NAME: ..... INDEX NUMBER: ...../.....

232/2 **SIGNATURE: .....**

PHYSICS **DATE..... .....**

Paper 2

2 hours

FORM 4 OPENER - 2016
PAVEMENT NATIONAL EXAMINATION

Kenya Certificate of Secondary Education
PHYSICS

Paper 2

2 hours

Instruction to Candidates

(ii) *Write your name, index number in the spaces provided above.*

(iii) *Sign and write the date of examination in the spaces provided above.*

(iv) *This paper consists of* **two** *sections:* **A** *and* **B**.

(v) *Answer* **all** *the questions in sections* **A** *and* **B** *in the spaces provided.*

(vi) ***All*** *working* **must** *be clearly shown.*

(vii) *Silent non programmable electronic calculators may be used.*

(viii) *Candidates should answer the questions in English.*

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 11	25	
B	12	15	
	13	10	
	14	12	
	15	14	

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Turn Over

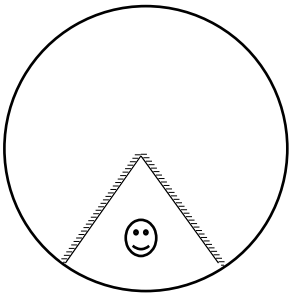
	16	4	
Score	**Total**	**80**	

This paper consists of 12 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 marks)

Answer all the questions in this section in the spaces provided

1. The figure below shows the two mirrors of a kaleidoscope. Use the diagram to show how the instrument form a beautiful pattern of images of the bead placed between the two mirrors. **(2 marks)**



2. Repulsion is the only sure way of testing polarity of magnets. Explain?
   (1 mark)

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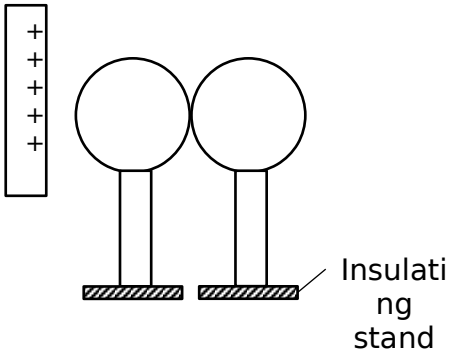
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3. State the basic law of electrostatics,
   (1 mark)

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4. The figure below shows two spheres in contact placed close to a positively charged rod.



(a) Show the distribution of charges in the two spheres.

(1 mark)

(b) In two more steps, use diagrams to show how the two spheres can be charged. **(2 marks)**

5. State two reasons why prism periscopes are preferred to mirror periscope.

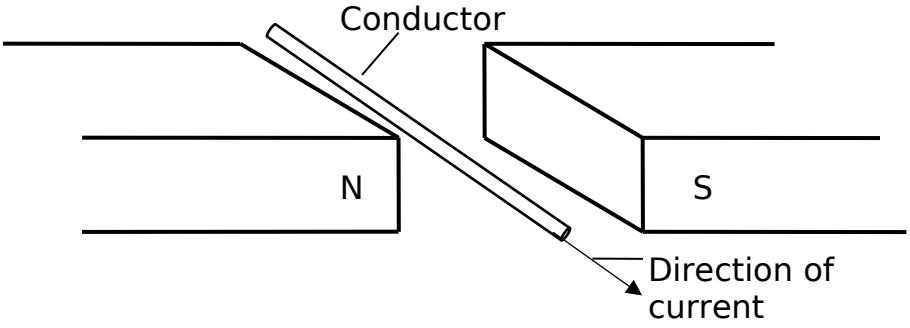
(2 marks)

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6. A current carrying conductor AB is in a magnetic field as shown in figure 1 below.



(a) Indicate the direction of the force F acting on the conductor.

(1 mark)

(b) State two factors that determine the direction of the force F.

