

## MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016

232/2

## PHYSICS

Paper 2

(THEORY)

JULY / AUGUST 2016

Time: 2 Hours

1. Figure 1 below shows a parabolic surface with focal point F. A small source of light is placed at F.

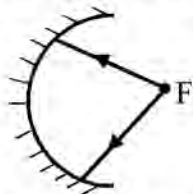


Fig. 1

Complete the ray diagram to show the incident rays are reflected by the surface.

2. Figure 2 below shows a metre rule in equilibrium balanced by the magnet and weight. The iron core fixed to the bench.

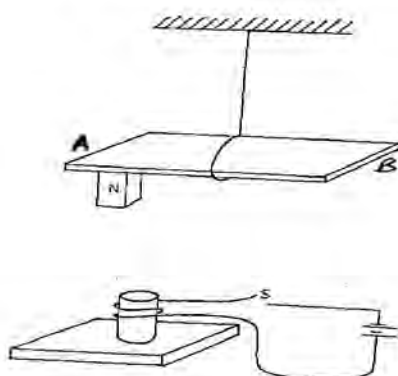


Fig. 2

State and explain the effect on the metre rule when the switch S is closed.

(2 marks)

3. The figure 3 below shows a positively charged metal plate with an earthing connection. Using an arrow, show the direction of charges through the earth connection and explain the final charge of the plate.

(2 marks)

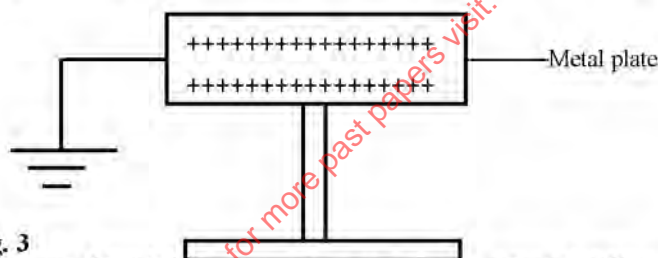


Fig. 3

4. A current of 0.7 A flows through a wire when a potential difference of 0.35 V is applied at the ends of the wire. If the wire is 0.5 m long and has a cross-sectional area of  $8.0 \times 10^{-3} \text{ mm}^2$ , determine its resistivity. (3 marks)
5. The control grid in a cathode ray oscilloscope (CRO) is used to control the brightness of the beam on the screen. Explain how the brightness of the beam can be increased (2 marks)
6. The following figure 4 shows the path of a ray of light through a transparent material placed in air.

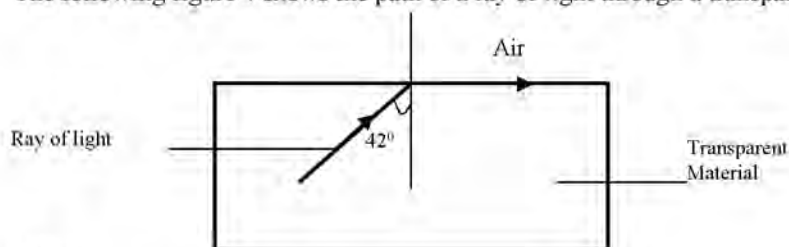


Fig. 4

Determine the refractive index of the transparent material

(2 marks)

7. Give a reason why x-rays but not radio waves are used to detect fractured bones. (1 mark)
8. One of the factors that affect efficiency of a transformer is hysteresis losses. What is hysteresis losses

9. A vibrator is sending out 8 ripples per second across a ripple water tank. The ripples are observed to be 4cm apart. Calculate the velocity of the ripples (2 marks)
10. A form two student from Kimomo Secondary School found his dry cells leaking on removing from his torch. What would be the possible cause of the leakage (2 marks)
11. A sample of a radioactive substance initially has  $8.0 \times 10^{25}$  particles. The half life of the sample is 98 seconds. Determine the number of particles that will have decayed after 294 seconds. (3 marks)
12. Below is part of a circuit that was setup by form four students of Okok Secondary School during a physics practical lesson to demonstrate full wave rectification using two diodes. Complete the circuit by correctly placing the load R and two diodes.

