

## SUNSHINE SECONDARY SCHOOL

FORM 2

PHYSICS

ENDTERM EXAM – JULY 2019

TIME: 2HRS

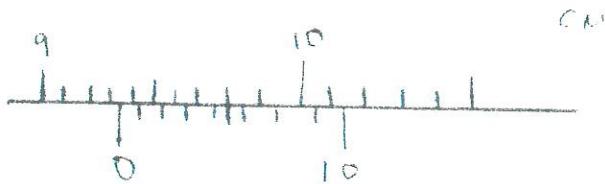
NAME: Marking guide CLASS: ..... ADMIN NO: .....  
2 - omnia  
3 - Hawthorne  
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8 & 10 - Mulengo  
9 - WoreINSTRUCTIONS

- a) Answer all Questions in the spaces provided
- b) All working must be clearly shown
- c) Non programmable silent electronic calculators may be used

FOR EXAMINERS USE ONLY

MAXIMUM SCORE	80

1. The figure below shows a vernier calipers being used to measure the length of a glass block.



What is the length of the glass block.

$$\text{M.S.R} = 9.30 \text{ cm.} \checkmark$$

$$\text{V.S.R} = \frac{1}{50} = 0.02 \checkmark$$

Reading

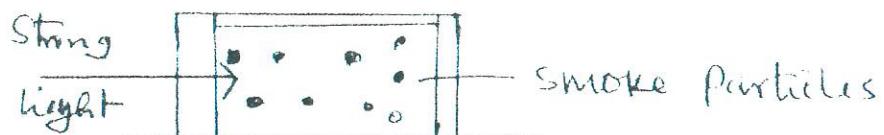
$$9.35 \text{ cm.} \checkmark$$

(2mks)

2. State two characteristics of an image formed by a pinhole camera. (2mks)

Inverted  $\checkmark$   
Real  $\checkmark$

3. The figure 2. Below shows a microscope M focused on smoke particles inside a glass container.



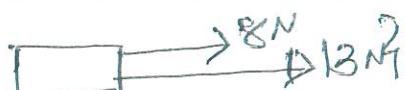
- i) State and explain what was observed. (2mks)

Bright specks move in constant random motion, due to hitting by tiny invisible air molecules  $\checkmark$

- ii) What change is observed to the movement of smoke particles when temperature is increased.

Particles move faster/increased speed of particles due to gained k.e  $\checkmark$

4. Show diagrammatically how forces of 13N and 8N can be combined to give resultant force of 21N.



Direction  $\checkmark$   
Magnitude  $\checkmark$

5. A pinhole camera forms an image of size 5cm tall for an object placed 25m away from pinhole. If the height of the object is 5M. Find the length of the pinhole camera(3mks)

$$\begin{aligned} h_i &= 5\text{cm} \\ u &= 2500\text{cm} \\ h_o &= 500\text{cm} \\ v = ? & \end{aligned}$$

by from

$$\frac{v}{u} = \frac{h_i}{h_o}$$

$$\frac{v}{2500} = \frac{5}{500}$$

$$v = 25\text{cm}$$

check on units  
(3mks)

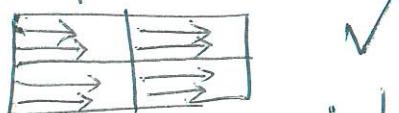
- 6.i) Name three magnetic materials.

Nickel ✓

iron ✓

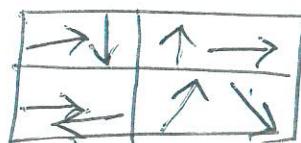
- ii) In the space below, draw a diagram to show the difference between magnetized steel bar and unmagnetised steel bar using the domain theory of magnetism.(2mks)

Steel bar (Magnetised)  
dipoles



dipoles are aligned  
giving in one direction

unmagnetised

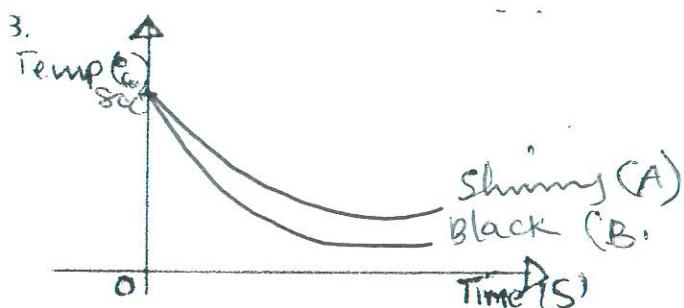


Dipoles are disorganized

7. State the difference between scalar and vector qualities. (1mk)

Scalar - have only magnitude but no direction  
Vector - have both direction and size.

