Important Revision Notes

Click on the respective topics for notes:

Notes summarised from class lessons and Physics Textbook/notes (all exam notes are summarised to ensure instant revision)

" There are no traffic jams along the extra mile."

New Physics notes are added to Ray-Resources for free download

Physics Kinematics (Revision)

PHYSICS Kinematics

1. Speed refers to the distance travelled per unit time.
2. Velocity is the rate of change of displacement
3. Acceleration is the rate of change of velocity

Difference between Velocity and Speed

Velocity has magnitude and direction while speed has magnitude only.

Note: Weight is a force, measured in Newtons

Instruments for measuring

- Measuring Tape - measuring Several Metres

- Metre Rule - Distance not more than 1m
- vernier Calipers - Less Than 10 cm
- Micrometer Screw gauge - Less than 2 cm

Pendulum

In pendulum,

Period is the time taken for 1 complete oscillation. > depends of the length of pendulum string.

Longer pendulum have longer periods.

One Oscillation means the pendulum

- swings from position A, to B, den come back to position A again.

<Diagram of Pendulum, Speed time graph>

Electromagnetic Induction

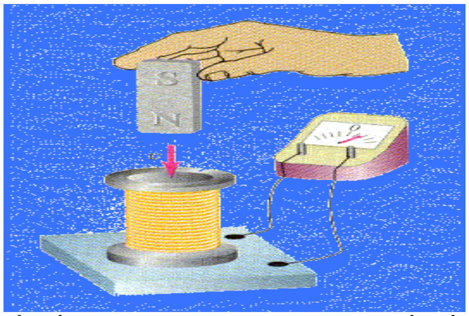
Electromagnetic Induction

Electromagnetic Induction refers to the phenomenon of producing an e.m.f in a circuit due to changing magnetic fields.

♦EM Induction consist of **3 parts:**

1. **Soleniod**
2. **A.C Generator**
3. **Transformer**

Solenoid



1) The magnet moves towards the coil of wire..

2) If the side of the magnet moving towards the coil is:

-South, Current move in **Clockwise** direction

-North, Current move in **NT Clockwise** Direction. (Anti-clockwise)

If the magnet moves **AWAY** from the coil of wire, the direction of current will be opposite!

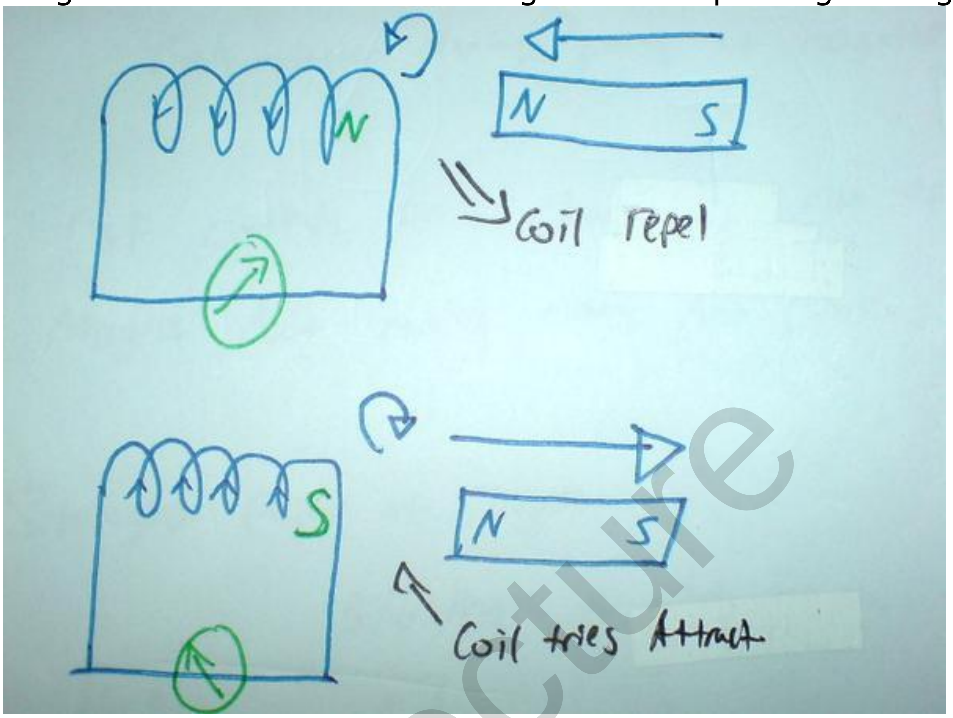
Galvonometer is a very sensitive device to **measure current.** (Similar to ammeter)

Deflection in pointer means an induced current is flowing.

