PHYSICS 1 2017 - NECTA FORM FOUR

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1.

i	ii	iii	lv	v	vi	vii	viii	ix	x
C	A	A	D	D	C	C	A	C	B

2.

i	ii	iii	lv	v	vi	vii	viii	ix	x
I	M	B	E	F	H	A	J	K	L

3. (i) Relative velocity

(ii) Radiation

(iii) Critical angle

(iv) Melting point

(v) Complementary colours

(vi) A multiplier

(vii) Electrons

(viii) Constellation

(ix) Flemings left hand rule and Flemings right hand rule

(x) Radio wave

4.(a) Applications of thermal expansions

-in making railway joints

-making steel roofs and bridges where gaps are left

-in making concrete slabs spaces are left for expansion

-overhead telephone and electric poles are made sagging to allow for expansion.

(b) Holes below chimneys of kerosene lamp or kitchen allow air to enter into the chimney and raise of smoke up the chimneys.

4. (c) $L = L_O (1+ \alpha\Delta T)$

$151 = 150(1 + 1.1 \times 10^{-5} \Delta T)$

$\Delta T = 91515$ K

From, $\Delta T = T - T_0$

$91515 = T - (273 + 10)$

$T = 91789$K.

5.(a)(i). Reasons to why convex mirrors are used as driving mirrors

-They give a wide view and so help the driver to see a large area.

-They form virtual images and so they do not require a screen.

(ii)from refractive index = sin 90°÷ sin C

index = 1/sin C, where C critical angle

1.5 = 1/sin C

C = 41.8°

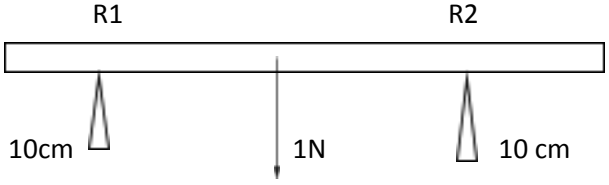
(b)Short sightedness Long sightedness Image of distant object is formed before the retina. Image in the eye is formed behind the retina.

6.(a)(i) lever class 1 effort is before pivote

lever class 2 effort is before the load

lever class 3 effort is between pivot and load

(ii)



1.5

At equilibrium, total upward force = total downward forces

R1 + R2 = 1N + 1.5 N

So, R1 + R2 = 2.5 N

Taking moments about R1,

2.5 x 0.4 = R2 x 0.8

R2 = 1.25 N

Since, sum of upward forces = sum o downward forces

1.25 + R1 = 2.5, R1 = 1.25 N

(b)(i) Law of floatation states that "A floating body displaces its own weight of the fluid in which it floats."

(ii)consider below,

When the cork floats in water,

Volume of cork immersed in water = Volume of water displaced

Mass of cork = mass of water displaced

Mass of water displaced = 20g

Also, Mass of water displaced

Volume of water displaced x density of water.

volume = Mass/density

= 20/1 = 20 g

So, volume of cork is $20cm^3$

whole volume of cork = total mass÷ it's density.

=20/0.25 = 80 cm^3

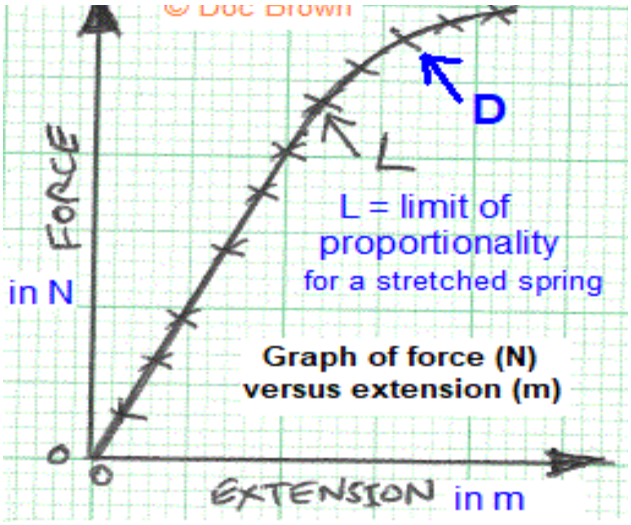
Fractional volume = volume in water÷ total volume

= 20÷80

= ¼

7. (a)(i) Essence of the kinetic theory of matter is that particles that make up matter are in constant motion and so posses kinetic energy. Because particles posses kinetic energy they can collide with one another to mix quickly or even bring about chemical reactions.

(ii)



https://docbrown.info/ephysics/forces4.htm

(b) (i) Hookes law states that "provided the elastic limit is not exceeded, the extension of a material is directly proportional to the applied force."

(ii)Uses of Gamma Rays:

-Sterilize medical equipment.

-Sterilize food (irradiated food)

-Used as tracers in medicine.

-Radio Therapy- In oncology, to kill cancerous cells.

8.(a) (i) Wavelength is the distance between two consecutive crests or troughs of a wave.

(ii) Diffraction begins to occur when the size of the gap in the barrier is equal to the wavelength of a wave. There after, the smaller the gap the bigger the diffraction effect observed.

