PHYSICS 1 2010 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

By Yohana Lazaro

i	ii	iii	Iv	v	vi	vii	viii	ix	X
D	A	B	A	B	B	D	B	E	B

2.

i	ii	iii	Iv	v	vi	vii	viii	ix	X
G	H	P	A	C	Q	S	D	O	I

3. (a)Heat capacity is the amount of heat required to rise the temperature of a substance by 1K.

Specific heat capacity is the amount of heat required to rise the temperature of a unit mass of a substance by 1K.

(b)Heat losses in vacuum flask is prevented by

- Silvering the glass walls to prevent heat loss by radiation
- By creating a vacuum between the glass walls to prevent heat loss by conduction
- The convection loss of heat is prevented because the liquid in the flask is of uniform temperature.

(c)(i) heat capacity = sp. Heat capacity x mass

= 960 x 50

= 48000J/K

(ii)heat supplied = heat capacity x temp. change

= power x time taken

960000 = 500 x time

Time taken = 1920 seconds

4. (a)(i) An opaque material is the material that do not allow light to pass through i.e., wood, metal sheet.

Translucent materials are the materials that allow only small amount of light to pass through it. For example, sun-glasses.

(ii)-red is bright and very visible

-red is least affected by fog, rain.

(b)Real image are formed by actual intersection of rays on a screen whereas virtual images are formed where the reflected rays appear to intersect when their directions are produced backwards behind the mirror.

(c)(i) convex mirror are used because;

- They have a wider field of view than all mirrors.
- They form diminished image.this enable a small mirror to view a large object
- They form virtual images.

(ii)Apply real-is-positive convention

F = -18cm, v = -6cm

From 1/f = 1/v + 1/u

-1/18 = -1/6 + 1/u

U = 9cm.

Hence, position of the object is 9 cm in front of the mirror.

5. (a)(i) Astronomy is the branch of science that deals with study of origin, devolution, composition and motion of the universe and the celestial bodies, gas and dust within it.

-An asteroid is a small rocky object within solar system which moves in elliptical orbit primarily between the orbits of mars and Jupiter.

(ii)Scorpion is a constellation because,

-it is a small group of stars that form a definite shape or pattern when viewed from the earth.

-it is found inside the milkyway galaxy; thus, it cannot be galaxy.

(b)(i)

PLANET	**STAR**
Is a large spherical object that orbits a star	Is a large celestial body made up of hot gases known as plasma
It is relatively cold	It is very hot
It is in solid form	It is in gaseous form
Does not produce light	Produces light

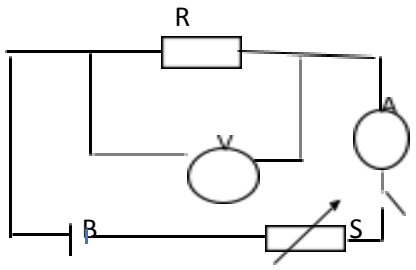
(ii)**Comet** is the small icy celestial body that revolves around the sun.

Meteor is the small solid body that enters the planet's atmosphere from outer space and raised to incandescence by the friction resulting from its rapid motion.

i. MERCURY
ii. PLUTO
iii. VENUS
iv. SATURN
v. SATURN

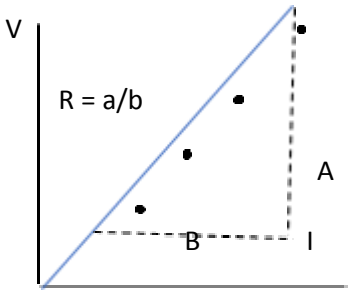
6. (a)(i) Ohm's law states that "at constant physical factors, the pd of the circuit is directly proportional to the applied current"

(ii)Proof of ohms law in laboratory.



-switch on the current, adjust the variable resistor to obtain five widely different values of V and corresponding values of current I.

-the slope of the graph should give the value of the fixed resistor.