Ways to increase magnitude of e.m.f:

1. Use stronger Magnet
2. Increase the speed of moving the magnets
3. Increase no. of turns on the coil.

Induced e.m.f is generated whenever the magnetic field passing through the coil changes.



From Diagram:

- The Galvonometer always points at negative OR Direction of current.
- When magnet is moved in, coil becomes NORTH as it tries to repel each other.
- When magnet moved out, Coil becomes SOUTH and tries to attract magnet.
- Diagram also showed; When North Pole of magnet is moved towards coil, current move in NT-Clockwise (Anti-Clockwise)
- But when North is moved away, direction of current become OPPOSITE. (Clockwise)

A.C Generator- Alternative Current Generator

Parts of A.C Generator:

1. 2 Carbon Brushes
2. 2 Slip Rings
3. 1 Permenent Magnet
4. Rectangular Coil mounted on axle.

Uses of Slip Rings and Carbon Brushes

- It is to ensure that the induced current in the circuit always has a closed circuit to flow while the coil is rotating.

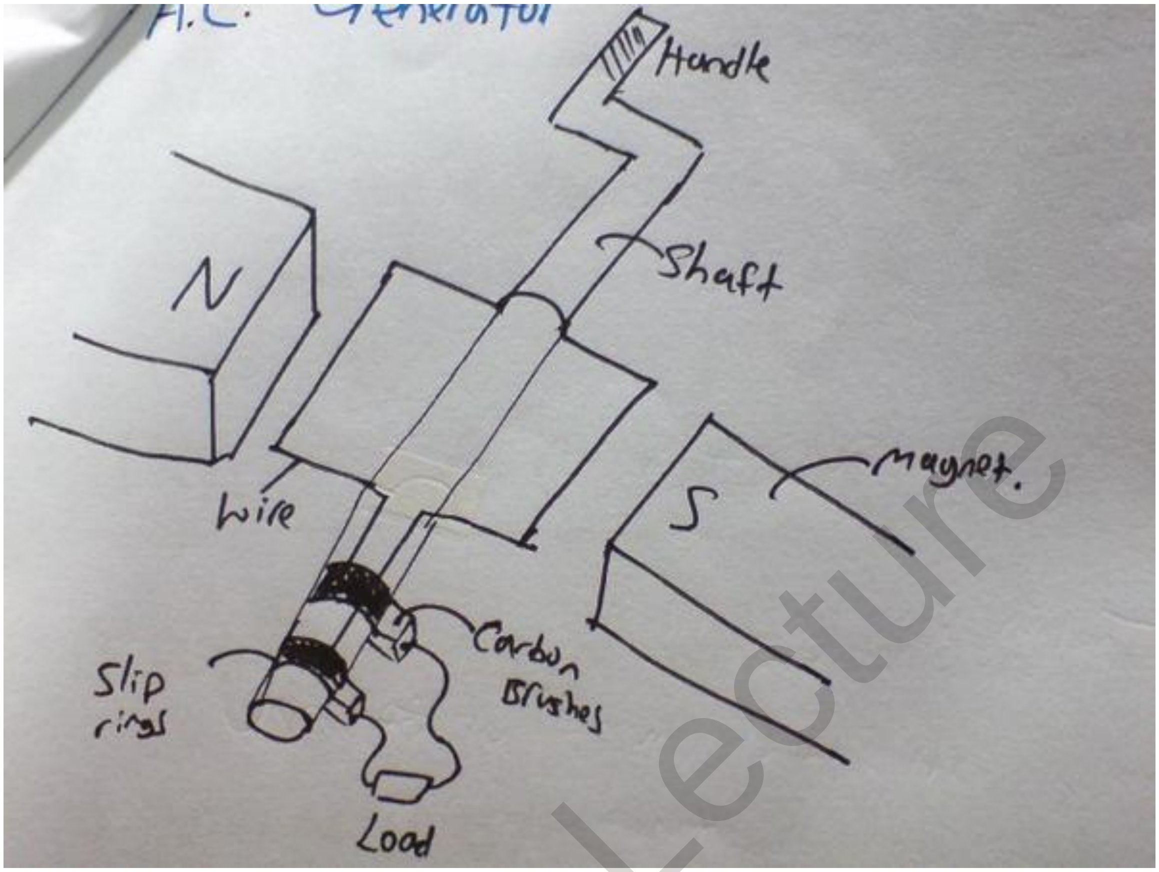
Ways to increase e.m.f in an A.C Generator:

