Name: ……...…… Index No: …….

Candidate's signature……

Date……

KAKAMEGA NORTH SUBCOUNTY JOINT EXAMINATIONS
KCSE Trial Exam

232/2
PHYSICS
PAPER 2
JULY 2018
2 Hours

INSTRUCTIONS:
Write your name and index number in the spaces provided above.
This paper consists of ***TWO*** sections: ***A*** and ***B***.
Answer ***ALL*** the questions in sections ***A*** and ***B*** in the spaces provided.
All working ***MUST*** be clearly shown in the spaces provided in this booklet.
KNEC mathematical tables and non programmable silent calculators may be used.

Physical Constants
Speed of sound in air = 330m/s
Refractive index of water = $^{4}/_{3}$

For Examiner's Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 - 13	25	
B	14	5	
	15	9	
	16	18	
	17	16	
	18	10	
	Total Score	**80**	

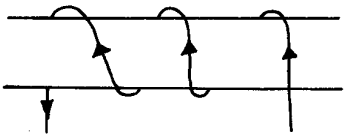
This paper consists of 10 printed pages

Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

SECTION A (25 Marks**)**

Answer all the questions in this section in the spaces provided below each question

1. Sketch the magnetic field for a conductor shown in the figure below. (2mks)



2. State ***one*** similarity and ***one*** difference between a camera and a human eye. (2mks)

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3. State ***one*** factor which does not change as water waves move from shallow to deep end. (1mk)

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4. A girl standing 200m from the foot of a high wall claps her hands and the echo reaches her 1.16 seconds later. Calculate the velocity of sound in air using this observation. (3mks)

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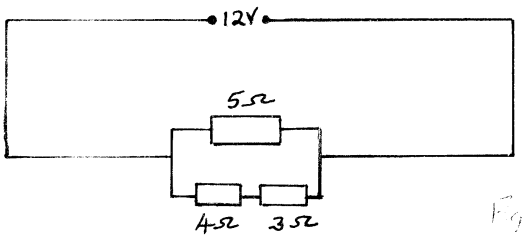
5. With the aid of a diagram, explain why convex mirror is preferred for use in supermarkets for surveillance to plane mirrors. (2mks)

6. Figure 1. is a circuit diagram of three resistors connected to a 12V battery.



Determine the potential difference across the 3Ω resistor. (3mks)

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7. State the energy transformation that takes place in a hydroelectric power station. (2mks)

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8. Name ***one*** type of electromagnetic radiation that ionizes air. (1mk)

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9. When the moon comes between the sun and the earth in a straight line, an eclipse occurs. Name the eclipse. (1mk)

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10. Explain how polarization affects the working of a simple cell. (2mks)

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11. Why is concave mirror used as a saloon mirror? (2mks)

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12. Write ***one*** difference between a virtual and a real image. (1mk)

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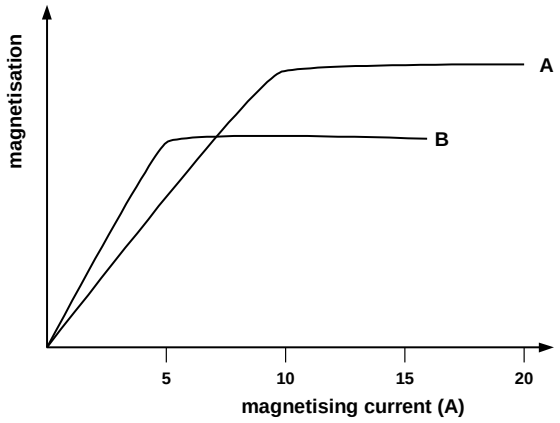
13. Figure 2 shows a graph of magnetisation against magnetising current for two materials A and B.



State with a reason, the material which is more suitable for use in a transformer to concentrate the magnetic fields. (3mks)

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SECTION B (55 MARKS)

Answer all the questions in this section

14. **(a)** Explain what is meant by the principle of superposition of two waves. (2mks)

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(b) In an experiment to try to produce an observable interference pattern, two monochromatic light sources, S_1 and S_2, are placed in front of a screen, as shown in Fig.1.

