PHYSICS 1 2000 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv	xv
C	D	D	A	B	A	B	A	B	D	C	D	C	C	A

2.(a)moment of force is the product of the force multiplied by the perpendicular distance from the line of action of the force to the pivot or point where the object will turn. the S.I unit is newton metre (Nm).

(b)They will be in equilibrium if the sum of the forces equals zero and the sum of the moments around a point in the plane equals zero.

(c)

3.(a)Heat is a measure of change, never a property possessed by an object or system. Therefore, it is classified as a process variable. Temperature describes the average kinetic energy of molecules within a material or system and is measured in Celsius (°C), Kelvin(K), Fahrenheit (°F).

(b)Water is not used as a thermometric liquid because It has a low coefficient of expansion so it is less sensitive to temperature changes.

(c)(i)The specific heat capacity is 800 Joules per kilogram per degree Celsius (J/kg°C). This means that it takes 800 J to raise the temperature of 1 kg of a substance by 1°C.

(ii)From, $Q = mC\Delta T$

$980 = 7 \times C \times (1000 - 0)$

$C = 0.14$ J/kg K

4.(a)Echo sound or sounds caused by the reflection of sound waves from a surface back to the listener.

(b)Factors affecting the velocity of sound in air are

-wind

-pressure

-humidity

(c)Because in a furnished room will absorb the sound waves,hence there won't be any echo. But in a an empty room reflect the sound. Therefore there will be echo. Hence we hear sound louder.

(d)

From, v = 2d/t

= (2 x 99)/0.6

Velocity is 330 m

5.(a)-An ampere is the unit used to measure electric current.

-potential difference is the difference in potential between two points that represents the work involved or the energy released in the transfer of a unit quantity of electricity from one point to the other.

(b)equivalent resistance is given by 1/R = 1/R1 + 1/R2

(c)effective emf = 3 x 1.5 = 4.5 V

effective resistance, 1/r = 1/0.6 x 3, r = 0.2 ohms

Then, 4.5 = I (0.2 + 5)

(i)Current is 0.87A

(ii)pd = Ir = 0.87 x 0.2

potential difference is 0.173V

6.(a)Constellations are the collection of only a few stars.In constellations, the stars are arranged in patterns which resemble human beings or with some animals.

-Galaxies are the collection of billions of stars.

-Astronomy is the study of everything in the universe beyond Earth's atmosphere. That includes objects we can see with our naked eyes, like the Sun , the Moon , the planets, and the stars .

(b)(i)Even though the sun is very far from Earth, it is much closer than other stars. Because the sun is closer to Earth than any other star, it appears much larger and brighter than any other star in the sky.

(ii)The four planets that orbit closest to the Sun – Mercury, Venus, Earth, and Mars– are called inner planets.

(c)Comet: A body of ice, rock and dust that can be several miles in diameter and orbits the sun. Debris from comets is the source of many meteoroids.

- meteor that hits Earth without burning up in the atmosphere.

7.(a)(i)Pressure is the perpendicular force per unit area,

(ii)-When air is pumped inside a balloon, it expands in size. This shows that the air inside exerts pressure on the walls of the balloon.

- A sealed packet of chips swells up in the mountains.

(b)(i)The chain or lever is connected to the flush valve. It lifts the flush valve allowing water to slip through a drain hole. The drain hole is connected to the bowl and water flows in. ... When the tank is empty the float ball falls free allowing the valve to open and fill the tank.

(ii)As the pressure decreases, the amount of oxygen available to breathe also decreases. At very high altitudes, atmospheric pressure and available oxygen get so low that people can become sick and even die.When a low-pressure system moves into an area, it usually leads to cloudiness, wind, and precipitation

(c)Are = 4 x 0.3 = 1.2m²

From, pressure = Force/area, so

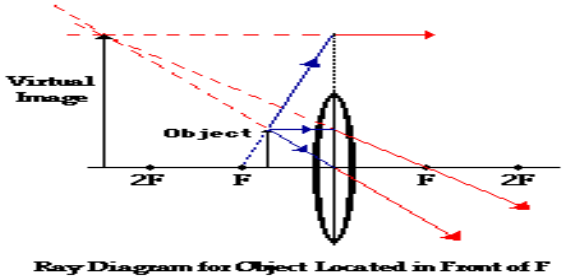
Force = pressure x area

= 1.01 x 10^5 x 1.2

Force = 1.212 x 10^5 N

8.(a)The principal focus is defined as the point where a beam parallel to the principal axis appears to diverge converges from a point on the principal axis after passing through the lens.

(b)-The image will be formed at infinity.



Ray Diagram for Object Located in Front of F

https://www.physicsclassroom.com/class/refrn/Lesson-5/Converging-Lenses-Ray-Diagrams

(c)(i)From, 1/f = 1/u + 1/v

-1/8 = 1/20 + 1/v

v = -5.7 cm

(ii) Magnification = v/u = 5.7/20 = 0.3

(III)Since 0.3 = h/4

Height of image is 1.2 cm

9.(a)(i)the angle between the direction indicated by a magnetic needle and the true meridian.