Slope = $\frac{\Delta v}{\Delta I} = \frac{v-0}{I-0} = \frac{v}{I} = R$

Thus, from the experiment we find that we have verified the ohms law (V = IR)

(b)to recharge the accumulator,

- We use the specialized battery hydrometer to check the relative density of the Sulphuric acid in the accumulator. if the relative density is low, then the battery is should be recharged
- By measuring its voltage using a voltmeter.

(c)(i) The potential is the same allover the surface of any material conductor but the charge density increases as we move towards the pear-shaped end.

(ii)The electron will be deflected towards the positive plate.

7. (a)(i) A solenoid is a coil of conducting wire – usually copper-wound in such a way that current flows in the same direction in all its turns.it is used to concentrate the magnetic fields generated by the electric current and applied for such processes as magnetization and demagnetization.

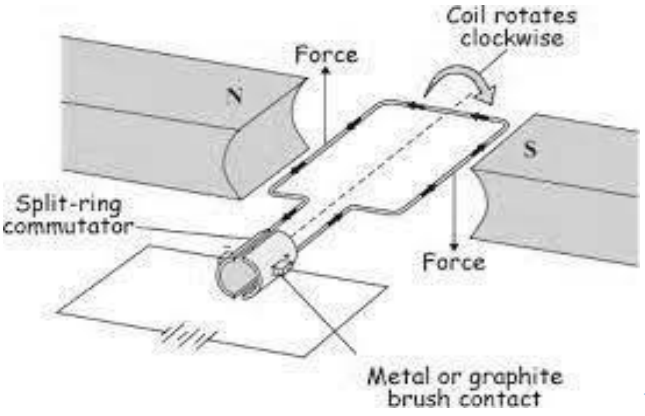
Electromagnetic induction is the creation of electric current through a conductor by changing the magnetic flux linking the conductor.

(ii) Applications of electromagnets;

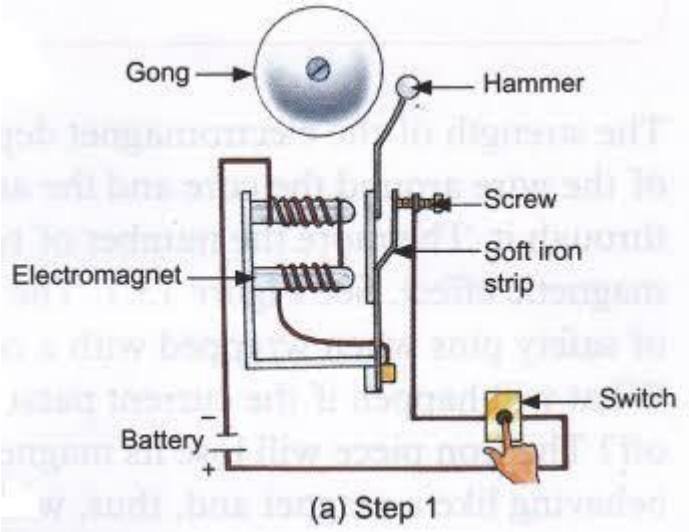
- Electric bells
- Automatic door locks
- Motors and dynamos

(b)Structure and mode of action of a simple DC motor.

-DC motor is an electrical machine which converts electrical energy into mechanical energy. The basic working principle of the DC motor is that whenever a current carrying conductor places in the magnetic field, it experiences a mechanical force.



(c)(i) Diagram of an electric bell



(ii)The bell will ring once and will not operate again because the yoke armature and the core will be permanently magnetized to become magnets even under no current.

8. (a)(i) Electrons are emitted because the thermal energy absorbed by the metal increases the kinetic energies of electrons in the outermost shells of the metal's atoms. As the result they break away from the nuclear attraction.

(ii)A transistor is a semiconductor device used to amplify electric current or as switch in electronic circuits.

9. (a)Acceleration due to gravity is the rate of changing velocity of a freefalling body caused by the pull that the earth exerts on it.