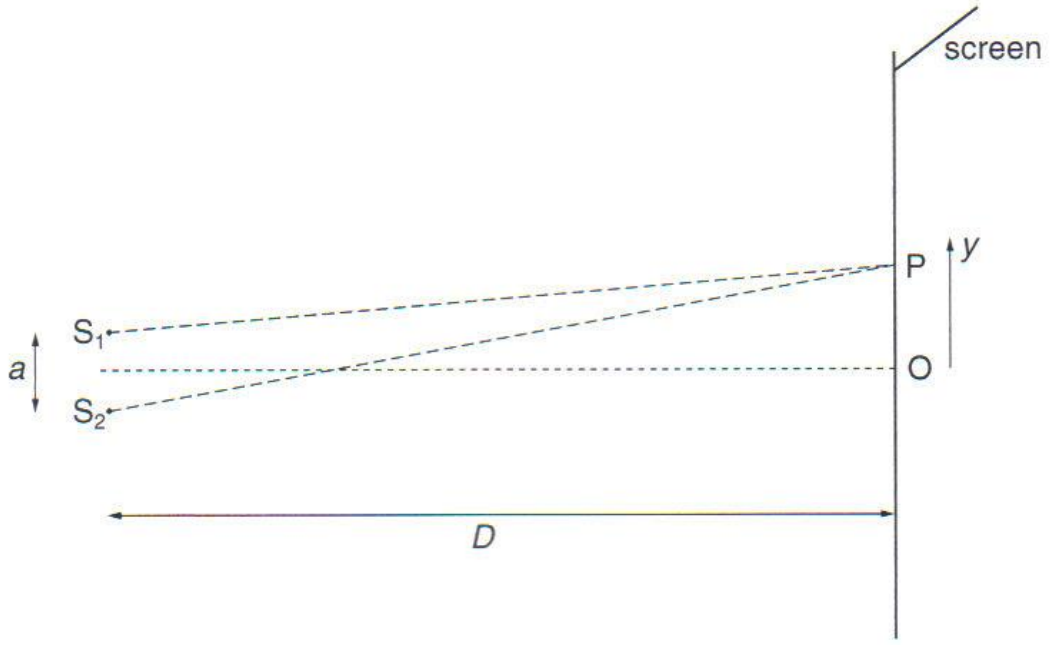

Fig. 1

(i) In order to produce a clear interference pattern on the screen, the light sources must be *coherent*. State what is meant by *coherent.* (1mk)

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(ii) In Fig 1, the central point O is a point of maximum intensity. Point P is the position of **minimum** intensity nearest to O. State, in terms of the wavelength λ, the magnitude of the path difference S_1P and S_2P. (2mks)

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15. An X-ray tube is operated at 120Kv with a beam current of 0.5mA. Assuming its efficiency is 1%, calculate:

(i) The number of electrons hitting the target each second (3mks)

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(ii) The X-ray energy emitted each second (2mks)

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(iii) The heat energy dissipated (2mks)

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(iv) The minimum wavelength of the emitted X-radiation. (2mks)

