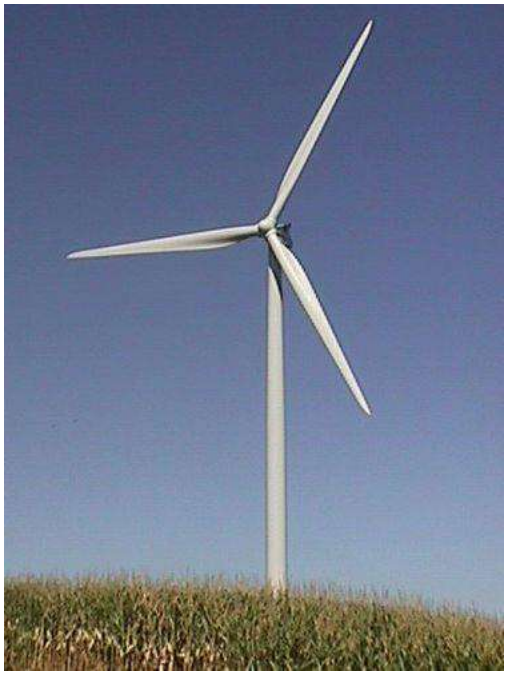
Potential and Kinetic Energy



I. Energy

A. Energy: how much work something can do
→ energy can change forms
→ measured in Nm=Joules, *J*

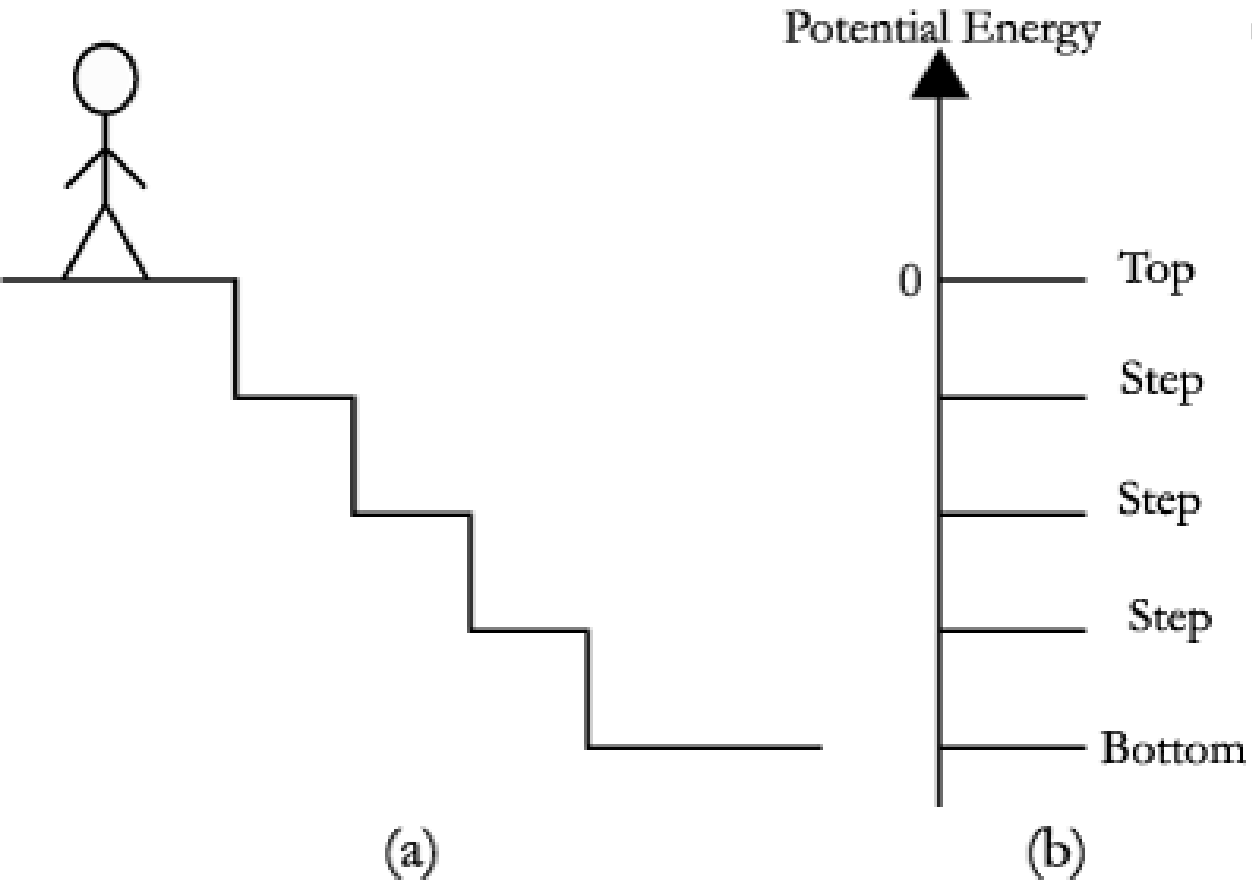


II. Potential Energy

A. Potential Energy: stored energy or "energy of position"

B. Depends on: mass, gravity, height

II. Potential Energy



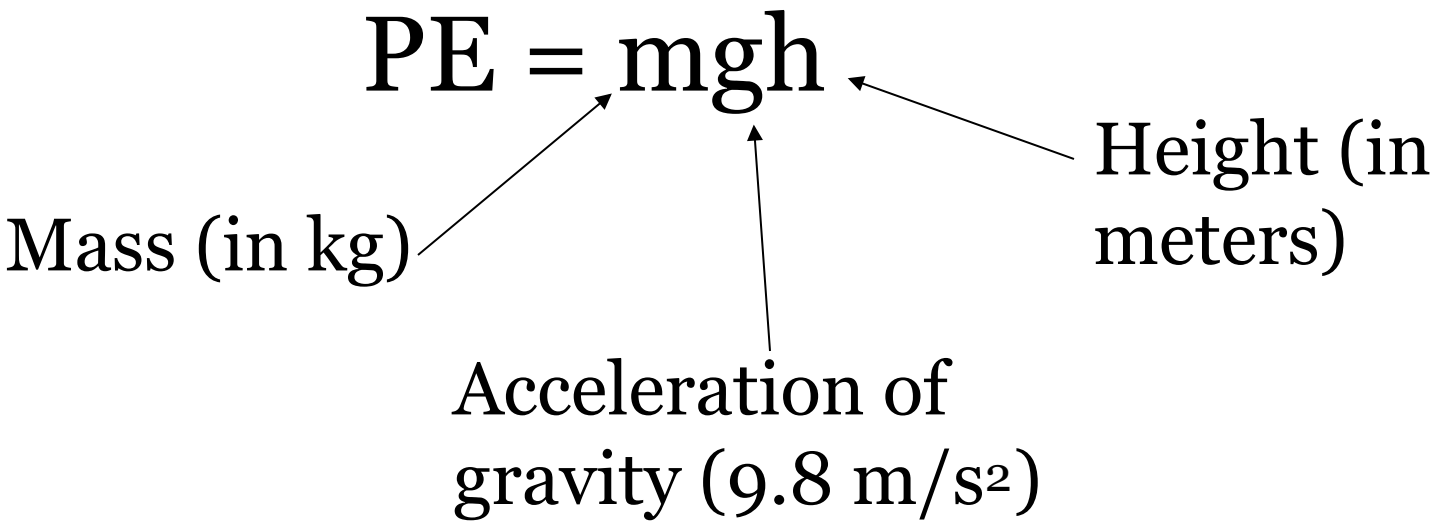
The person has more potential energy at the top of the stairs than at the bottom.

II. Potential Energy

Does an egg dropped from the 2nd or 3rd floor of a building have more potential energy?

II. Potential Energy

C. Formula:



II. Potential Energy

D. Examples

Ex1 If your egg drop device has a mass of 2 kg, how much potential energy does it hold at a height of 10 meters?