1. Decrease distance between the magnet and coil.
2. Use stronger Magnet
3. Increase the speed of moving the magnets
4. Increase no. of turns on the coil.

(e.m.f- Electromotive Force)

Question: Describe the process/operation of the A.C Generator

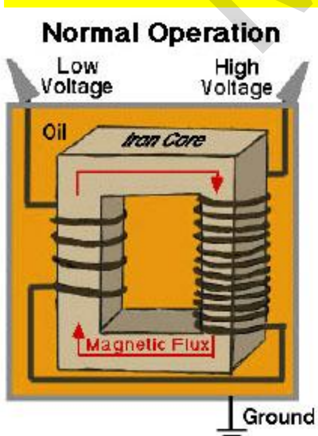
1. Turn the wire.
2. The wire cuts through the magnetic field as it turns.
3. This produces an induced emf.
4. Because of the load, an induced current is produced.

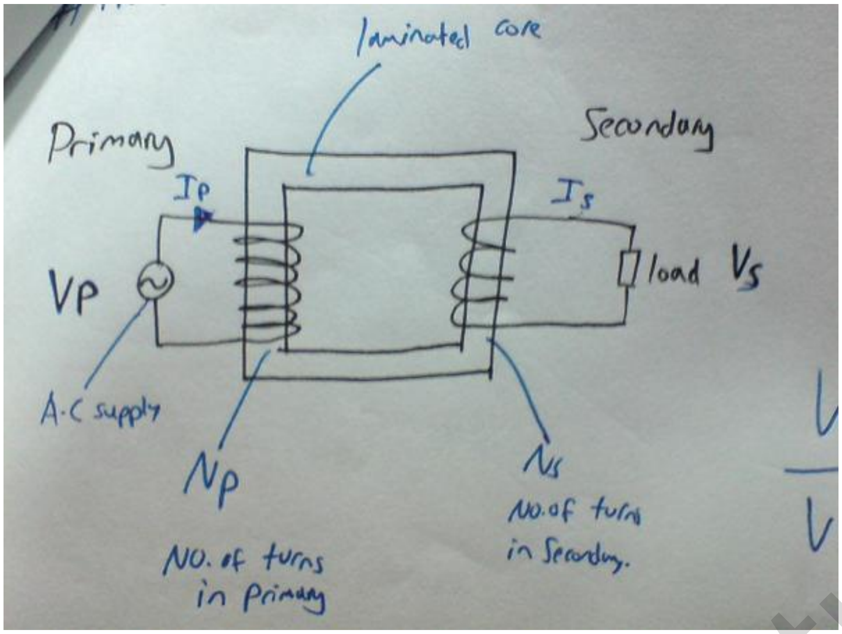


Drawing tips: The rectangular wire must be between the magnets- Cannot draw it bigger than width of magnets. Carbon Brushes must touch Slip rings. See carefully how is the wire connected to the Slip Rings! All labels must have arrows touching their respective components.

Failure to meet any of the above requirements, marks will be penelised!