8. (i) Two similar open tins with equal amounts of water at 80°C were left to cool. If tin A is shiny and B is blackened, sketch on the same axes the graphs of temperature against time for tin A and tin B. (2mks)



(ii) Mention two features in a thermos flask which reduce heat loss by conduction.(2mks)

Cork | plastic stopper ✓  
Vacuum ✓

9. Define polarization as a defect of a simple cell and state how it can be minimized.

A/fn: formation of hydrogen gas bubbles (2mks)  
around copper electrodes. Minimized by adding a depolarizer.

10. Give one advantage of connecting bulbs in parallel in domestic lighting.

✓ Bulbs operate independently ✓ (1mk) e.g Potassium dichromate  
Dear cleaning o

### SECTION B (55MKS)

11a) Define the principle of moments.

For a system in equil. Sum S<sub>W</sub>M<sub>W</sub> must be abt a point equal to sum of M<sub>W</sub> abt the same pt. ✓ (1mk) 2 fully in words not cum/pari

ii) State two conditions of a body to be at equilibrium

(2mks)

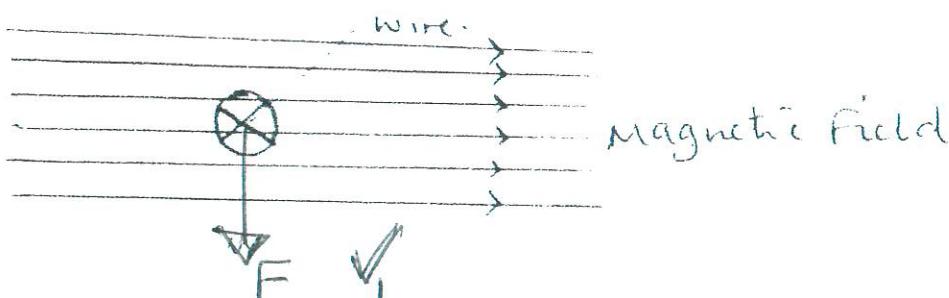
• Sum of CM = S ACTW ✓

• Sum of upward forces = sum of downward ✓

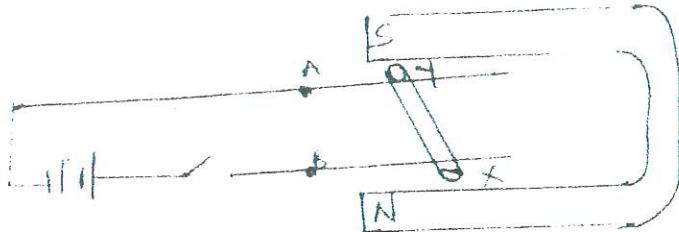
b) State one advantage of an alkaline accumulator over lead acid accumulator.(1mk)

Less maintenance required ✓

c) The figure 1. Shows a wire in a magnetic field. A current is switched on to flow through the wire in the direction shown. State the direction of motion of wire. (1mk) accept any correct



- d) i) An un-insulated copper wire XY lies over the fixed wire A and B connected to a battery. When the key in the circuit is closed, the rod XY moves. In which direction does the wire XY experience the force? (Indicate using an arrow) (1mk)



- iii) When is the force on the wire XY greatest? (1mk)  
When conductor XY and Magnetic field are perpendicular ✓

- e) State two factors that affect the strength of an electromagnet. (2mks)

✓ Size of current ✓, no. of turns of wire ✓  
✓ Nature of the core ✓, length of the conductor  
any (2x1)

- f) State the basic law of magnetism.

like poles repel unlike poles attract  
Repel charges

- g) Distinguish between hard and soft magnetic materials (1mk)

Hard - difficult to magnetise but once magnetised, they retain magnetism for long while  
Soft - easy to magnetise and demagnetise.

