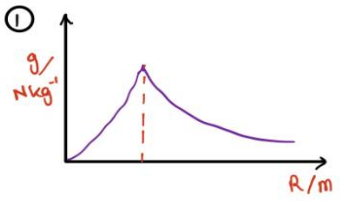
ABDUL HAKEEM JANJUAH

# Physics Graphs:

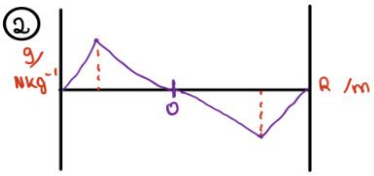
## Gravitational Fields:

① 

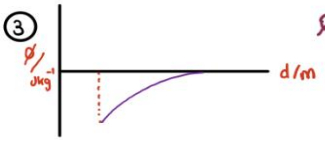

Graph for isolated mass

$g = \frac{GM}{R^2}$ when R is doubled $\Rightarrow$ g is $\frac{1}{4}$

- at the surface g is max
- $g \propto R$ inside sphere

② 

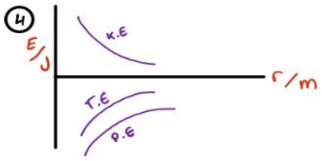

Graph is for g between 2 masses

③ 


$\phi = -\frac{GM}{R}$ when R is doubled $\Rightarrow$ $\phi$ is $\frac{1}{2}$

when R is infinity $\Rightarrow$ $\phi$ is 0

- at R $\phi$ is -ve max
- gradient = g

④ 

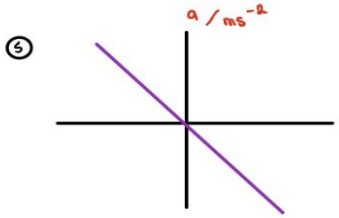

$P.E = \phi m$

$P.E = \frac{GMm}{r}$

$K.E = +\frac{1}{2} m \frac{GMm}{r}$

$T.E = -\frac{1}{2} m \frac{GMm}{r}$

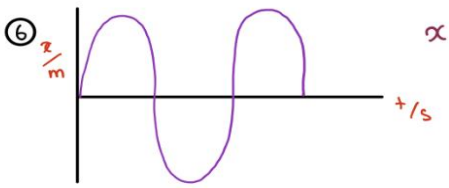
## Simple Harmonic motion:

⑤ 

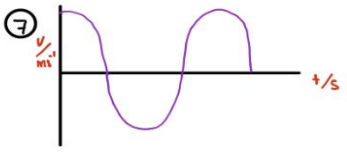

gradient = $\omega^2$

from this graph we can find f & T

because $\omega = 2\pi f$ or $\omega = \frac{2\pi}{T}$

⑥ 


$x = x_0 \sin\omega t$

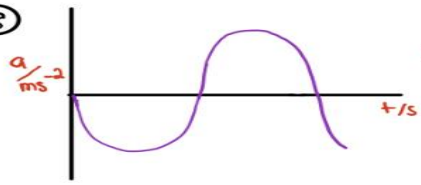
⑦ 


$V_{max} \Rightarrow x = 0$

$V = 0 \Rightarrow x = max$

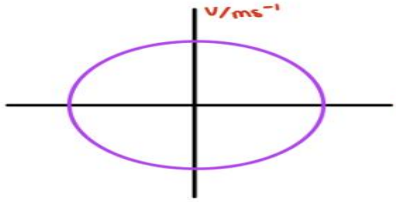
90° out of phase from x-t graph

(8)



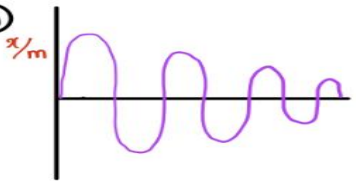

180° out of phase from x–t graph

(9)



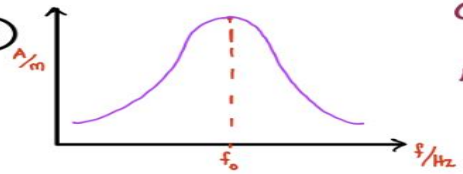

V – x
V – a
} same graph

(10)




Graph for damping
Amplitude ↓
Time period
frequency
} remains the same

(11)