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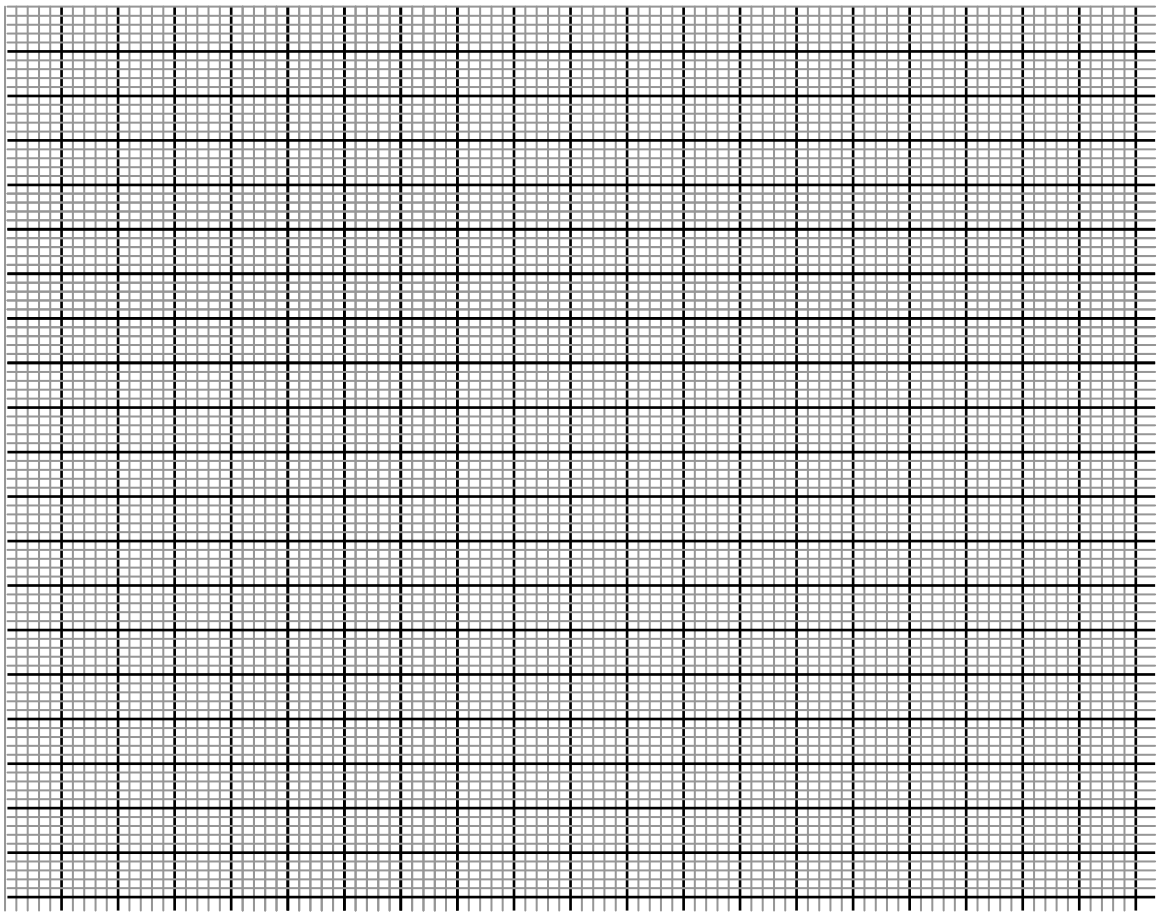
16. In an experiment to determine the range of beta particles in aluminium, different thickness of aluminium sheets were interposed between a small beta source and the window of a Geiger tube 20mm apart.

Thickness/mm	0	0.45	0.90	1.35	1.80	5.40	7.20
Count rate/s^{-1}	85.0	59.5	41.6	29.2	20.4	1.5	1.5

a) Plot a graph of count rate against thickness. (5mks)



b) Use your graph to determine the range of beta particles in aluminium. (2mks)

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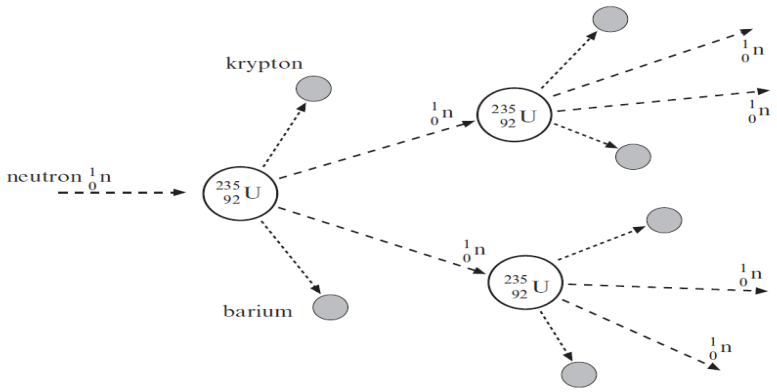
c) The diagram shows an uncontrolled nuclear fission reaction. When a **slow-moving** neutron strikes an atom of U, the atom splits. In this reaction two **fast moving** neutrons are produced together with the radioactive fission fragments of Ba (barium) and Kr (krypton).



