Name ..... **Index Number** .....

School ..... **Candidate's Signature** .....

232/2 **Date** .....

PHYSICS

(Theory)

2015

2 hours

MAKUENI COUNTY KCSE 2015 PREPARATORY EXAMINATION

Kenya Certificate of Secondary Education

PHYSICS

Paper 2

(Theory)

2 hours

Instructions to Candidates

(a) Write your name and index number in the spaces above.

(b) Sign and write the date of examination in the spaces provided.

*(c) This paper consists of **TWO** sections: **A** and **B**.*

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

(e) All working must be clearly shown.

(f) Silent non programmable electronic calculators may be used.

*(g) **This paper consists of 14 printed pages**.*

*(h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing**.*

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

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1 - 13	25	
B	14	15	
	15	14	
	16	14	
	17	12	
	Total Score	**80**	

Sponsored by H.E. Prof. Kivutha Kibwana, Governor, Makueni County.

SECTION A (25 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. The figure below shows a ray of light being reflected from a plane mirror.

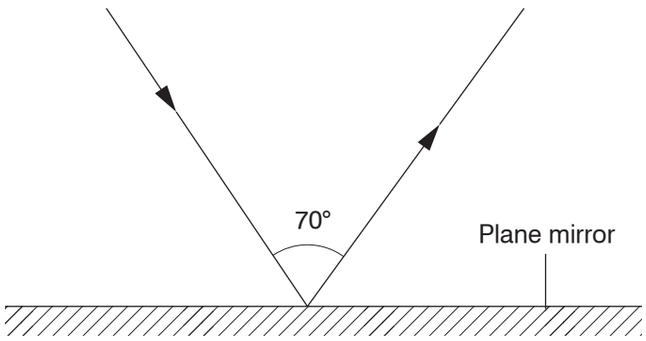

Figure 1

The plane mirror is then rotated clockwise through 20° keeping the incident ray fixed. What would be the new angle of reflection? (1 mark)

2. When a highly charged polythene rod is brought close to a positively charged leaf electroscope, it is observed that the leaf initially falls and then rises.

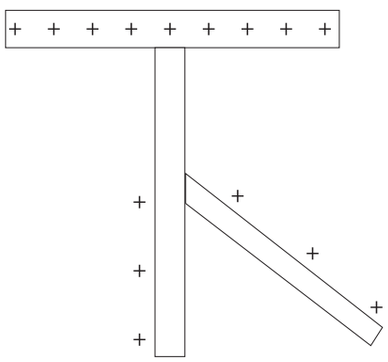

Figure 2

(a) State the charge on the polythene rod. (1 mark)

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(b) Explain the above observation. (1 mark)

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3. Explain briefly how polarisation occurs in a simple cell and state how the defect is minimised. (2 marks)

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4. The figure below shows a positively charged conductor suspended by a silk thread. The N-Pole of a magnet is brought close but does not touch it as shown.

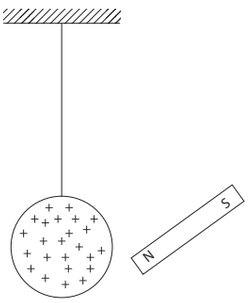

Figure 3

With a reason, state the observation made. (2 marks)

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5. A white paper is a good reflector of light but does not form an image like a concave mirror. Explain this observation. (2 marks)

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6. The figure shows two parallel current conductors P and R which are close to each other. Both conductors have current flowing as shown.

Figure 4

(a) On the figure:

(i) sketch the magnetic field pattern. (1 mark)

(ii) indicate the force F due to the current on each conductor. (1 mark)

(b) Explain the cause of the force. (1 mark)

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7. The figure below shows a wave profile for a wave whose frequency is 5 Hz.