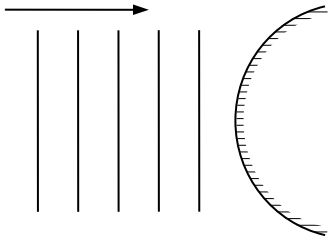
(2 marks)

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7. The diagram below shows a series of plane waves incident on a convex reflector.



Complete the diagram to show how the waves move after reflection.
(2 marks)

8. Five successive wave fronts in a ripple tank are observed to spread over a distance of **6.4 cm**. If the vibrator has a frequency of **8 Hz**, determine the speed of the wave. **(3 marks)**

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9. In a certain pinhole camera, the screen is **10 cm** from the pinhole. When the camera is placed **6 m** away from a tree, a sharp image of the tree **16 cm** high is formed on the screen. Determine the height of the tree.

(3 marks)

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10. Draw a diagram to illustrate how dispersion of white light can be achieved using a prism by drawing only the red and violet rays

(2 marks)

11. A small object lies at the bottom of a water pond at a depth of 1.2m. given that the refractive index of water is 1.3, determine the apparent depth of the object. *(Give your answer to one decimal place)*

(3 marks)

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SECTION B (55 marks)

Answer all the questions in this section in the spaces provided

12. (a) State Ohm's law.

(1 mark)

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(b) State **three** conditions which must be satisfied for Ohm's law to be obeyed by a conductor.

(3 marks)

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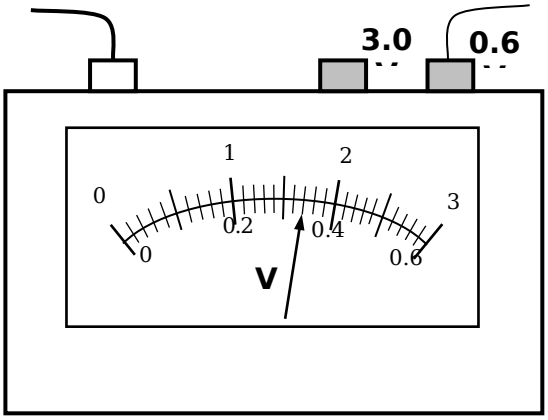
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(c) The figure below shows part of the scale of a voltmeter, which is being used in an experiment to measure potential difference across a resistor.



(i) State the accuracy of the upper and the lower scales of the voltmeter.

(2 marks)

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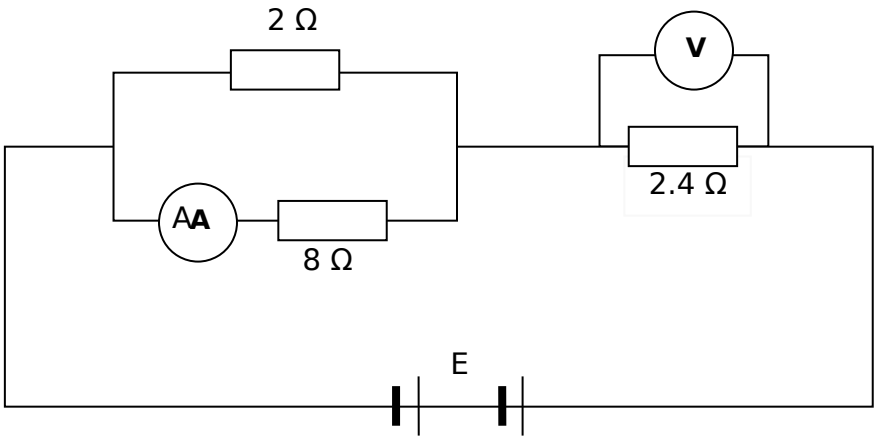
(ii) Record the reading shown by the scale of the voltmeter.

(1 mark)

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(d) The figure below shows an electrical circuit with three resistors connected across a battery of negligible internal resistance and of electromotive force, E.



If the ammeter reads **0.5 A**, determine the:

(i) Current through the 2 Ω resistor.
(3 marks)

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(ii) Voltmeter reading.
(2 marks)

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(iii) The electromotive force, E, of the battery
(2 marks)

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13. (a) Define the terms. **(2 marks)**

(i) Wavelength.