I. What name is given to an uncontrolled fission reaction? (1mk)

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II. Complete the nuclear equation for this reaction**.** (2mks)

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{144}Ba + {}_{36}Kr + 2\,{}^{1}_{0}n$$

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III. In a nuclear reactor, the fission reaction is controlled using control rods of boron steel which readily absorb neutrons and a graphite moderator which improves the chances of uranium atoms splitting apart. State how the graphite moderator improves the possibility of fission of uranium. (1mk)

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(i) Explain how the energy released from a nuclear reactor can be increased. (2mks)

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(ii) Outline the advantages of producing electricity from nuclear fusion rather than nuclear fission in the future. (2mks)

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d) Explain what is meant by the half-life of a radioactive substance. (1mk)

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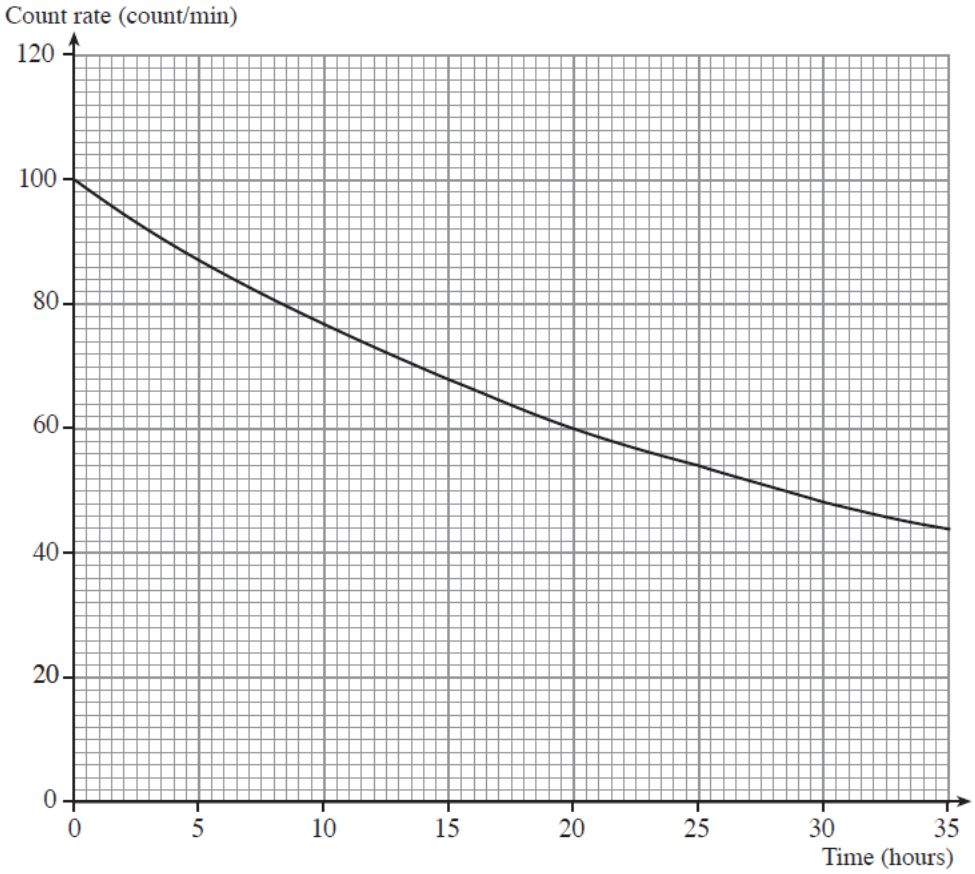
The count rate changed in the way shown in the graph below:



Use the graph to find a value for the half-life of the radioactive source. (2mks)

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17. A set of Christmas tree lights consists of 40 identical filament lamps connected in series across a supply of 240V.

