Chapter 6 - Work, Power, Energy

§6-1 Work & Energy

Types of energy - { kinetic energy
potential energy (gravitational & elastic)
energy in chemical reactions
nuclear energy
sound
heat
light

mechanical energy

Work is not energy, but rather related to the transfer of energy to a body

Work is a scalar quantity. Work is done when a force acts on an object over a distance.

$$W = F_{\parallel} \Delta d$$

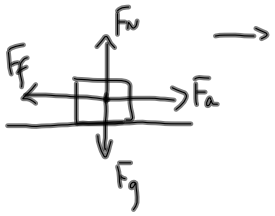
Where W is the work done on a body (N·m or J)
$F_{\parallel}$ is the force acting in the direction of Δd (N)
Δd is the distance the body moves (m)

mp 220

$\Delta d = 3.00\,m$
$F_a = 2.00 \times 10^2\,N$
$W = ?$

$1\,J = 1\,N \cdot m$

$W = F_{\parallel} \Delta d$
$W = (2.00 \times 10^2\,N)(3.00\,m)$
$W = 6.00 \times 10^2\,J$



She did 6.00×10^2 J of work on the desk.

Situations when no work is done (p222-223)

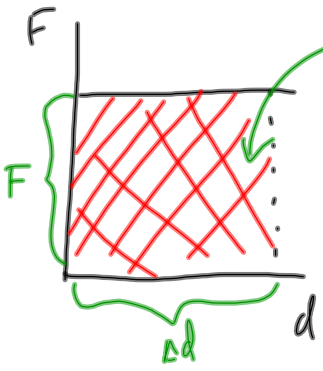
1. When you apply a force but the object does not move.
2. When the objects is moving, but no force acts on it.
3. When the force acting on the body is perpendicular to the displacement.

MP 224

Since T is always perpendicular to the motion, no work is done.

Work and a F-d graph

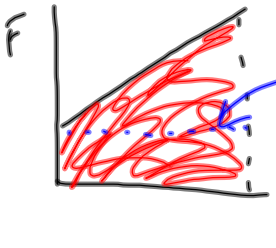
Consider a constant force acting on a body:



area of rectangle = l × w

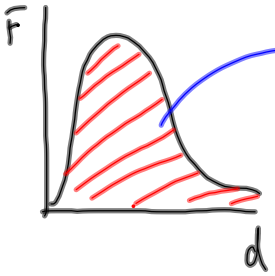
area = FΔd = Work!

∴ W = area under a F-d graph



area of a trapezoid = $\frac{1}{2}(h_1 + h_2)b$

= area □ + area △



▷ area under the curve:

① count squares

② use calculus

③ use technology (logger pro)

Look at MP|227

TODO:

① PP|221

② PP|225

③ PP|229|11 (look over MP|227 first)