- h) Explain why repulsion is the only surest method of determining the polarity of a magnet. (2mks)

only occurs between like poles of a magnet

- i) State the reason why magnetic field strength of a magnet is greatest at the poles. (1mk)

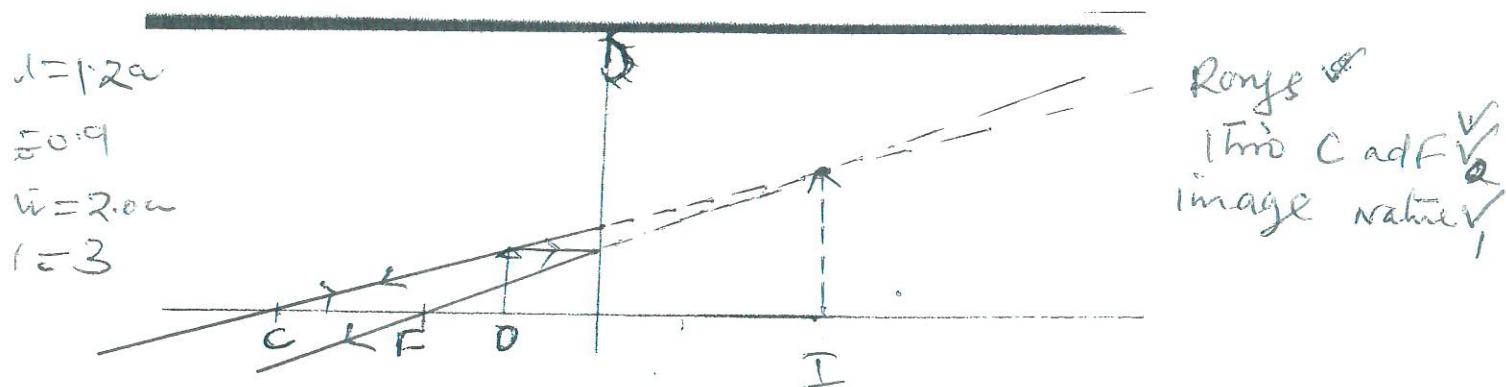
Within the magnet the poles cancel each other unlike at the poles where there is residual

12. State three uses of a charged gold leaf electroscope.

(3mks)

- Detects presence of charge ✓
- Tests the quantity of charge ✓
- Tests the sign of charge ✓
- Tests quantity ~~accept any correct~~ ✓

b) The figure below shows an object O placed in front of a concave mirror. The figure is drawn to scale.



- Ray 3 ✓  
Two C ad F ✓  
Image real ✓

i) By drawing suitable rays, show the position of the image (3mks)

ii) Use the ray diagram to determine the:

a) Image distance (1mk)

$$V = 3.0 \pm 0.5 \text{ cm}$$

b) Magnification (2mks)

$$M = \frac{V}{U}$$

$$= \frac{3.0}{1.2} \quad \cancel{= 2.5}$$

$$2.5 \quad \checkmark$$

iii) State one characteristic of the image formed (1mk)

Virtual  
Erect/Upright

c) State two advantages of using convex mirrors to monitor movement in large supermarket.

(2mks)

wide field of view ✓

upright images ✓

$$\begin{array}{r}
 83.5 \\
 -44.2 \\
 \hline
 39.3
 \end{array}$$

$$\begin{array}{r}
 67.5 \\
 -14.5 \\
 \hline
 53.0
 \end{array}$$

13. In an experiment to determine the density of sand using a density bottle, the following measurement were recorded.

Mass of empty density bottle = 44.2g

Mass of density bottle full of water = 67.5g

Mass of density bottle with some sand = 69.8g

Mass of density bottle with sand and filled up with water = 83.5g

Use the above data to determine the:-

- i) Volume of water that completely filled the bottle.

$$M = 67.5 - 44.2 \quad V = M/p = 23.3 \text{ cm}^3$$

- ii) Volume of water occupying the space above sand

$$83.5 - 69 \quad V = 14.5 \text{ cm}^3$$

- iii) Volume of sand

$$23.3 - 14.5 \quad 8.8 \text{ cm}^3$$

- iv) Mass of sand.

$$69.8 - 44.2$$

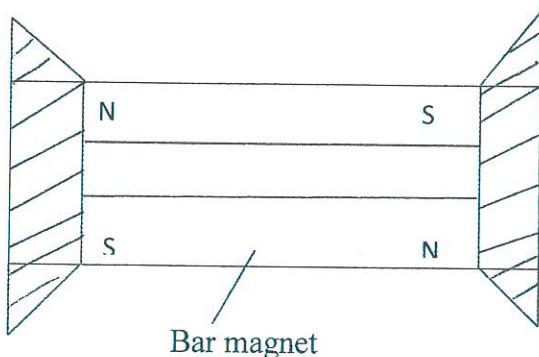
- v) Density of sand

(3mks)

$$\rho = \frac{M}{V}$$

$$24.8 \text{ g/cm}^3 \Rightarrow 2.818 \text{ g/cm}^3$$

13b)i) The diagram below shows how magnets are stored in pairs with keepers at the ends.



