Work Done and Energy

Work done is **maximum** when cos0 = 0 (the force and distance travelled are therefore parallel)
Work done is **minimum** when cos0 = 90 (the force and distance travelled are therefore perpendicular)
types of energy:
- kinetic energy
- potential energy
- thermal energy (not covered in this spec point)

for example:
a ball held at a height will have Ep, when dropped and landing on the ground (assuming there is no energy loss) all the energy will be converted into Ek.
Δ E = W --> change in energy in a system = work done on a system

Derrivations

Gravitational Potential Energy:
ΔE = W
ΔE = Fxcos0
(work done is force x distance x angle)
where F = ma (in this case a is g)
and distance is hieght travelled
ΔE = mghcos0
as cos0 where 0 is 0' cos0 = 1 so
ΔE = mgh
Kinetic Energy:
ΔE = W
ΔE = Fxcos0
(work done is force x distance x angle)
ΔE = Fs
(cos0 = 1)
ΔE = mas
as $v^2 = u^2 + 2as$
rearrange where u = 0
as = $v^2/2$
therefore
ΔE = 1/2 mv^2

Definitions

Work done	product of the force and the distance moved in this direction
power	rate of work done
	rate of energy transferred

Equations

Work done	Fxcos0 ---(where x is distance and 0 is theta between f and x)
change in energy	ΔE = W
power	W/t
	Fx/t
	Fv
efficiency	useful/total (x100)

Conversion of energy

example of findign resistive forces going down hill
--top | v=0
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--bottom | v=8
a ball is roll down from the top to the bottom
-length of the ramp is 7m
-height is 5m
as ΔE = W
energy at top (Ep no Ek) then energy at bottom (Ek no Ep)
from this we know it is all transferred (assuming no loss to heat)
therefore
ΔE = mgh - 1/2mv^2
mgh - 1/2mv^2 = Fx
(where x is length of ramp)
then just put in numbers to solve for F