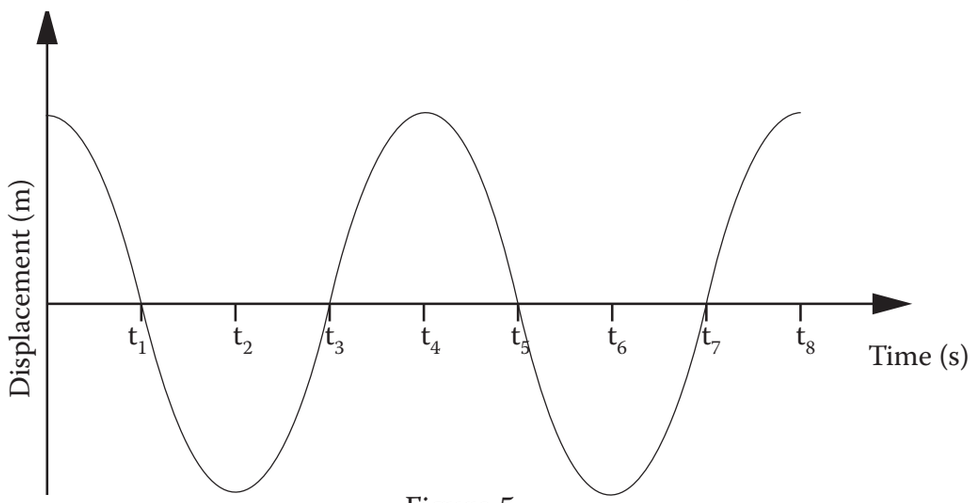

Figure 5

Determine the value of t_5. (2 marks)

8. Distinguish between thermionic emission and photoelectric effect. (1 mark)

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9. The figure below shows a circuit involving two resistors and a capacitor connected to 6 volts source.

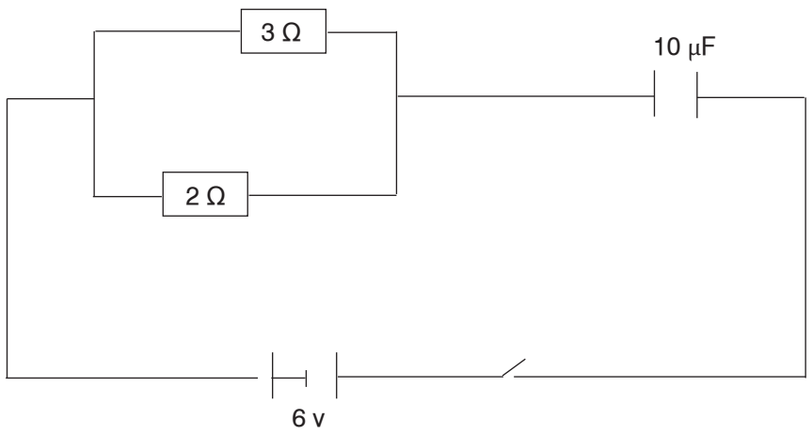

Figure 6

(a) Determine the current in the circuit when the switch is closed. (2 marks)

(b) Find the charge stored on the capacitor when fully charged. (2 marks)

10. When an electrician does domestic wiring, she connects lamps in the lighting circuit in parallel and not in series. Give two reasons for this requirement. (2 marks)

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11. State the purpose of the presence of argon and nitrogen gases at low pressure inside a filament lamp. (1 mark)

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12. The leaf of an electroscope falls when ultraviolet radiation is directed into a zinc plate placed on the cap of the electroscope. Identify the charge on the electroscope and explain the observations made. (2 marks)

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13. Distinguish between a region of compression and a rarefaction in a longitudinal wave. (1 mark)

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SECTION B (55 marks)

*Answer **all** the questions in the spaces provided in this section.*

14. (a) (i) State one condition under which Ohm's law must be obeyed. (1 mark)

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(ii) The circuit diagram below shows two cells each of e.m.f E volts and internal resistance 0.5 ohms supplying a current to a network of resistors. When switched on the ammeter reading is found to be 0.2A. Determine the value of E. (4 marks)

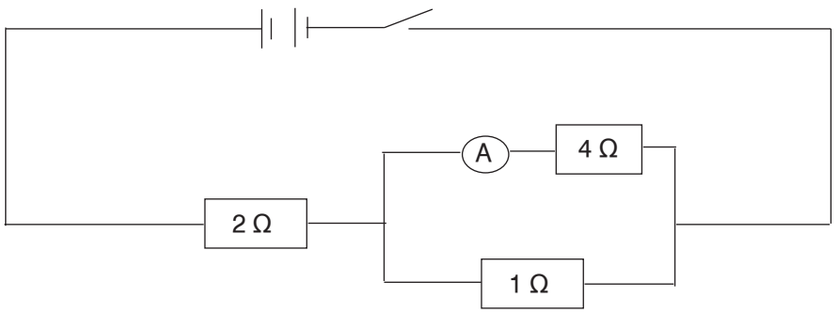

Figure 7

(b) A piece of red-hot charcoal is brought close to the cap of a negatively charged electroscope using tweezers. Explain what is observed. (3 marks)

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(c) A transformer has 1000 turns in its primary coil which is connected to a 250 V a.c supply. The secondary is connected to an ammeter via a 100 ohm resistor. Determine the number of turns in the secondary coil if the ammeter reads 1.5A. (3 marks)

(d) Explain the working of a circuit breaker as a safety device. (1 mark)