(b) Radio waves have frequencies in the MHz 106 region and relatively long wavelengths while light in the visible have higher frequency (≈1015Hz) and smaller wavelengths

Frequency = number of waves ÷ time

=1/(0.005 - 0.001)

=250 Hz

Also, wavelength = 10-2= 8 m

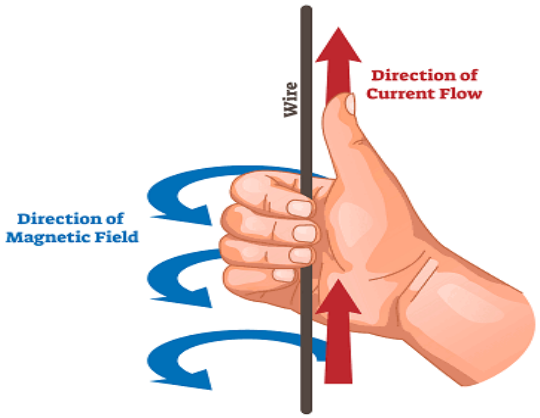
Also, velocity = wavelength x frequency

= 8 x 250

= 2000 m/s

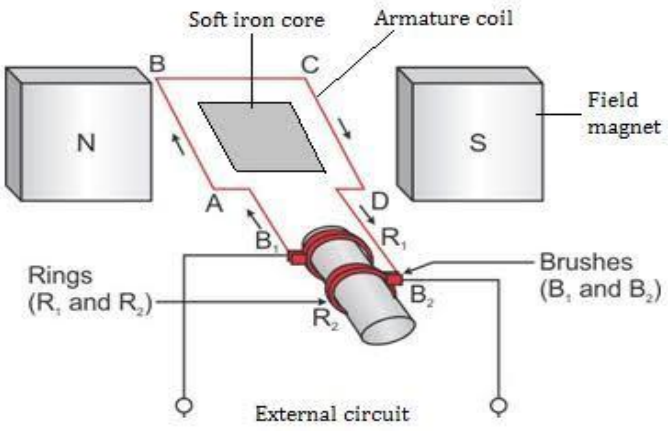
9.(a)(i)Mutual induction is the induction of emf in conductor as a result of change in current in another conductor near it.

(ii) Right hand grip rule states that "If you grip the imaginary axis of rotation of the rotational force so that your fingers point in the direction of the force, then the extended thumb points in the direction of the torque vector"



https://www.pasco.com/products/guides/right-hand-rule

(i).



https://www.topperlearning.com

(ii) A simple a.c dynamo can be converted to a simple d.c dynamo by replacing a pair of slip rings in the a c dynamo with a pair of commutators.

10. (a) (i)Semiconductors are materials that have conductivity that is lower than that of a conductor but higher than that of insulators.

(ii) Whereas extrinsic semiconductors are impure semiconductor formed by adding an impurity to a pure semiconductor. No, any external impurity is doped in case of an intrinsic semiconductor while extrinsic semiconductors are formed by adding either trivalent or pentavalent impurities to the semiconductor material.

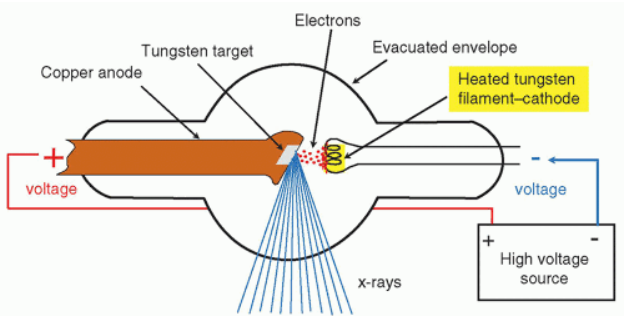
(b)b) (i) Four properties of cathode rays.

-They have a negative charge.

-They have momentum.

-They travel in straight line.

-They can be deflected by electric and magnetic fields.



(ii) X-ray tube, also called Roentgen tube, evacuated electron tube that produces X rays by accelerating electrons to a high velocity with a high-voltage field and causing them to collide with a target, the anode plate.

(c)Uses of the induction coil.

To generate a spark for igniting gasoline in a gasoline engine. To provide high voltage for electrical discharges in gases at low pressure.

To produce flash light in optical cameras.

In operating x-ray tubes (in the past).

In science research for investigation of high voltages

(ii) The working principle of a bicycle dynamo.

A bicycle dynamo is essentially an ac generator in which the rotation of a coil is caused by the rotating wheel of the bicycle.

11.(a)(i) The increase in length of a conductor leads to increase in the resistance of a conductor since more length is like adding a resistor in series.

Increase in cross sectional area of a conductor lowers the resistance of the conductor since it is equivalent to adding a resistor in parallel.

(b) Let resistance of wire A = kl_A/A_A

Resistance of wire B = Kl_B/A_B

$Diameter_A = 2diameter_B$

Therefore, ratio of resistance A and resistance B is 1: 8

(c)(i) power =IV

720 = I x240

Current = 3A.

heat energy = Mass x SHC x T

= 2 x 4200 x (100 - 30)

= 588000J

The heater must provide 588kJ of energy to the water in order for it to boil.

Energy = Power x time

588,000 = 720x time

Time = 816.67 seconds

= 13.6 minutes

It will take the heater 13.6 minutes.