

# The Système International

SI Units

GEL2006

Base Quantity		Base Unit	
Name	Symbol	Name	Symbol
Time	t	second	s
Length	l	metre	m
Mass	m	kilogram	kg
Temperature	T, $\Theta$	kelvin	K
Electric Current	I	ampere	A
Amount of Substance	n	mole	mol
Luminous Intensity	(not in A Level)	candela	cd

Physical Quantity	Defined as :	Unit	Special Name
velocity			
acceleration			
density			
momentum			
force			
pressure			
work (energy)			
power			
<b>electrical charge</b>			
<b>potential difference</b>			
resistance			

# Homogenous Equations

- $E_p = m g h$

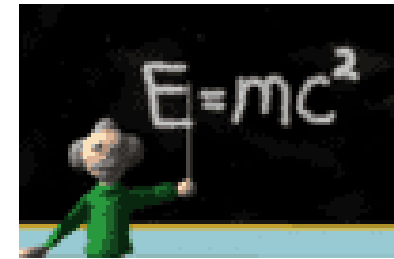
- $J = \text{kg Nkg}^{-1} \text{ m}$

- $\text{Nm} = \text{kg kgms}^{-2}\text{kg}^{-1} \text{ m}$

- $\text{kgms}^{-2} \text{ m} = \text{kgm}^2\text{s}^{-2}$

- $\text{kgm}^2\text{s}^{-2}$  =  $\text{kgm}^2\text{s}^{-2}$

- $\therefore$  This equation is homogenous



# Homogenous Equations

- $v^2 = u^2 + 2ax$

- $m^2s^{-2} = m^2s^{-2} + ms^{-2} m$

- $m^2s^{-2}$  =  $m^2s^{-2}$  +  $m^2s^{-2}$

- $\therefore$  This equation is homogenous

# Homogenous Equations

- $F = \underline{mv}$

- $N = \text{kg} \text{ ms}^{-1} \text{ m}^{-1}$

- $\underline{\text{kgms}^{-2}} = \underline{\text{kgs}^{-1}}$

- $\therefore$  This equation is not homogenous

# Homogenous Equations

- What is missing?  $\underline{\text{kgms}^{-2}} = \underline{\text{kgs}^{-1}}$

$$\text{ms}^{-1} = v \text{ on rhs}$$

- $\therefore$  The equation should read:

- $F = \frac{mv^2}{r}$

# Homogenous Equations

- Try these:

- $E_k = \frac{1}{2} m v^2$

$$J = \text{kg m}^2\text{s}^{-2}$$

$$\text{N m} = \text{kg m}^2\text{s}^{-2}$$

$$\underline{\text{kg m}^2\text{s}^{-2}} = \underline{\text{kg m}^2\text{s}^{-2}} \quad \text{OK}$$

- and  $v = u + at^2$

$$\text{ms}^{-1} = \text{ms}^{-1} + \text{ms}^{-2} \text{ s}^2$$

$$\underline{\text{ms}^{-1}} = \underline{\text{ms}^{-1}} + \underline{\text{m}} \quad \text{Not OK}$$

$\text{s}^{-1}$  is missing, so equation should read:

$$V = u + at$$



# Homogenous Equations

## Homework:

Show that these equations are homogenous

a)  $x = ut + \frac{1}{2}at^2$

b)  $T = 2\pi\sqrt{l/g}$

c)  $v = f\lambda$

d)  $I = nAve$

e)  $W = \frac{1}{2}CV^2$

What is missing here?

f)  $F = mv - mu$

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