(ii)Angle of dip is also known as the magnetic dip and is defined as the angle that is made by the earth's magnetic field lines with the horizontal. .

(iii)magnetic pole, region at each end of a magnet where the external magnetic field is strongest.

(b)The polarity of any magnet may be tested by bringing both its poles, in turn, near to the known poles of a suspended magnet. Repulsion will indicate similar polarity. If attraction occurs, no firm conclusion can be drawn, since attraction would be obtained between either:

(a) two unlike poles or

(b) a pole and a piece of magnetized material.

Repulsionis, therefore, the only sure test for polarity

(c)(i)magnetic field is a field explaining the magnetic influence on an object in space. A electric field is a field defined by the magnitude of the electric force at any given point in space.

(ii)A neutral point of Magnet is a point at which the resultant magnetic field is zero. In general, the neutral point is obtained when a horizontal component of the earth's field is balanced by the produced by the magnet. When the N pole of the magnet points South and the magnet in the magnetic meridian

10.(a) Faraday's law of electromagnetic induction states that the magnitude of the emf induced in a circuit is proportional to the rate of change of the magnetic flux that cuts across the circuit.

(b)Advantage - Very susceptible to magnetic permeability changes.

Disadvantage - There is a major heat loss during cycling eddy currents due to friction in the magnetic circuit, especially where the core is saturated. Thus there is the loss of useful electrical energy in the form of heat. There is magnetic flux leakage..

(c) From, Np/Ns = Vp/Vs

Vs = 240 x 60 ÷ 1200

Vs = 12V.

Then,

Current = 12/3 = 4A.

11.(a)(i)Alpha particles, also called alpha rays or alpha radiation, consist of two protons and two neutrons bound together into a particle identical to a helium-4 nucleus.

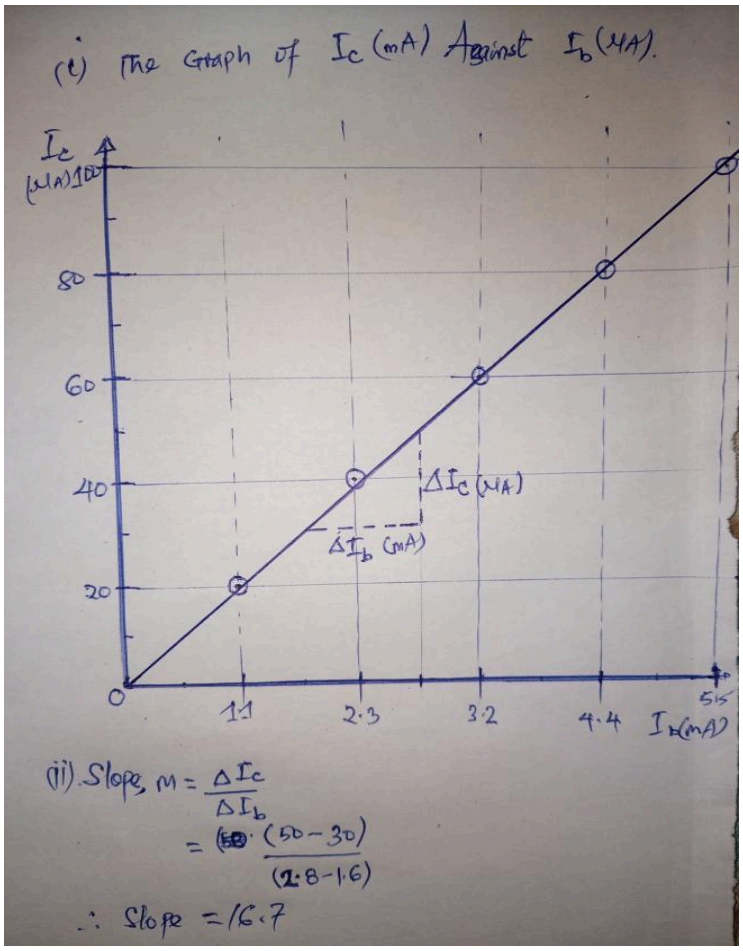
(ii)beta particle, also called beta ray or beta radiation, is a high-energy, high-speed electron or positron emitted by the radioactive decay of an atomic nucleus during the process of beta decay

(iii)Gamma rays have the smallest wavelengths and the most energy of any wave in the electromagnetic spectrum.

12.(a)(i)The main difference between intrinsic and extrinsic semiconductor is that intrinsic semiconductors are pure in form, no form of impurity is added to them while extrinsic semiconductors being impure, contains the doping of trivalent or pentavalent impurities.

(ii)An extrinsic semiconductor is one that has been doped; during manufacture of the semiconductor crystal a trace element or chemical called a doping agent has been incorporated chemically into the crystal, for the purpose of giving it different electrical properties than the pure semiconductor crystal.

(b)



(iv)The variation of collector current(IC) with the emitter current(IE), keeping Collector Base voltage(VCB) constant. The resulting current gain has a value less than 1.