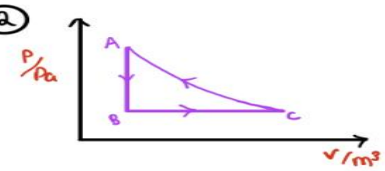



Graph for resonance

Amplitude (A) is max when forced frequency matches the natural frequency

## Ideal Gases :

(12)




ΔU = 0
work B → C
pΔV
expansion by the gas

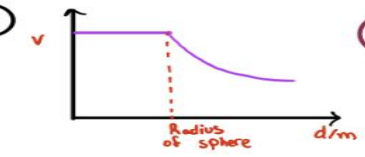
## Electric field :

(13)


inside sphere
E = 0
$E = \frac{kq}{r^2}$

when r is doubled ⇒ E is ¼

(14)




inside sphere
E = 0
inside no work is done
$V = \frac{kq}{r}$ when r is doubled ⇒ V is ½

-ve gradient = E

To be a point charge, the product of V and d must be constant

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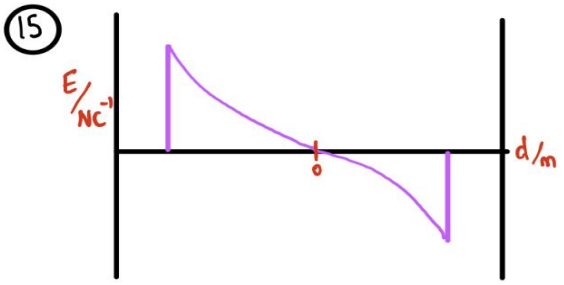


Recall g between 2 masses

- Graph for similar charges

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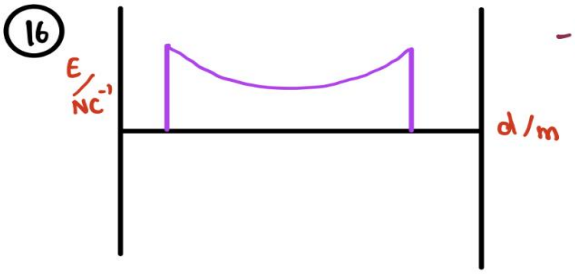
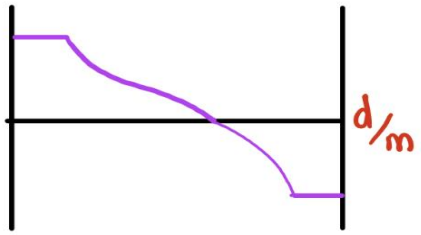



- Graph for opposite charges

E is never 0

17




Graph for opposite charges

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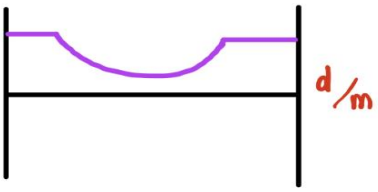


Graph for similar charges

## Capacitance :

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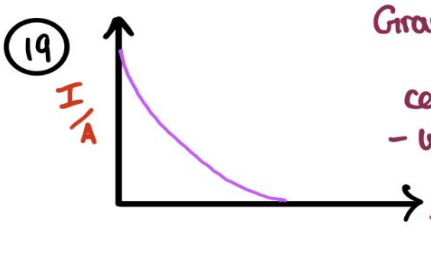
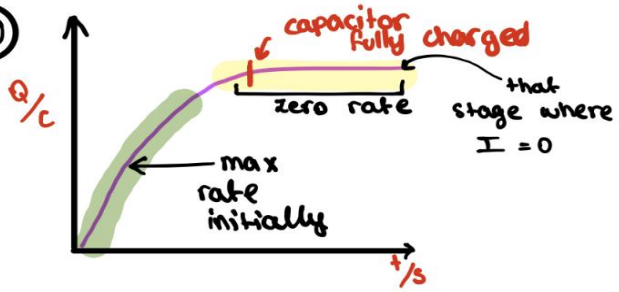