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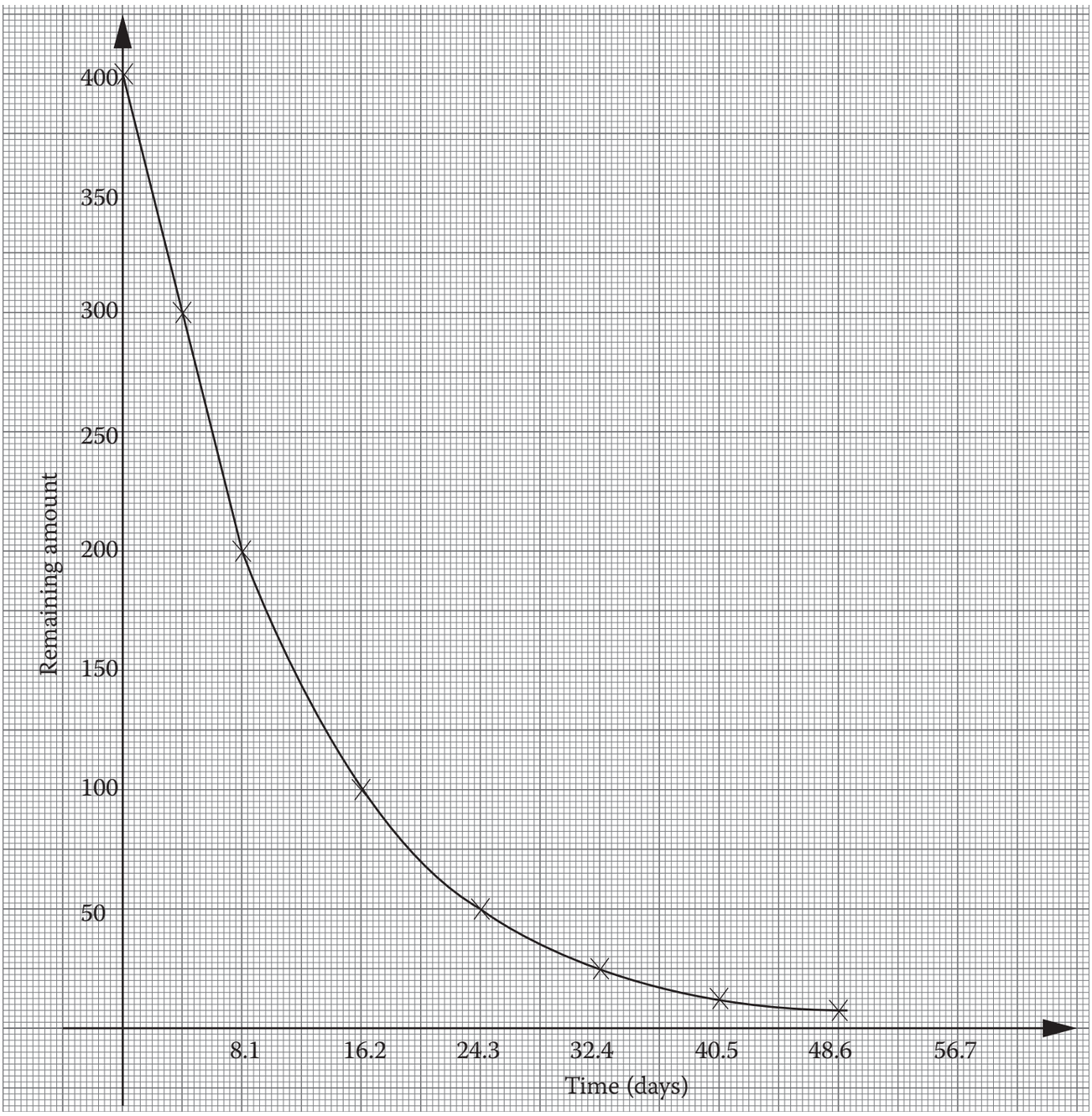
(e) The power company supplies electrical energy and charges the consumption to ordinary domestic consumers as follows:
A monthly fixed charge of Kshs. 75
Kshs. 1.55 per unit for the first 50 units consumed
Kshs. 6.65 per unit for the next 51–300 units
A consumer uses 1.98×10^5 kilojoules of electrical energy in a given month. Determine the total month's bill.
(1 unit = 1 Kilowatt – hour (kWh) (3 marks)

15. (a) The graph below shows radioactive decay of iodine.