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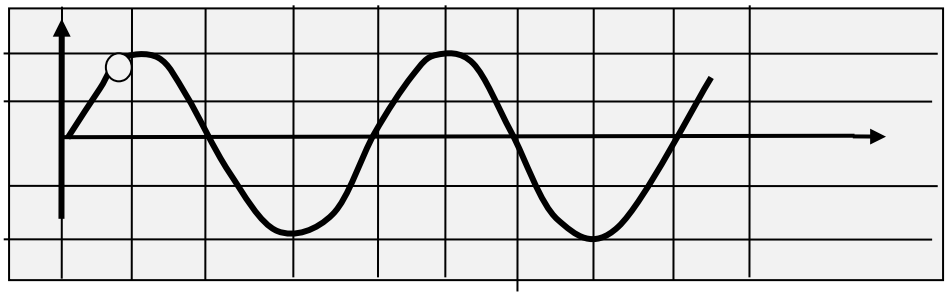
(ii) speed as used in waves.

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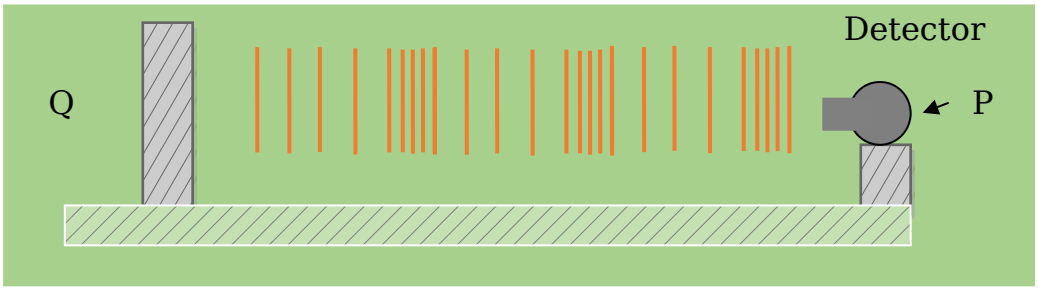
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(b) Below is a wave traveling to the right side. Indicate the direction in which the particle at point Q is going to move.



(c) Name and briefly explain three properties of electromagnetic waves.
(3 marks)

(d) Sound waves are generated at point P. They hit a reflecting surface at Q and come back. A detector is put at point P. If it takes a time of 3 seconds to detect the echo,



(i) How far is Q from P.? Take speed of sound as 340m/s
(3 marks)

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(ii) What will be the effect of increased humidity of the surrounding air
a. Decreasing the amplitude on loudness of sound?
(1 mark)

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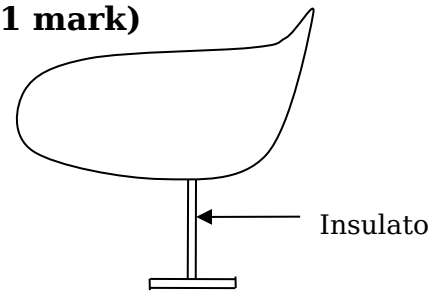
b. Increasing the frequency?
(1 mark)

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14. (a) Show the charge distribution on the hollow conductor shown below if it is positively charged.
(1 mark)



(b) State three factors affecting capacitance of a parallel plate capacitor.
(3 marks)

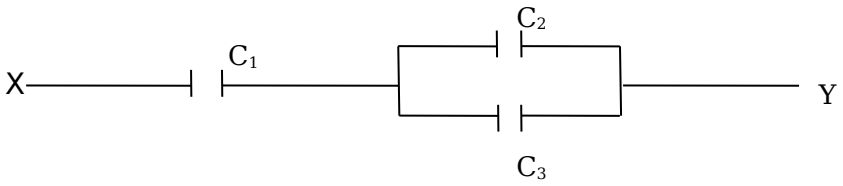
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(c) The diagram below shows a circuit containing three capacitors.



