
ENERGY

Units:

Energy and Work = joules (J) = Newton-meter (Nm)

Mass = kilograms (kg)

Weight = newtons (N)

Gravity constant = 9.8m/sec/sec ~ 10 m/sec/sec

Velocity = m/s

Height = meters (m)

1km = 1000m 1kg= 1000g 1hr= 3,600sec


POTENTIAL
ENERGY

ENERGY A BODY HAS BECAUSE OF ITS POSITION OR CONDITION

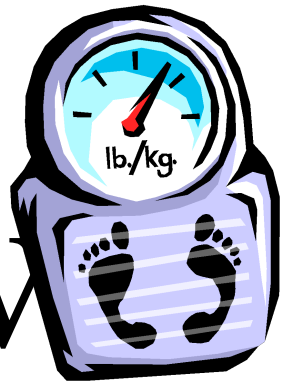
$$P.E. = E_p = mgh$$

G.P.E. = weight x height

Weight and Mass

Weight is a measure of the force of gravity on an object

Weight = Mass x acceleration due to gravity



$w = mg$

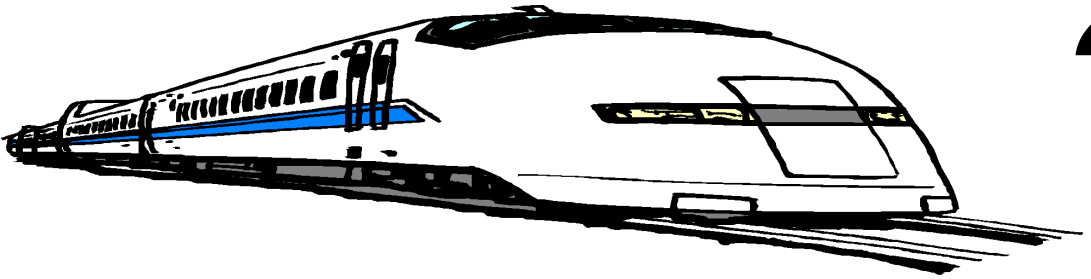
Weight Vs. Mass

http://www.youtube.com/watch?v=grWG_U4sgS8&feature=related

KINETIC ENERGY

$$(E_k) = \tfrac{1}{2}\, mv^2$$

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



Kinetic energy Ek or k.e. is the energy that an object has because it is **moving**

STEPS IN PROBLEM SOLVING

- ✓ STEP 1. Write the formula
- ✓ STEP 2. Substitute given numbers and units
- ✓ STEP 3. Solve for the unknown.

EXAMPLE

What is the p.e. of a book of mass 1.2 kg, resting on a shelf 2 m above the ground?

---

p.e. = mgh

p.e. = 1.2kg x 10m/s/s x 2m

p.e. = 12.0 N x 2 m ***(opt'l to show)***

p.e. = 24 Joules

SAMPLE PROBLEM:

A hiker weighing 680 N climbs 40 m up a hill. Calculate the gravitational potential energy gained at the top of the climb.

ANSWER ON NEXT SLIDE

$E_p = w_x h$

$E_p = 680\ N \times 40\ m$

$= 27{,}200\ J$

or 27.2 KJ

ANSWER ON NEXT SLIDE

identify the tricky part of this next Q (but don't do in notes:

2. Calculate the p.e. of a 65,000 g boulder resting at 22 m above the road.

Try this one:

3. How high is a .2 kg jar if it has 3J of p.e.?

ANSWERS

2. Tricky part is to convert grams to kilograms

3. How high is a .2 kg jar if it has 3J of p.e.?

p.e. = mgh

3 J= 0.2kg x 10m/s/s x h

***h*=1.5 m**

What is the *E_k of an arrow* with a mass of 0.025 kg traveling at 25m/s?

ANSWER ON NEXT SLIDE

What is the *Ek of an arrow* with a mass of 25 gm traveling at 25m/s?

Answer:

$$k.e. = \tfrac{1}{2}\, mv^2$$

$$= \tfrac{1}{2} \times .025kg \times (25m/s)^2$$

$$= \tfrac{1}{2} \times 0.025kg \times 625m/s$$

$$= (0.5)\ 15.625$$

$$= 7.8125\ J$$