(a) Define *resistance.* (3mks)

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(b) Each lamp when lit normally carries a current of 250mA. Calculate:

(i) The potential difference *V* across a lamp. (3mks)

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(ii) The resistance *R* of a lamp. (3mks)

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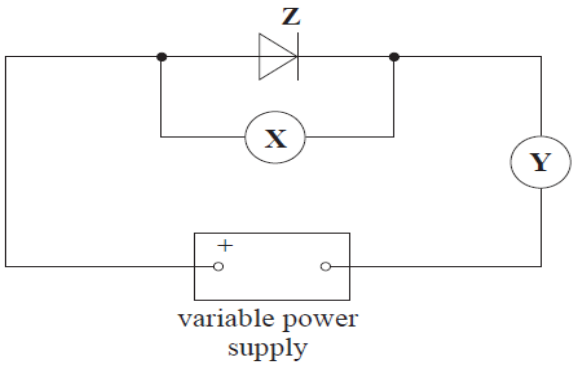
(c) The circuit shown is used to investigate how the current changes with voltage for component **Z**.



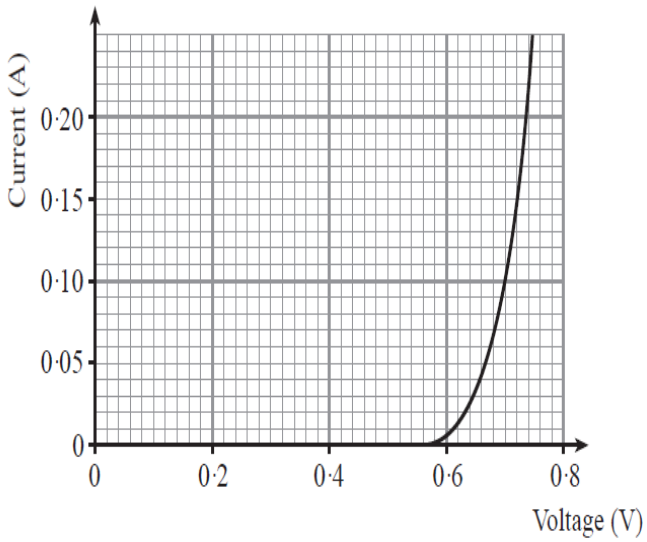
(a) Name the component: (3mks)

X ……

Y ……

Z ……

(b) The results from the investigation are shown on the graph.



(i) Describe **carefully** how the current through **Z** changes as the voltage is increased from 0·0 to 0·7V**.** (2mks)

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(ii) Write down in words an equation and use it to find the resistance of **Z** when the voltage is 0·7V. (2mks)

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18. Fig.2.1 shows two capacitors, **A** of capacitance 2μF, and **B** of capacitance 4μF, connected in parallel. Fig. 2.2 shows them connected in series. A two-way switch **S** can connect the capacitors either to a d.c. supply, of e.m.f. 6V, or to a voltmeter.

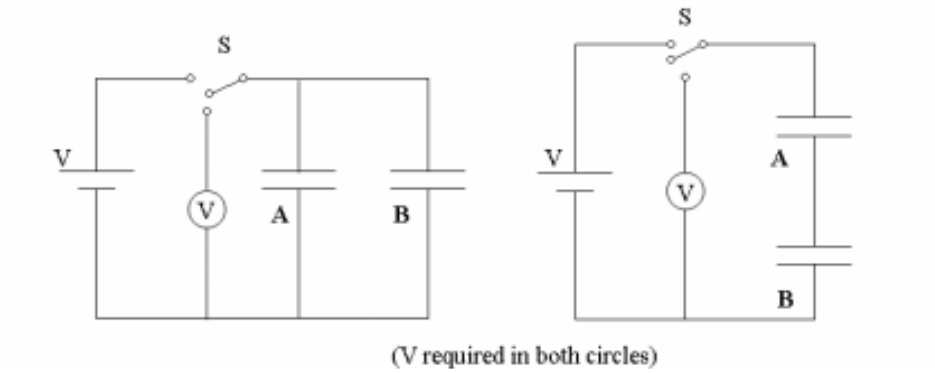

Fig. 2.1 **Fig. 2.2**

(a) Calculate the total capacitance of the capacitors

(i) When connected as in Fig. 2.1 (2mks)

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(ii) When connected as in Fig. 2.2 (2mks)

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(b) The switch in the circuit shown in Fig. 2.1 is then connected to the battery. Calculate

(i) The potential difference across capacitor (2mks)

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(ii) The total charge stored on the capacitors. (2mks)

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(c) The switch in the circuit shown in Fig.2.2 is then connected to the battery. Calculate the total energy stored in the two capacitors. (2mks)

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