

The background of the image is a close-up photograph of dark asphalt pavement that has cracked significantly. The cracks are irregular and run in various directions, creating a textured, fragmented appearance. The lighting is somewhat uneven, with some areas appearing darker than others, emphasizing the depth of the cracks.

ENERGY

Units:

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

Mass = kilograms (kg)

Weight = newtons (N)

Gravity constant = $9.8\text{m/sec/sec} \sim 10\text{ m/sec/sec}$

Velocity = m/s

Height = meters (m)

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

A close-up photograph of a dark, cracked, and textured surface, possibly a rock or concrete. The surface is covered in numerous small, irregular cracks and crevices, giving it a rough and weathered appearance. The lighting is dramatic, with strong highlights and deep shadows, emphasizing the texture. Overlaid on this background is the text "POTENTIAL ENERGY" in a large, bold, white, sans-serif font, centered horizontally and vertically.

POTENTIAL ENERGY

ENERGY A BODY HAS BECAUSE OF ITS POSITION OR CONDITION

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

$$G.P.E. = \text{weight} \times \text{height}$$

Weight and Mass

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

Weight = Mass x acceleration
due to gravity



mg

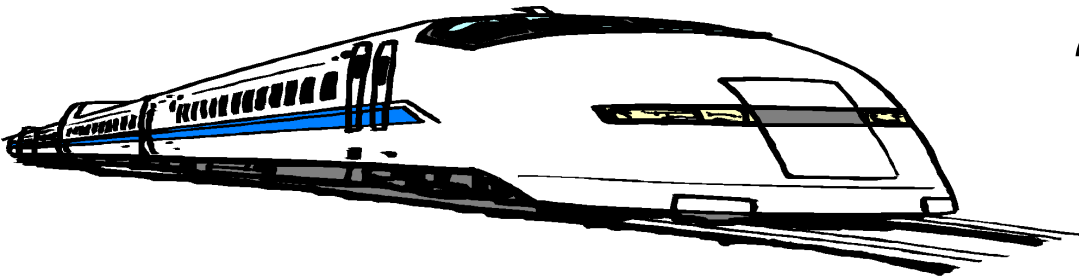
Weight Vs. Mass

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

KINETIC ENERGY

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

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



Kinetic energy E_k 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?



$$\text{p.e.} = mgh$$

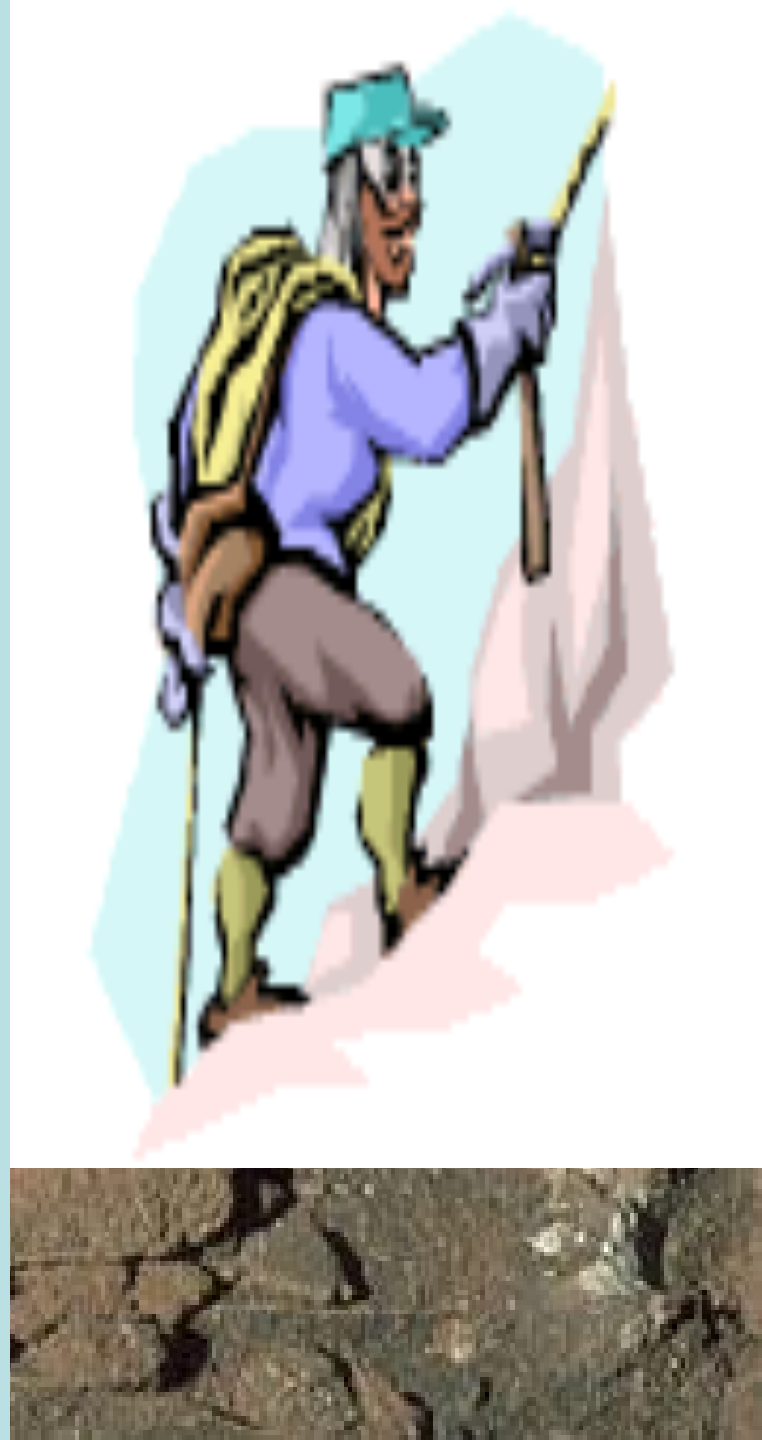
$$\text{p.e.} = 1.2\text{kg} \times 10\text{m/s/s} \times 2\text{m}$$

$$\text{p.e.} = 12.0 \text{ N} \times 2 \text{ m} \text{ (opt'l to show)}$$

$$\text{p.e.} = 24 \text{ Joules}$$

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

$$E_p = w \times h$$

$$E_p = 680 \text{ N} \times 40 \text{ m}$$

$$= 27,200 \text{ J}$$

$$\text{or } 27.2 \text{ KJ}$$

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.?

$$\text{p.e.} = mgh$$

$$3 \text{ J} = 0.2\text{kg} \times 10\text{m/s/s} \times h$$

$$h = 1.5 \text{ m}$$

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:

$$\text{k.e.} = \frac{1}{2} mv^2$$

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

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

$$= (0.5) 15.625$$

$$= 7.8125 \text{ J}$$