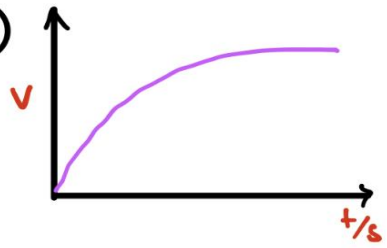

Graph is for charging of capacitor

- when fully charged I = 0

20

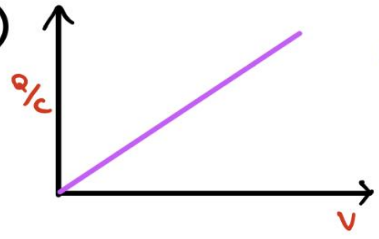



21




- Graph for charging of capacitor

22




gradient = capacitance

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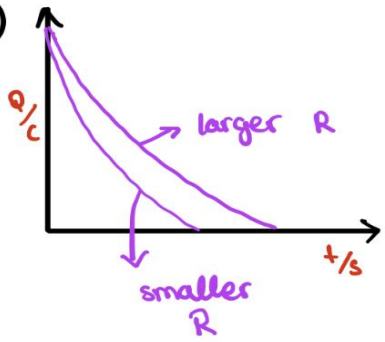


Discharging graphs

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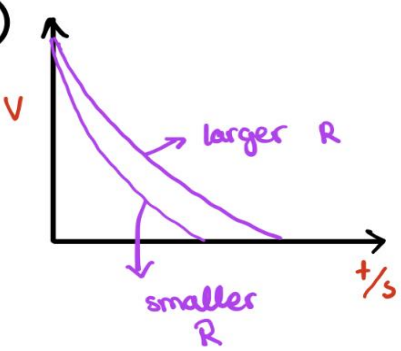
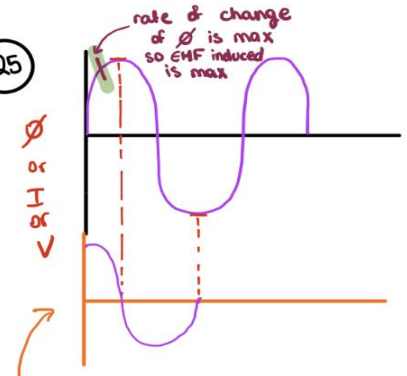



Discharging graph

AHJ

## Magnetic Fields & Electromagnetic Induction:

(25)

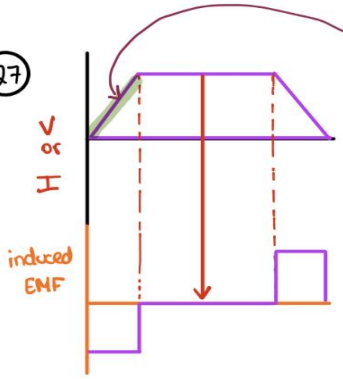



$\emptyset \propto I \propto V$

so graph will be same with Ø, I, & V

(26) induced EMF graph

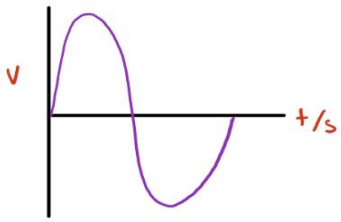
(27)




$-V \propto I \propto \emptyset \propto B$

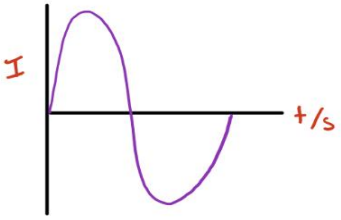
## Alternating Current:

(28)




$$V_{r.m.s.} = \frac{V_0}{\sqrt{2}}$$

(29)




$$I_{r.m.s.} = \frac{I_0}{\sqrt{2}}$$

AHJ

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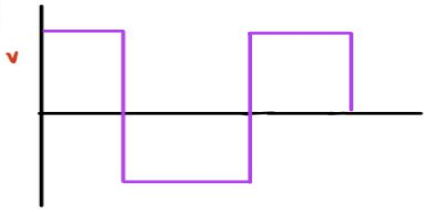


$V_{r.m.s} = V_0$

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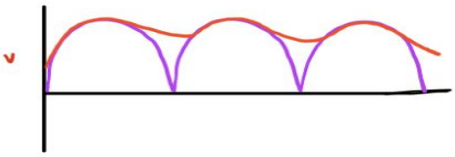


Rectification graph

increased capacitance or resistance causes the ripple depth to decrease

## Nuclear Physics

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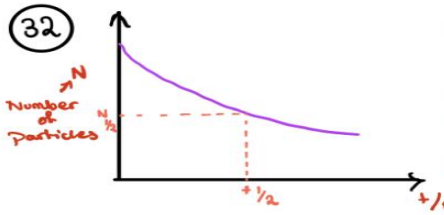