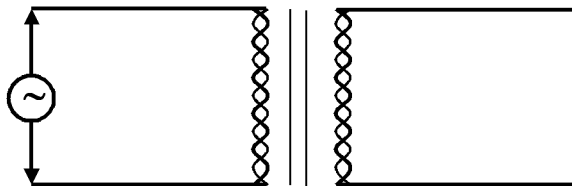


Fig. 5

13. State two factors that affects the speed of sound in gases. (2 marks)

### SECTION B (55 MARKS)

**Answer ALL the questions in the spaces provided**

14. Some students wish to determine the focal length of a convex lens of thickness 0.6cm using an optical pin and a plane mirror. Figure 6 shows the experimental set up when there is no parallax between the pin and the image.

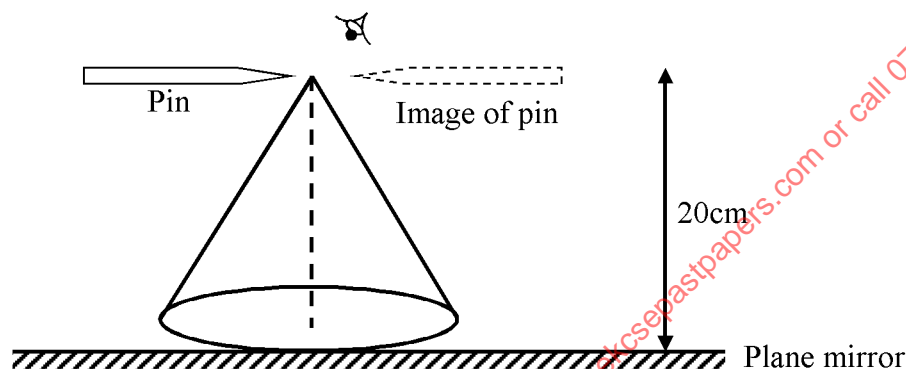


Fig. 6

Determine the focal length of the lens

(2 marks)

- (b) An optician in Eldoret Hospital examined an eye of a patient and made the following observations:

Eye too short and the focal length of the eye lens short

(i) State the eye defect the patient could be having. (1 mark)

(ii) Use a diagram to describe how the defect could be corrected. (2 marks)

- (c) The graph below shows the variation of  $1/v$  and  $1/u$  in an experiment to determine the focal length of a lens.

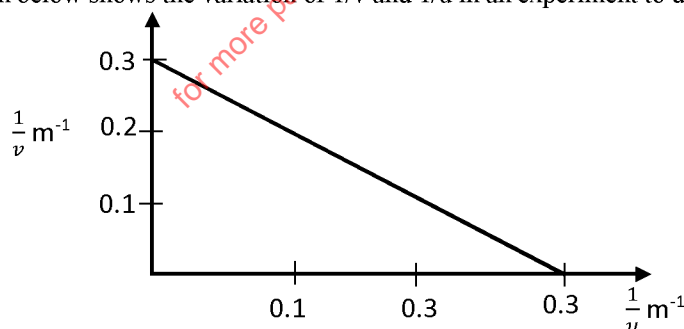


Fig. 7

- (i) Use the graph to determine the focal length (3 marks)
- (ii) What is the power of the lens used? (2 marks)
- (d) A converging lens forms an image which is three times the object. Determine the focal length of the lens if the distance between the object and the screen is 80cm. (3 marks)
15. (a) An uncharged metal rod brought close but not touching the cap of a charged electroscope causes a decrease in the divergence of the leaf. Explain the observation. (1mark)
- (b) In experiment to investigate factors affecting capacitance of a capacitor, a student increased the area of the plates and decreased the separation of the plates. Explain the effect on the capacitance when
- (i) the area of plates increased (1 mark)
- (ii) the distance of the separation of the plates decreased (1 mark)

(c) Figure 8 illustrates a method of charging a metal sphere.