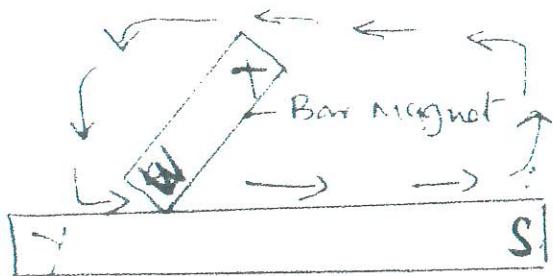
Explain how this method of storing helps in retaining magnetism longer.

(2mks)

Keepers acquire opposite polarities at the poles  
The dipoles of a magnet are attracted and form a closed loop

ii) In the sketch diagrams below identify the points marked W, X, Y

(3mks)



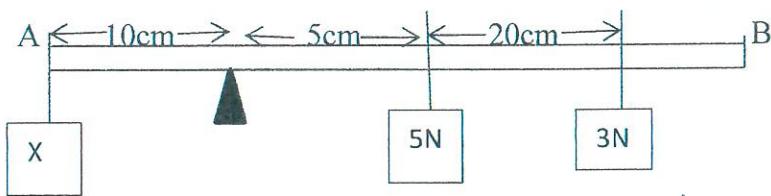
W ..... South .....

X ..... North .....

Y ..... North .....

c) A light rod AB is in equilibrium when forces 3N, 5N and x act on it as shown in the figure below. Find the magnitude of X

(3mks)



Cwm

$$5 \times 5 + 3 \times 25$$

$$25 + 75 = 100 \text{ Ncm} \quad \checkmark$$

ACwm

$$\underline{10x} \quad \checkmark$$

At equil

$$\text{cwm} = \text{ACwm}$$

$$\frac{100}{10} = \frac{10x}{10}$$

$$x = 10N \quad \checkmark$$

d) Explain why:

- i) It is not safe for a double decker bus to carry standing passengers on the upper decker.

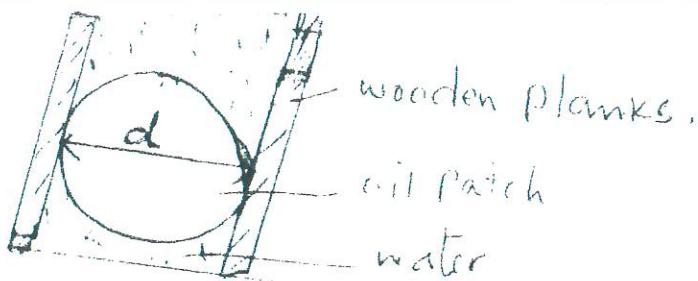
(1mk)

Vehicle becomes unstable  
Since position of C.O.G. will be raised

- ii) Bus body builders build luggage compartments under the seats rather than on roof racks (1mks)

~~Reason the luggage + the chassis make the base lower section of the bus heavier, lowering the position of C.O.G thus more stable~~

14. The fig below shows a part of an experiment set for estimating the diameter of the oil molecule.



- a) Describe how the oil patch is formed. (2mks)

Since it floats and being an impurity in water, it breaks surface tension. The greater forces on the outside of the patch pull it apart.

- b) In an experiment, a diameter of the patch is measured to be 200mm for an oil drop of radius 0.25mm. Determine the diameter of the oil molecule. (3mks)

~~Oil drop      Patch      Molecule~~



~~Patch~~

~~Molecule~~

$$V = \frac{4}{3}\pi r^3$$

~~200~~

~~200~~

$$V = \pi t^3$$

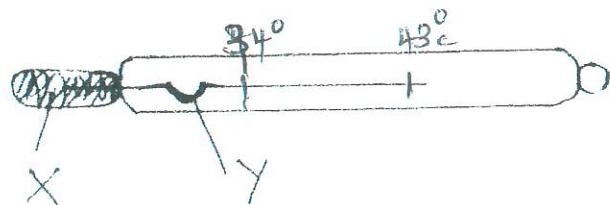
$$A = \pi r^2$$

$$t = \frac{6.065 \times 10^{-2}}{\pi \times 100^2}$$

- c) State two assumptions made in the experiment. (2mks)

Patch - Perfect circle.  
drop - perfect sphere  
Patch - monolayer.

- d) The figure below shows a clinical thermometer which is graduated.



- i) Name the parts labeled (2mks)

X Glass bulb. ✓

Y Constriction ✓

- ii) Mark the appropriate scale range in degrees celcius. (1mk)  
on the diagram ✓

- iii) Explain the use of part Y (1mk)

Prevent backflow of Mercury to the bulb before readings are taken ✓