PE = ?

m = 2 kg

g = 9.8 m/s^2

h = 10 m

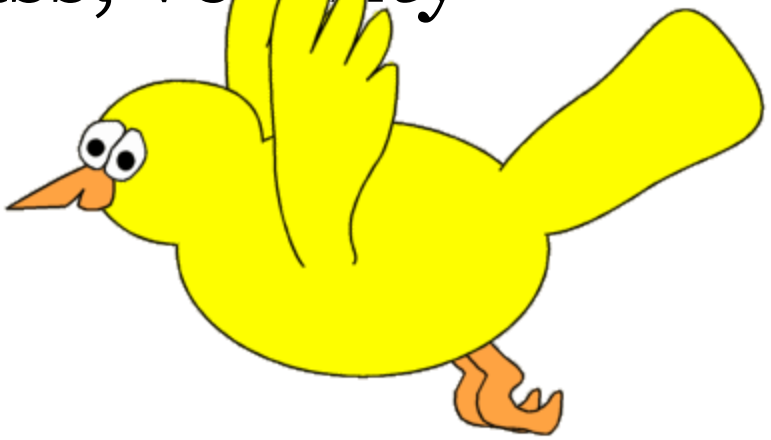
PE = mgh

PE = (2 kg)(9.8 m/s^2)(10 m) = 196 J

III. Kinetic energy

A. Kinetic Energy: energy of motion

B. Depends on: mass, velocity



III. Kinetic Energy

Which has more kinetic energy, the regular car or the race car?

The race car has more KE because it has a higher velocity.

III. Kinetic Energy

Which would hurt more, getting hit by a 15 foot wave or a 2 foot wave?

The bigger wave would hurt more because even though they travel at the same speed, the bigger wave has more mass.

Can you think of any more examples of kinetic energy?

III. Kinetic Energy

C. Formula

$$KE = \tfrac{1}{2}mv^2$$

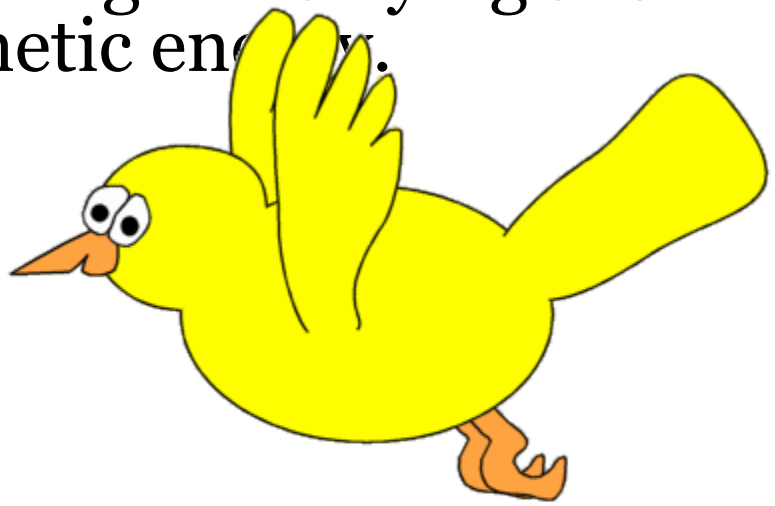
Mass (in kg)

Velocity (in m/s)

III. Kinetic Energy

D. Examples

Ex2 The bird has a mass of 2 kg. It is flying at a speed of 5 m/s. Find its kinetic energy.



KE = ?

m = 2 kg

v = 5 m/s

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2}(2\text{ kg})(5\text{ m/s})^2$

$= \boxed{25\text{ J}}$

Conservation of PE and KE

$$PE + KE = PE + KE$$

$$mgh + 0 = 0 + \tfrac{1}{2} mv^2$$

$$gh = \tfrac{1}{2} v^2$$

$$2gh = v^2$$

$$\sqrt{2gh} = v$$

Group Practice

- Write down 4 examples of potential energy, 4 examples of kinetic energy on the slips of paper
- Pass the slips to another group
- Place the slips you receive in the right category on your sheet
- When you're done, get your Independent Practice

Independent Practice

Homework time!