Newton's first law of motion states that "A body will continue to remain on its state of rest or uniform motion unless an external net force is applied on it"

(b)the body is dropped from Aeroplane, so its initial velocity is 0

(i) $s = ut + 1/2at^2$

$= 0 \times 15 + ½ \times 9.8 \times 15^2$

Height = 1102.5 m

(ii)v = u + at

= 0 + 9.8 x 15

Velocity to strickle the ground is 147 m/s

(c)(I) Impulse = force x time = $\Delta(mass\ x\ velocity)$

Force x (2 x 60) = 200000 x ((54 x 1000)/ (60 x 60))

Force = 25,000 N

(ii) u = 54,000m/s v = 0m/s t = 120s

Since force = mass x acceleration

25000 = 200000 x acc.

Acceleration = 0.125 m/s^2

Then, distance, $s = ut + ½\ at^2$

$= 54000 \times 120 + ½ \times 0.125 \times 120^2$

Distance travelled = 900m

10. As light enters an optically less dense medium the following occurs;

- Its speed increases
- Its direction changes

(i)An echo is the reflected sound

Let the depth be d

-Assuming that the waves are sent straight to the ocean floor;

Total distance travelled = 2 x depth of the ocean

= 2d……..(i)

Also, total distance travelled = wave speed x time

= 1500 x 1s……(ii)

Equating (i) and (ii)

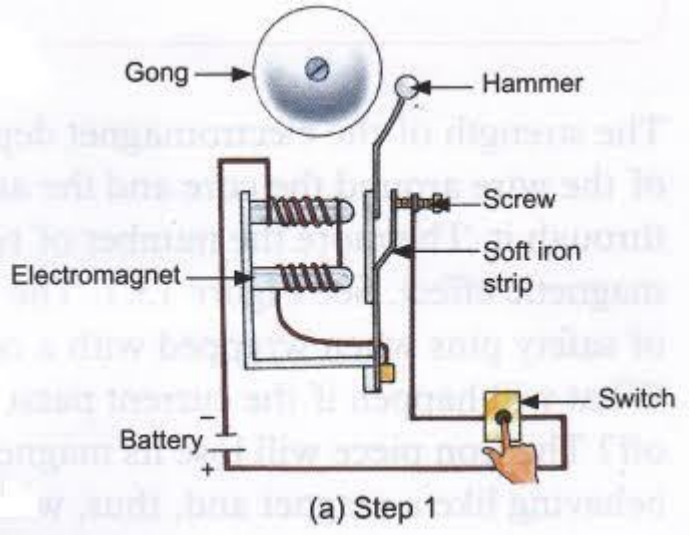
2d = 1500

d = 750m

depth of the ocean is 750m

11. (a)(i) Electromagnetic field is a region of magnetism created by an electric current flowing in a conductor.

(b)operation of an electric bell.



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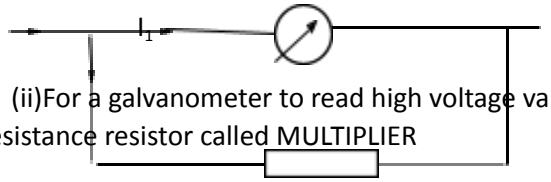
Working principle

-When the switch is pushed on, the circuit gets completed and the current starts flowing through the U-shaped electromagnet which creates a magnetic field in the core. This attracts the iron armature.

When the armature moves towards the electromagnet, the hammer strikes the gong and the bell rings.

As the armature moves towards the electromagnet, the contact with the adjustment screw breaks which breaks the closed circuit and stops the current. Now, when there is no current there is no electromagnetism and the armature returns to the original position. This making and breaking of the circuit of the electromagnet continue as long as the button remains pres.

(c)(i) For a galvanometer to read high current values it should be connected in parallel with a SHUNT (low resistor that takes most of the current).



(ii)For a galvanometer to read high voltage values should be connected in series with a high resistance resistor called MULTIPLIER