PHYSICS 1 2019 - NECTA FORM FOUR

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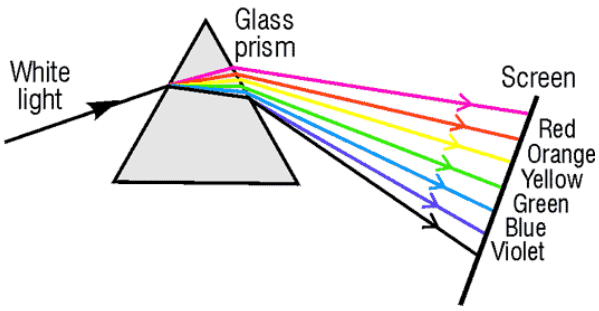
1.

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

2.

i	ii	iii	iv	V
B	A	C	A	A

3.(a)consider the figure below.



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Lens Camera

-Focuses by altering the distance between the lens and film

-Image formed in the film is processed chemically to produce the final image.

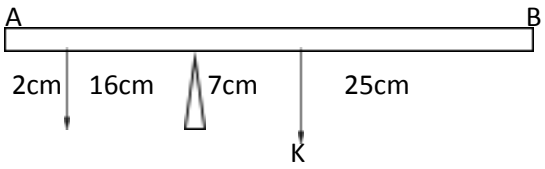
Eye

-Focuses by altering the shape of the lens

-Image formed is converted to electrical impulse, that travels via to brain, this impulse is interpreted to create final perceived image.

4(a)This is because, the pressure under a liquid surface varies with depth. As depth increases, pressure increases. At the bottom of the pond there is greater pressure than at the top of the pond. Thus, when a bubble rises from below the surface it encounters less pressure. This causes the volume to increase and the bubble rises in size as it rises from a depth.

(b)Consider the diagram below



Let K be the mass of the rule.

From principle of moments, sum of clockwise moment=sum of anti-clockwise moment

K x 7cm= 35g x 16cm

7K=560, divide by 7 both sides to get value of K

K =80 g.

5(a)Consider inclined plane as shown below.

Apply Pythagoras theorem;

$L^2 = (1)^2 + (4.9)^2$

$L^2 = 1 + 24.01 = 25.01$

L = 5 cm

from, MA = Load/effort

= 2000/500 = 4

Also, from VR = load distance÷ effort distance

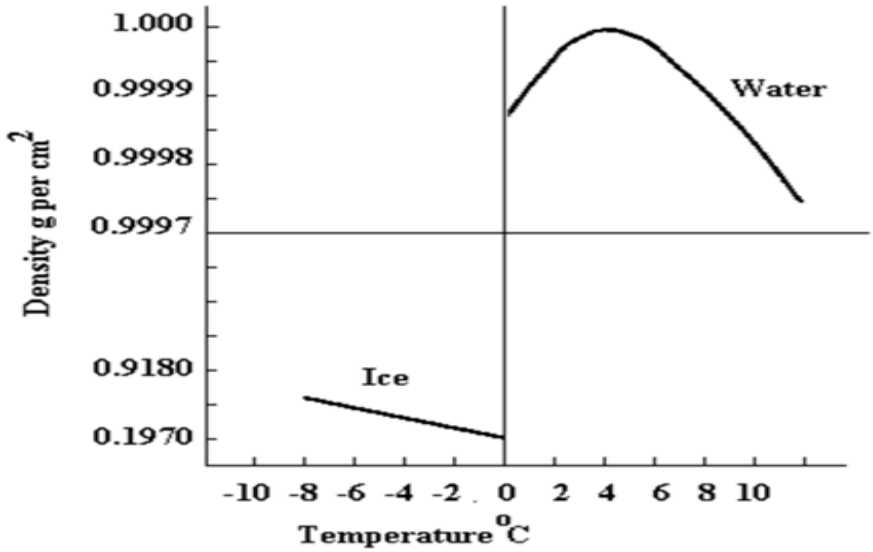
= 5/1 = 5

Then Efficiency =MA/VR x 100%

=4/5 x 100% = 80%

Apply Newton's second law which states that the force F acting on a body is equal to the mass m of the body multiplied by the acceleration a of its center of mass, F = ma.

6.(a) The density of water does not vary uniformly with an increase in temperature. When an ice heated form -5^{0}C to 0^{0}C, the density of water increases linearly; But also, when the temperature increases from 0^{0}C to 4^{0}C, the density of water increases exponentially and it is at maximum. This situation is called Anomalous Expansion of Water.