Transformer





Primary- Part where power is supplied (Put in)

Secondary- The output for power (Give out)

Labels in Transformer:

Np - No. of coil turns in Primary

Ns - No. of coil turns in Secondary

Ip - Current in Primary

Is - Current in Secondary

Vp - Voltage in Primary

Vs - Voltage in Secondary

Types of Transformer:

- Step-Down Transformer- Reduce Voltage (lesser coil turns at secondary) (Used for all home appliances)

- Step-Up Transformer- Increases Voltage (More Coil turns at secondary) (Used for factory purposes)

Note: Transformer can only work with A.C (alternating current):

- Induced EMF is produced only when there is changing magnetic fields, A.C current cause magnetic field to change so EMF is produced.
- If a transformer is connected to a D.C (Direct Current) input, the current will be steady so no induced emf produced!

Formular for Transformer Calculations:

$$Vp/Vs = Np/Ns = Is/Ip$$

Energy Changes of Transformer: **Electricity--Magnetism--Electricity**

Question: Describe the operation of the Transformer

1. Alternating Current supplied to the primary coil.
2. Alternating Voltage cause iron core to magnetise and the magnetic field to change.
3. Magnetic field follow iron coil and link to secondary coil.
4. Hence emf is induced in secondary coil by electromagnetic induction.

Uses of Transformer

- Electric Power Transmission
- Regulating voltages for proper operation of appliances
  Tip: The Greater the voltage, the smaller is the current.

Waves

WAVES

Memorise these Definitions:

What is a wave?

A wave refers to a phenomenon in which energy is transfered through vbraitions.

2 Types of Waves

- Transverse waves refers to waves where the direction of travel is **perpendicular (↕)** to the direction of vibration. (Light/Water)

- Longitudinal Waves refers to waves where the direction of travel is **parallel (↔)** to the direction of vibration.(eg.Sound)

Amplitude refers to the maximum displacement from rest position.

Wavelength refers to the distance between one crest to the next successive crest. SI Unit: Lamda 入

Frequency refers to the number of waves produced per unit time. SI Unit: Hertz (Hz)

Period refers to the time taken for one complete wave.

Speed refers to the distance travelled by the wave per unit time.

In Physics, "relationship" means the formula.

→Relationship of Speed **V**, Frequency ***f*** and Wavelength**入:**

$V = F\lambda$

Deep to Shallow Water:

- **Wavelength** - Become Shorter
- **Frequency** - NO CHANGE
- **Speed** - Slower

Sound

SOUND

“Sound is produced by vibrations placed in a medium”

Remember:

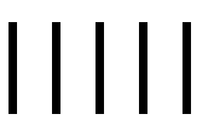
- Sound cannot travel through vacuum.
- Sound can travel though a medium (Material) eg. Solid, Liquid, Gases)
- Speed of sound in air: 300m/s
- Human hearing Range: 20hz - 20KHz (20 000 Hz)
- Sound is a longitudinal (<-->) wave.

Movement of air particle when sound passes thru:

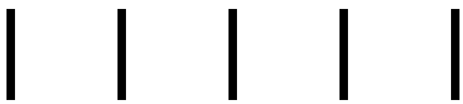
The air particles vibrates to and fro.

Compressions and Rarefactions

Compression occurs when the air molecules are closer together and the air pressure ishigher than the surrounding pressure.



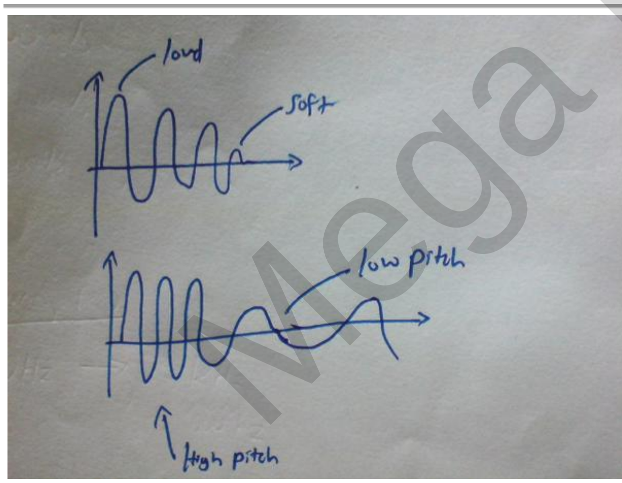
Rarefaction occurs when the air molecules are <u>further apart</u> and the air pressure is <u>lower</u>than the surrounding pressure.