(i) Write an expression for effective capacitance between X and Y.

(2 marks)

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(ii) If c_1=6μF, c_2=4.5μF and c_3=5 μF, calculate the charge stored when point XY is connected in series with a battery of 6V

(3 marks)

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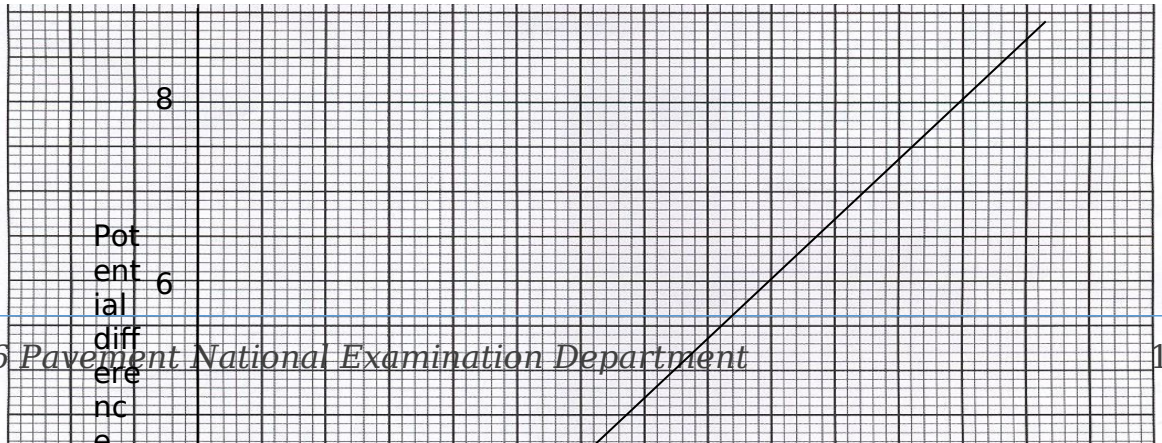
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d) The graph below shows the relationship between the voltage drop across a certain capacitor and the charge stored in the capacitor.



From the graph calculate the capacitance of the capacitor.

(3 marks)

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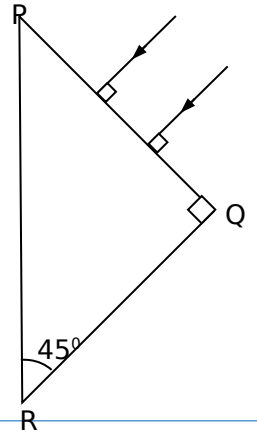
15. (a) State **two** conditions which must be satisfied for total internal reflection to occur. **(2 marks)**

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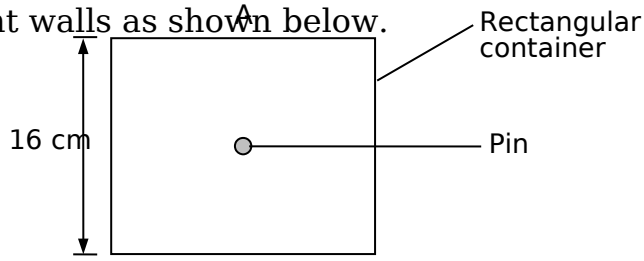
(b) The diagram below shows two rays of light incident normally on face **PQ** of a glass prism, whose critical angle is **42^0**.



Complete the diagram to show the paths of the two rays as they pass through the prism.

(3 marks)

(c) A pin is fixed horizontally at the centre of a rectangular container with thin transparent walls as shown below.



A transparent liquid is then poured into the container. When viewed from side **A**, the distance of the pin is **6 cm** from the surface of the liquid. Determine the refractive index of the liquid.