This graph can be used to find:

1. half-life ($t_{\frac{1}{2}}$)
2. $\lambda$ as $\lambda = \frac{0.693}{t_{\frac{1}{2}}}$
3. A as $A = \lambda N$

## Quantum Physics

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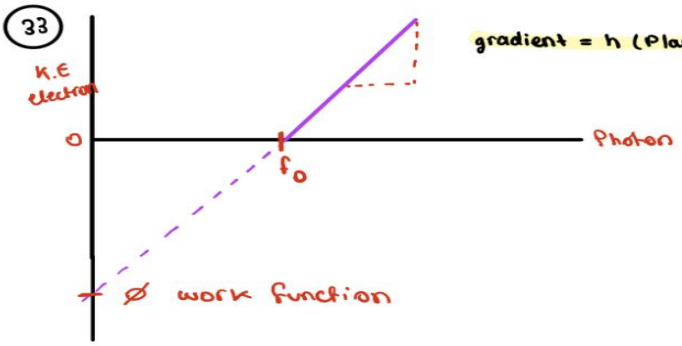


gradient = h (Plank's constant)

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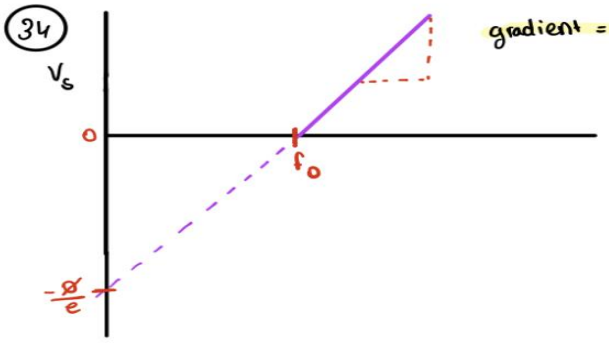


gradient = $\frac{h}{e}$

## Medical Physics:

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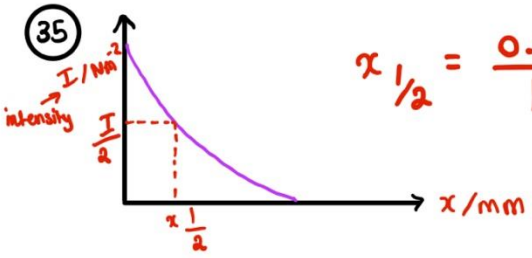


$$x_{1/2} = \frac{0.693}{\mu}$$

## Astronomy & Cosmology:

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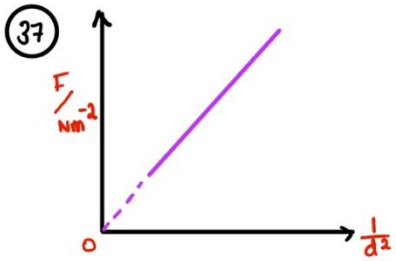


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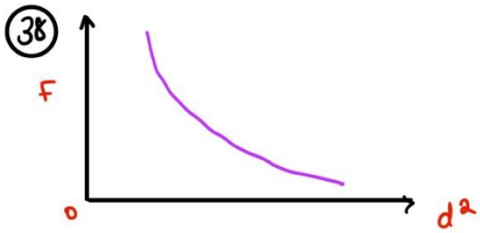
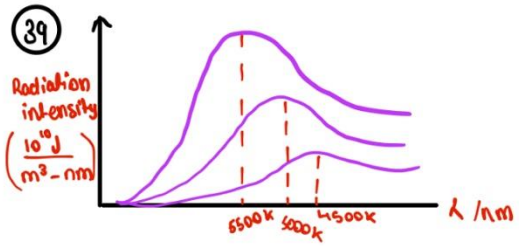
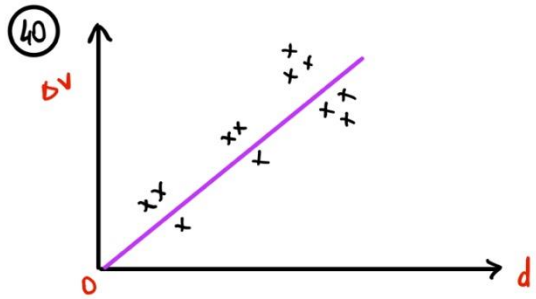



39




40




AHJ