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Given that

-Initial temperature(T1)=200C

-Dimensions= 30cm x 18cm x 10cm

-Final Temperature(T2)=150 0C

-Linear expansivity= 1.2 x 10-5 K-1

From, $\Delta L = L \Delta T$.

= 0.000012 x 30 x (150 - 20)

= 0.0468 cm

then new length = 30 + 0.0468 = 30.0468 cm.

For 18 cm, increase in length is given by,

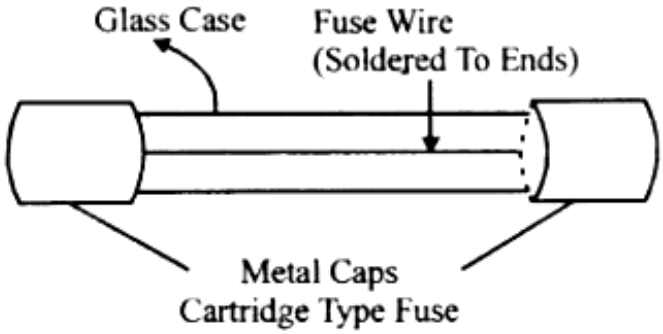
0.000012 x 18 x (150 - 20) = 0.02808 cm

Then, new length = 18 + 0.02808

= 18.02808 cm.

7.(a) fuse is a safety device used to protect an electrical appliance against excess current.

This device is designed to allow only a certain amount of current pass through it. So, when there is excess current in electrical appliances than rated amount, then the fuse melts and cut off the flow of current between the parts of an electrical appliance.



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(b)First, let find the total power of all appliances.

PT = 100 + 75 + 300 + 1500=1975W

But from the formula of Power

P=IV

P=1975 W, V=240v, I=?

I=P / V

= (1975) / (240) =8.229=8.23A

Therefore, the appliances in the house use an electric current of 8.23A only. Hence the fuse will blow on since it has rated at 10A

8.(a)This is because, The melting point of a material (temperature at which it changes from a solid to a liquid) varies with the pressure. So when pressure increases also the melting point has to increase. So the inner core is subjected to very high pressure compared to outer core. Therefore, this makes the melting pint of inner core lower than outer core because of very high pressure at the inner core despite of it high temperature.

(b)Given

-T1=2N

-T2=6N + 2n=8N

-F1=400Hz, F2= ?

From,

F1/F2 = sqrt(T2/T1)

F2 = 400 x sqrt (8÷2)

= 800Hz

9.(a)(i) To use soft iron core. This is because make a strong and permanent magnetism of a magnetic material

(ii) To increase number of turns of wire(solenoid), If the number of turns increases, the magnet also become strong enough to lift a heavier iron.

(iii) To use high electric current so as to create strong magnetic fields, which can make strong magnet enough to lift a heavy metal.

(b)A musician retune a stringed instrument when temperature changes because stringed instrument length changes when temperature changes. If temperature increased, the string becomes long and when temperature decreased the string shortens, so the musician should retune it.

(c)Given that:

-Time (t)=10s

-Speed of Light In Air= 3 x 108m/s

-Speed of sound In Air=340m/s

-Distance= Speed x Time D= 340 x10=3400m.

10.(a)Given That:

-Half life (t1/2)=57000 years

-Time for decay (t) =11,400 years

from $N1/No = (1/2)^2$

hence factor is 1/4

(b)The PN junction is made up by combining a P-type semiconductor and N-type semiconductor in a single continuous crystal.

Mode Of Action Of PN Junction.

The Electrons from n-type cross over the junction to P-type fill the holes, at the same time holes from P-type crossover the junction to capture electron from n-type. These movement of electrons and holes causes the n-type to become positively charged and the p-type to become negatively charged and creating a potential difference at the boundary. This stops further flow of electrons and holes at the boundary.

11.(a) It is necessary to transmits A.C at high voltage so that to minimize amount of power lost as electricity flows from one location to another. The high voltage is necessary to overcome the voltage lost through resistance produced by cables, since the resistance increases as the length increases.

(b)When there is a varying current in generator from 0 to 10A, the induced e.m.f is produced, which acts as a back e.m.f

When the current in generator was increased to 10A, the induced e.m.f reduce the original current from 10A to 4A, this induced e.m.f acted as a back e.m.f in the coil of magnetic field, flow in opposite direction with that of original current of 10A