Use the graph to determine the:

(i) fraction of the amount remaining after 16.2 days. (1 mark)

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(ii) half-life of iodine. (1 mark)

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(b) (i) Distinguish between nucleus fusion and nuclear fission. (2 marks)

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(ii) The following nuclear reaction is part of a radioactive series.

$$\overset{210}{\underset{83}{B}} \xrightarrow{R} \overset{210}{\underset{84}{C}} \xrightarrow{S} \overset{y}{\underset{82}{D}}$$

Name the radiations represented by R and S. (2 marks)

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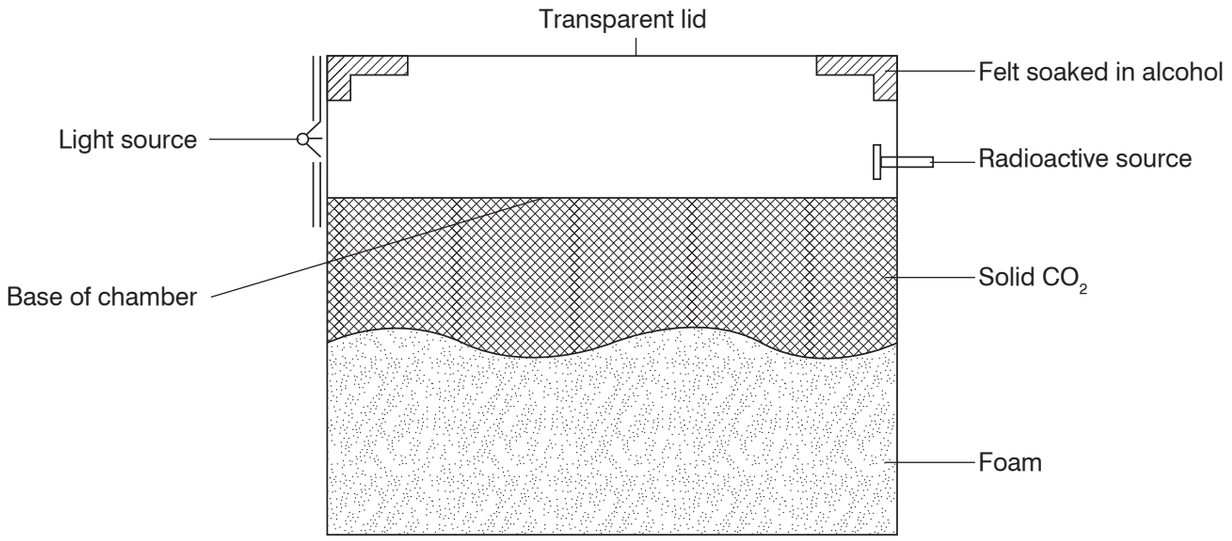
(c) The diagram below shows a diffusion cloud chamber for detecting radioactivity.



State the function of the following:

(i) Alcohol (1 mark)

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(ii) Solid CO_2 (1 mark)

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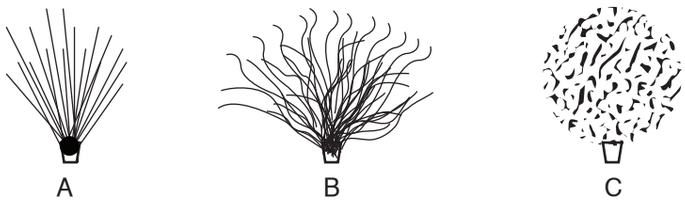
(d) In an experiment using a cloud chamber, the following tracks were obtained.



Identify each of the tracks and explain why they are different. (3 marks)

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(e) The activity of a radioactive element dropped from 100 counts per second to 12.5 counts per second in 9 years. Find the half-life period of the element. (3 marks)

16. (a) (i) What do you understand by the term 'doping' with regard to semiconductors? (1 mark)

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(ii) Explain briefly the process of producing a n-type and a p-type semiconductor. (2 marks)

(iii) Explain how the conductivity of a semiconductor changes with temperature. (1 mark)

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(b) (i) State two factors that affect photoelectric emission. (2 marks)