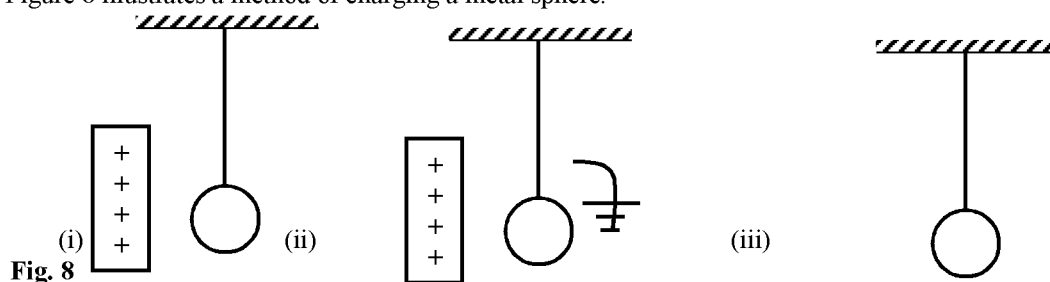


Fig. 8

- (i) Name the method of charging shown in fig 8.  
 (ii) Indicate the final charge on the sphere in fig 8.

(1 mark)

(d) Figure 9 shows an arrangement of capacitors connected to a 10V d.c supply.

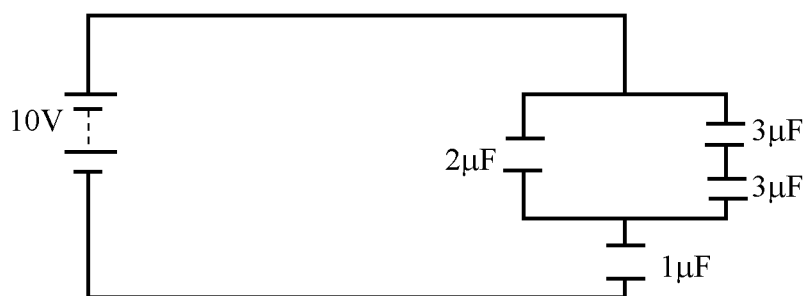


Fig.9

Determine

- (i) the combined capacitance  
 (ii) the total charge in the circuit  
 (iii) the total energy stored in the circuit.

(2 marks)

(1 mark)

(2 marks)

16. Figure 10 shows photocell used in a set-up for a burglar alarm.

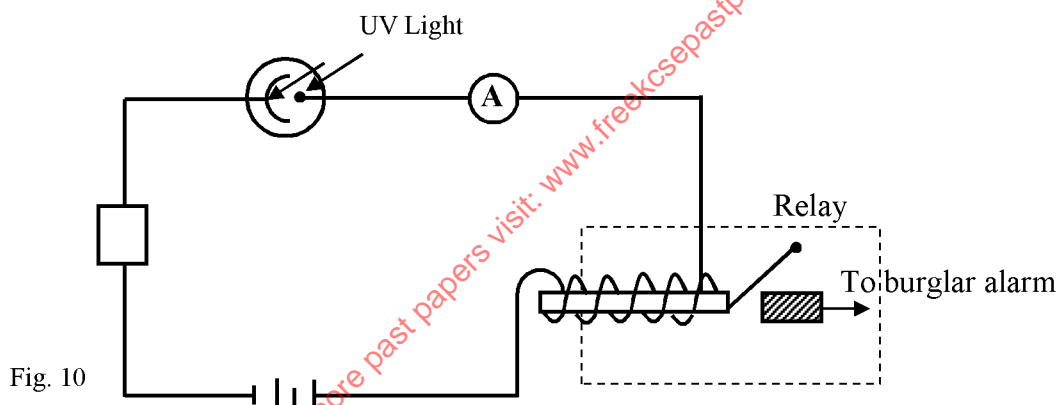


Fig. 10

- (i) Give a reason why the photocell is usually evacuated.  
 (ii) State the function of the resistor R in this circuit  
 (iii) Explain why a particular radiation such as ultra-violet light is used to strike a given cathode surface.  
 (iv) Explain how the set-up in the figure can be used as a burglar alarm.