<u>Factors that Affect speed of sound:</u>

1) Temperature- The higher the faster.
2) Medium - Solid > Liquid > Gas (Fastest in solid, Slowest in Gas)

3) Humidity - More humid is faster than less humid



<u>Properties of sound wave</u>

1) The higher the **amplitude**, the louder is the sound.

2) **Frequency** is the pitch of the sound.

3) **Quality** refers to the tone.

Echo is reflected sound.

Formula for Echo:

V=2s/t

In this formula, "V" is speed, "s" is distance, "t" is the time.

Electromagnetic Spectrum

Just memorise:

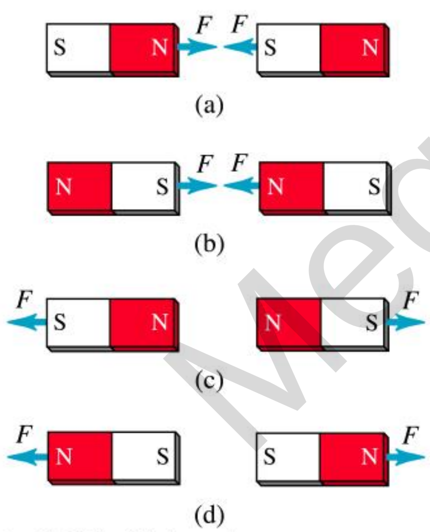
GAMMA RAYS | X-RAYS | ULTRA-VIOLET | Visible Light | Infrared | MICRO-WAVES | RADIO

-Shortest Wavelength
-Highest Frequency

- Longest Wavelength
-Lowest Frequency

Magnets

MAGNETS



- Strongest Point of magnet is at 5/6 length of whole magnet.

Strongest near the poles, NOT the side of magnet!

#Magnetic Materials:

1. Cobalt
2. Iron
3. Steel
4. Nickel

Iron - Temporary magnet coz **EASY** to magnetise & Demagnetise

Steel - Permenent Magnet coz **HARD** to magnetise & demagnetise.

#Freely suspended magnet come to rest at North-South Direction.

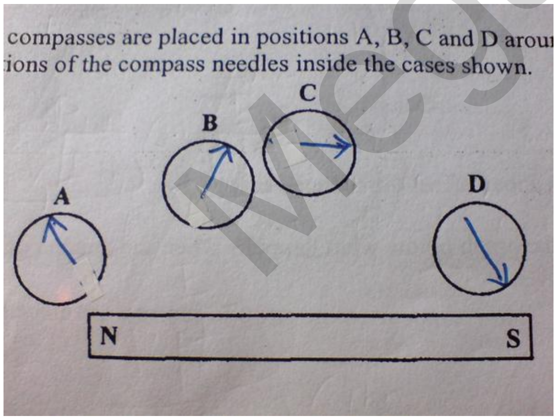
#All magnetic materials can attract to magnet, only magnets can repel magnets.