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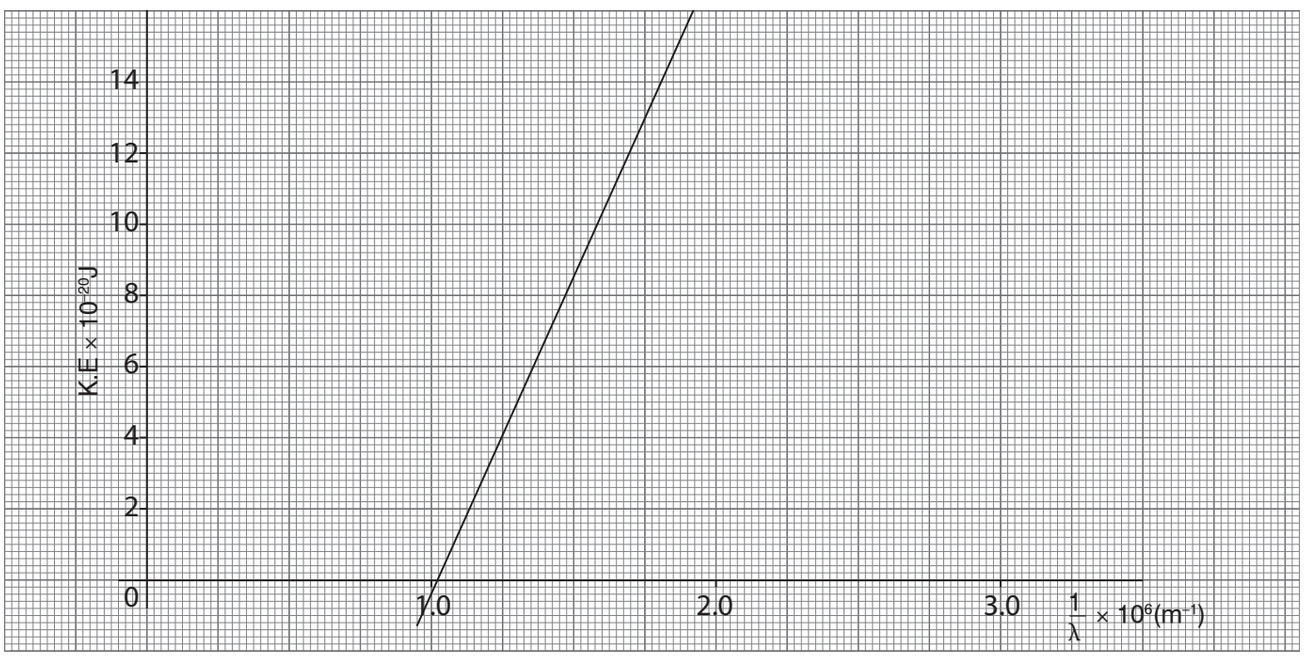
(ii) The maximum kinetic energy of a photoelectron emitted from a metal surface is 9.95×10^{-20} Joules. If the threshold frequency of light required to cause photoelectric emission with this metal is 5×10^{14} Hz, calculate the frequency of the incident radiation (Planck's constant = 6.63×10^{-34} Js). (3 marks)

(c) The graph below shows the relationship between the maximum kinetic energy of the photoelectrons emitted from a certain metal surface and the wavelength of the incident radiation.



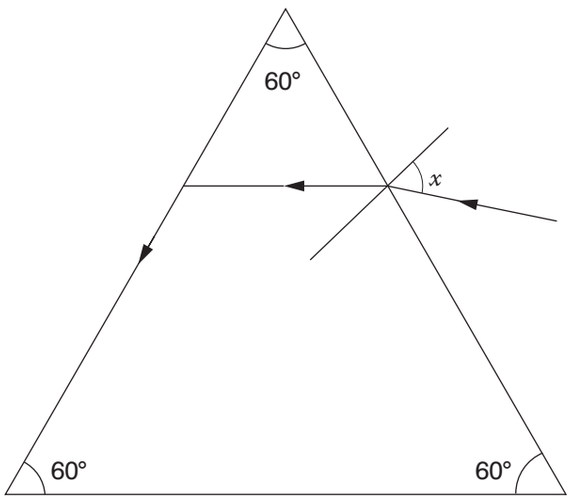
From the graph, find:

(i) the threshold wavelength of the incident radiation. (2 marks)

(ii) the work function of the metal surface.
Planck's constant = 6.63×10^{-34} Js
Velocity of light = 3×10^{8} m/s (3 marks)

17. (a) A coin was dropped into a water bucket of depth 60 cm. Given that the refractive index of water is 1.2, determine the vertical displacement of the coin when viewed from above. (2 marks)

(b) The figure below shows the path of a ray of light passing through a glass prism. Given that the speed of the light is 2.0×10^8 m/s,



(i) calculate the refractive index of the prism material given that $c = 3.0 \times 10^8$ m/s. (2 marks)

(ii) work out the critical angle of the prism and show it on the figure. (2 marks)

(iii) State two applications of the prism. (2 marks)

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(c) Given that $a^nw = \frac{4}{3}$ and $_an_g = 1.5$, work out $_wn_g$. (2 marks)

(d) Explain why the sun can be seen before it rises above the horizon. (2 marks)

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