Physics 11
Energy
6.2 Mechanical Energy

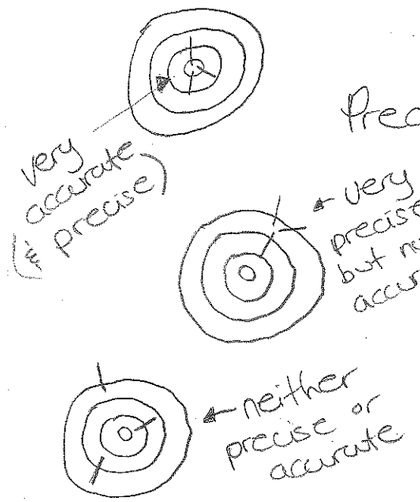
Review

Accurancy vs. Precision

Accuracy: how close a measured value is to ≠ true value

Precision: ≠ agreement or reproducibility of several measurements

: a measurement can be precise but not accurate



New

A moving object can do work ∴ nrg is ≠ ability to do work ∴ a moving object has nrg → kinetic nrg is ≠ nrg of a moving object

$W = F \cdot d = (ma)d = m(ad) = \frac{1}{2}mv^2 = W$ ....>

$F = ma$

$V_f^2 = 2ad \rightarrow \frac{1}{2}V_f^2 = ad$

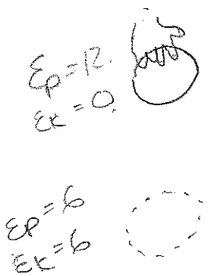
The work done on an object to accelerate it up to a speed (v_f) results in kinetic nrg transferred to ≠ object

$$W = E_k = \frac{1}{2}mv^2$$

Gravitational Potential Energy

$$E_p = mgh$$

→ ≠ starting point of ≠ movement = reference point



All gravitational potential nrg

$\frac{1}{2}E_p + \frac{1}{2}E_K$

* The total nrg of a mechanical system is constant ∴ $E_p + E_k$ = constant

All kinetic nrg

Mechanical nrg can be kinetic or potential but ≠ total mechanical nrg is constant

Examples

#1 Work needed to accelerate a 1.0g insect from rest up to 12 m/s?

m = 0.001 kg

v = 12 m/s

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

↑ the work done on ≠ object is ≠ objects E_K

$E_k = \frac{1}{2}(0.001)(12)^2$

$E_K = 0.072\ J$

$7.2 \times 10^{-2}\ J$

#2 It takes 240 J to lift a 4.0 kg object, how high is it lifted.

m = 4.0 kg

$E_p = 240$

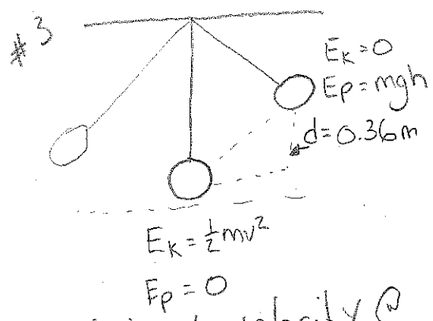
$E_p = mgh$

$240\ J = (4.0kg)(9.8m/s^2)(h)$

$240 = 39.2(h)$

$6.1m = h$

#3



What is ≠ velocity @ ≠ bottom of ≠ swing?

$E_p = E_K$

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

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

$2gh = v^2$

$\sqrt{2gh} = v$

$V = \sqrt{2(9.8)(0.36)}$

$V = \sqrt{7.056\ m^2/s^2}$

$V = 2.7\ m/s$