Ways to Demagnetise Magnets

1. Dropping/ Hammering
2. Heating
3. Electrical Method (Use of AC Current)

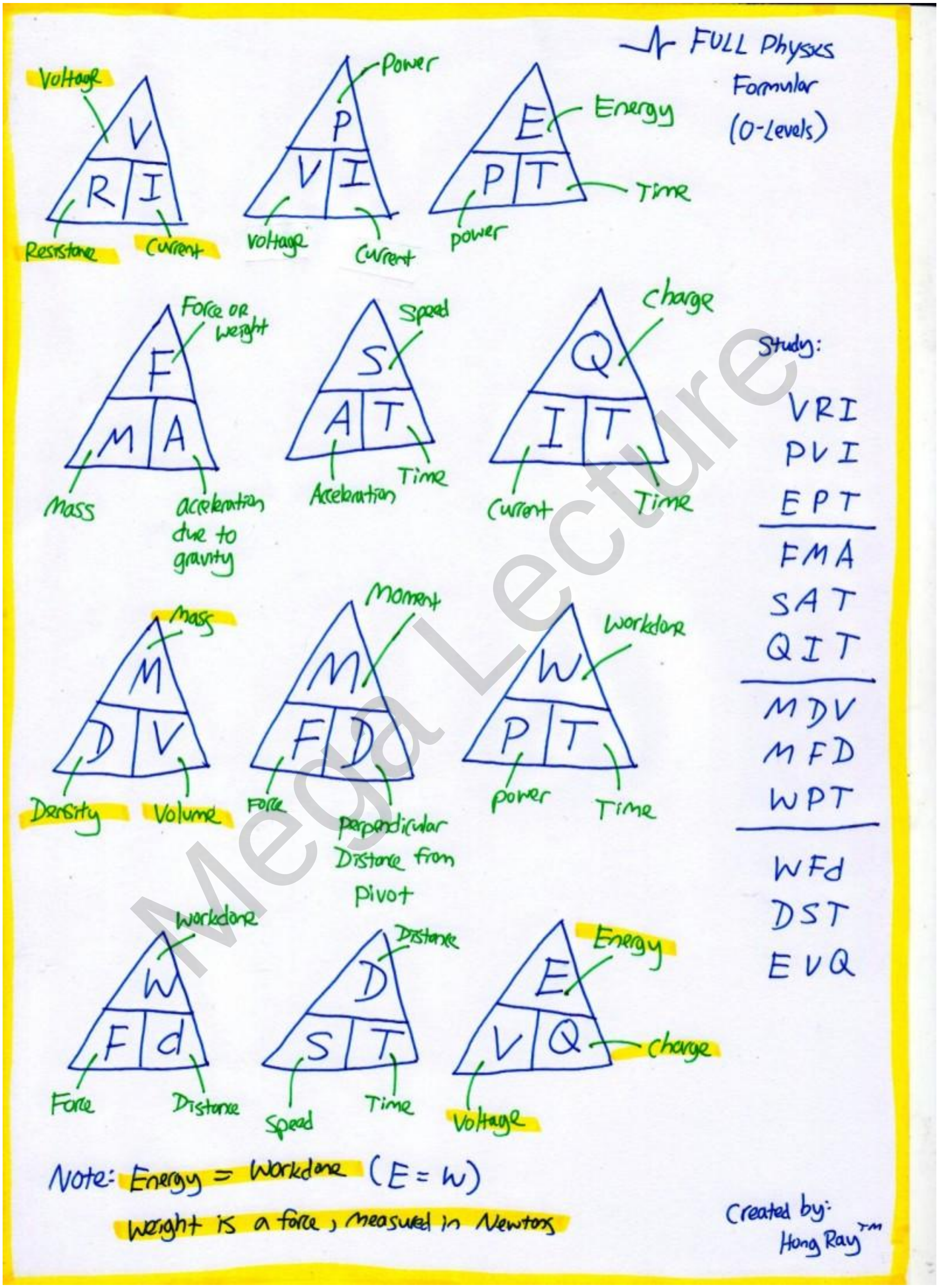
Diagram of compasses placed near a magnet at different positions

-The direction the arrow point is North. North always attract the south, South always attract the North. This is why **Compass D** have it's pointer pointing at South Pole of the magnet.



Important Formulars

Full Physics Formulas (New) v1.02


FULL Physics Formular (O-Levels)
Voltage
V
R I
Resistance
Current
Power
P
V I
Voltage
Current
E
P T
Energy
Time
power
Force OR weight
F
M A
Mass
acceleration due to gravity
Speed
S
A T
Acceleration
Time
charge
Q
I T
Current
Time
Study:
VRI
PVI
EPT
FMA
SAT
QIT
MDV
MFD
WPT
WFd
DST
EVQ
Mass
M
D V
Density
Volume
Moment
M
F D
Force
perpendicular Distance from pivot
Workdone
W
P T
power
Time
Workdone
W
F d
Force
Distance
Distance
D
S T
Speed
Time
Energy
E
V Q
charge
Voltage
Note: Energy = Workdone (E = W)
Weight is a force, measured in Newtons
Created by: Hong Ray TM

Physical Units

Name:	Measured in	SI Unit
Voltage	Volts	V
Resistance	Ohms	Ω
Current	Ampheres	A
Power	Watts	W
Energy	Joules	J
Force	Newtons	N
Charge	Coulomb	C
Frequency	Hertz	Hz
Time	Seconds	S

Suggestions