Definition of Concept

Work done

- Work done by a force is defined as the product of the forrce and the distance moved **in the direction**of the force
- $W = F * s$
- Work is a scalar(result of dot product)

Power

- power is the rate of energy transform

Energy

- Energy is the ability to conduct work

Kinetics Energy

- Kinetic energy is the energy of mass has due to motion

Gravatitional potential energy

- Gravational energy is the energy

elastic potential energy

efficiency

- $\eta = \frac{Useful}{Total}$
- it could be power/energy/heat

conservation of energy

- energy can not be created or destroyed. It can only be converted from one form to another.
- The only exception is **Nuclear Reaction**
- The energy comes from **Big Bang**

Definition of Unit

Joule

- $J = Nm$
- Joule is such amount of work done when a force of 1 N moves a distance of 1 metre($1J = 1N/1m$)

Watts

- $W = \frac{J}{s}$
- 1 watt is such amount of power when an energy of 1J is exerted in 1 second($1W = 1J/1s$)

Derivation

GPE

- $GPE = mgh$
- plug in $F = W = mg$ and change s to h

EPE

- $EPE = \frac{1}{2}kx^2$
- Derivation based on the graph of force-extension
- $Workdone = Areaunderthegraph$
- $Area = \frac{1}{2}Fx$
- Plug in Hooke's law$F = kx$

KE

- $KE = \frac{1}{2}mv^2$
- Derivation based on $v^2 - u^2 = 2as$
- take the inital velocity as 0, obtain $v^2 = 2as$
- multiple both side $\frac{1}{2}m$ gives $\frac{1}{2}mV^2 =$

Power via speed

- $P = F * v$
- Derivation based on definition of power $P = \frac{W}{t}$ into $P = \frac{F*s}{t}$
- taken $\frac{s}{t}$ as v
- Notice the force could only be driving force, not a resultant force(Must be constant speed)

Work done by gas

- $W = p\Delta V$
- Notice the ΔV is a must
- Using proof from unit $W = pv = [Pa * m^3] = [\frac{N}{m^2} * m^3] = [Nm] = [J]$

Other Concept

Sankey Diagram

- It can gives the effeciency of the apparatus
- If no number shown, measure the length and give the scale of the effeciency

Work done/not done