(3 marks)

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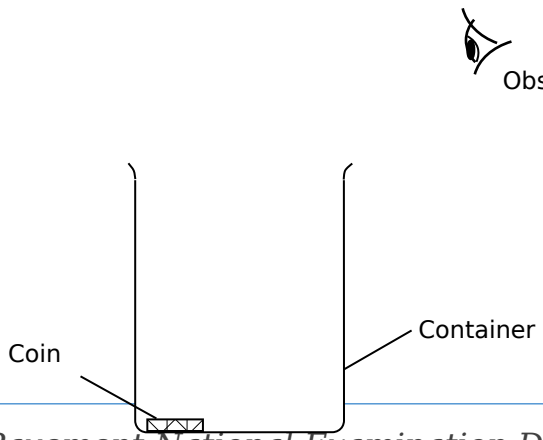
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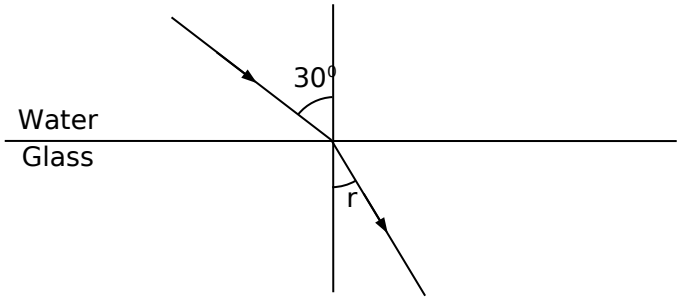
(d) The figure below shows a coin placed in a large empty beaker. An observer looking into the beaker from the position shown is unable to see the coin.



Sketch two rays from a point on the coin to show how the observer is able to see the image of the coin after the container if filled with water.

(3 marks)

(e) A ray of light is incident on a water-glass interface as shown in the diagram below.



Calculate the value of angle, **r**, given that the refractive index of glass and water are **1.5** and **1.33** respectively.

(3 marks)

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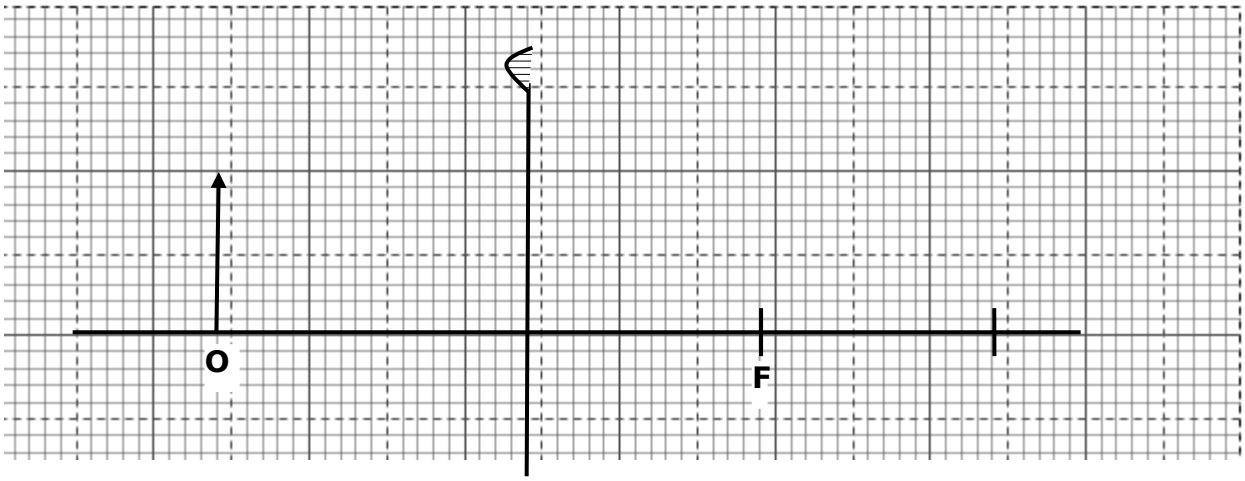
16. (a) Define principal focus **(1 mark)**

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(b) Figure 3 show an object placed in front of a convex mirror.



On the same diagram draw the appropriate rays and locate the image formed.

(3 marks)