(1 mark)

(1 mark)

(2 marks)

(3 marks)

(b) Light of frequency  $5.50 \times 10^{14}$  Hz is incident on a surface whose work function is 2.5eV.

(3 marks)

(i) Determine the energy of photons of light in eV. (Take  $h = 6.63 \times 10^{-34}$  Js) and 1eV

(2 marks)

(ii) Will photoelectric emission occur? Explain

(1 mark)

17. (a) Define electric resistance.

(b) Figure 11 shows three resistors as shown.

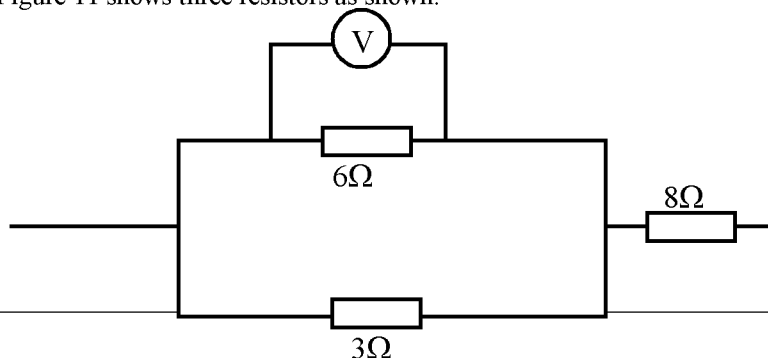


Fig. 11

- If the voltmeter reads 4V, find the
- (i) Effective resistance (2 marks)
  - (ii) Current through the  $3\Omega$  resistor (2 marks)
  - (iii) Potential difference across the  $8\Omega$  resistor. (2 marks)
- (c) (i) What is meant by the term “lost volts”? (1 mark)
- (ii) A cell supplies a current of 0.5A when connected to a  $2\Omega$  resistor and 0.25A when connected to a  $5\Omega$  resistor. Find the e.m.f and the internal resistance of the cell. (4 marks)
18. Figure 12 shows a diffusion cloud chamber for detecting radioactivity.

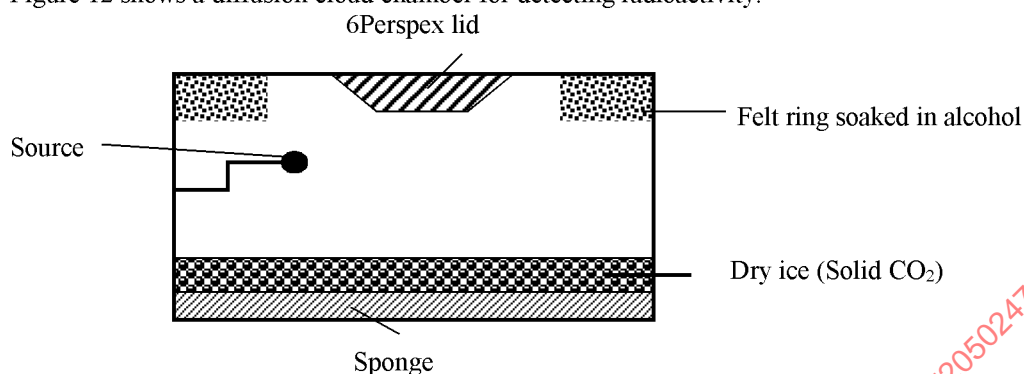


Fig. 12

- (a) State the function of the following.
- (I) Alcohol (1 mark)
  - (II) Solid  $\text{CO}_2$  (1 mark)
- (b) When radiation from the source enters the chamber, some white traces are observed.
- (I) Explain how the traces are formed. (1 mark)
  - (II) State how the radiation is identified (1 mark)
- (c) A leaf electroscope can be used as a detector of radiation. State two advantages of the diffusion cloud chamber over the leaf electroscope.

