WOODLANDS SECONDARY SCHOOL

EXAMINATION	:	'O' Level Preliminary Exam
LEVEL	:	SECONDARY FOUR EXPRESS
DAY /DATE	:	30-9-94 Friday
SUBJECT	:	**SCIENCE(PHYSICS)**
PAPER	:	**TWO**
DURATION	:	ONE HOUR FIFTEEN MINUTES
TIME	:	7.45-9.00am
MAXIMUM MARKS	:	65

INSTRUCTIONS TO CANDIDATES :

This paper consists of two sections.

In Section A, answer ALL the questions in the spaces provided in the question paper.

In Section B, answer any TWO questions in the foolscap paper provided.

Take g = 10 N/kg or 10 m s^{-2}.

FOR THE CANDIDATE Please tick the numbers of the two questions that you have answered in Section B	FOR THE EXAMINER
SECTION A	.....
SECTION B	
1	.....
2	.....
3	.....

NAME : _____( ) CLASS : SEC. ( )

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

THIS QUESTION PAPER CONSISTS OF ONE COVER PAGE AND 8 PRINTED PAGES.

Section A
[45 marks]

Answer ALL the questions in this section in the spaces provided.

1 A simple pendulum is found to make 50 complete vibrations in 60 s.

(a) What is the period, T, of the vibration ?

_____ (2)

(b) What is the frequency, f, of the vibration ?

_____ (2)

(c) Suggest one way of increasing the frequency of the pendulum.

_____

_____ (1)

2 (a) Why is it wrong to define the upper fixed point of the Celsius scale as the "boiling point of water" ?

_____

_____ (2)

(b) Give the correct definition of the upper fixed point.

_____

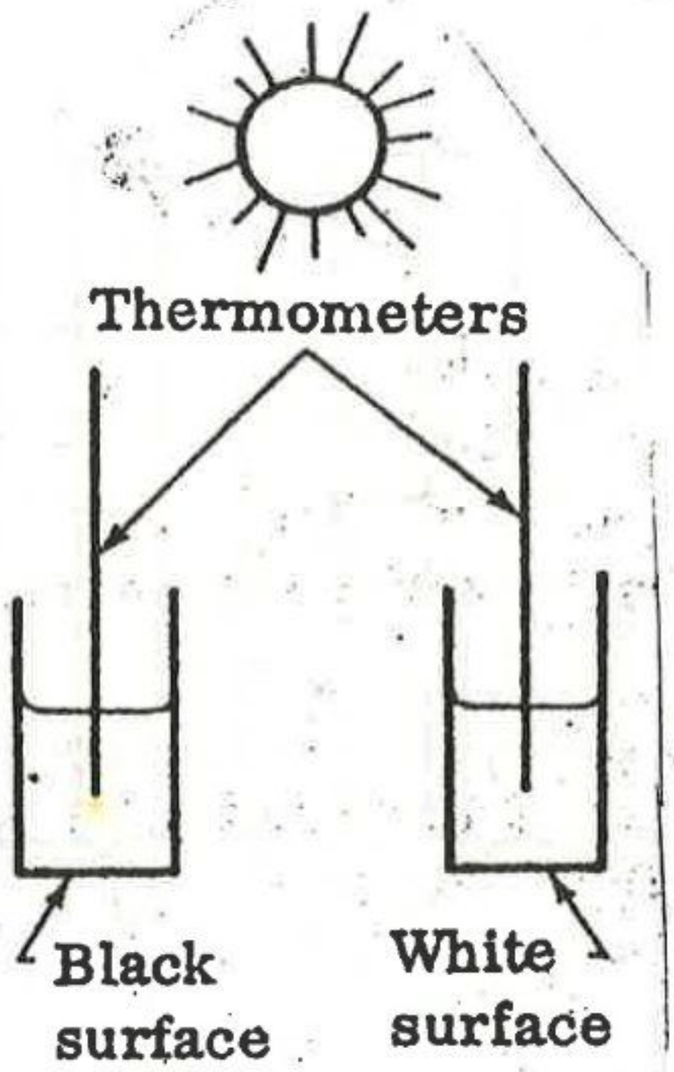
_____ (1)

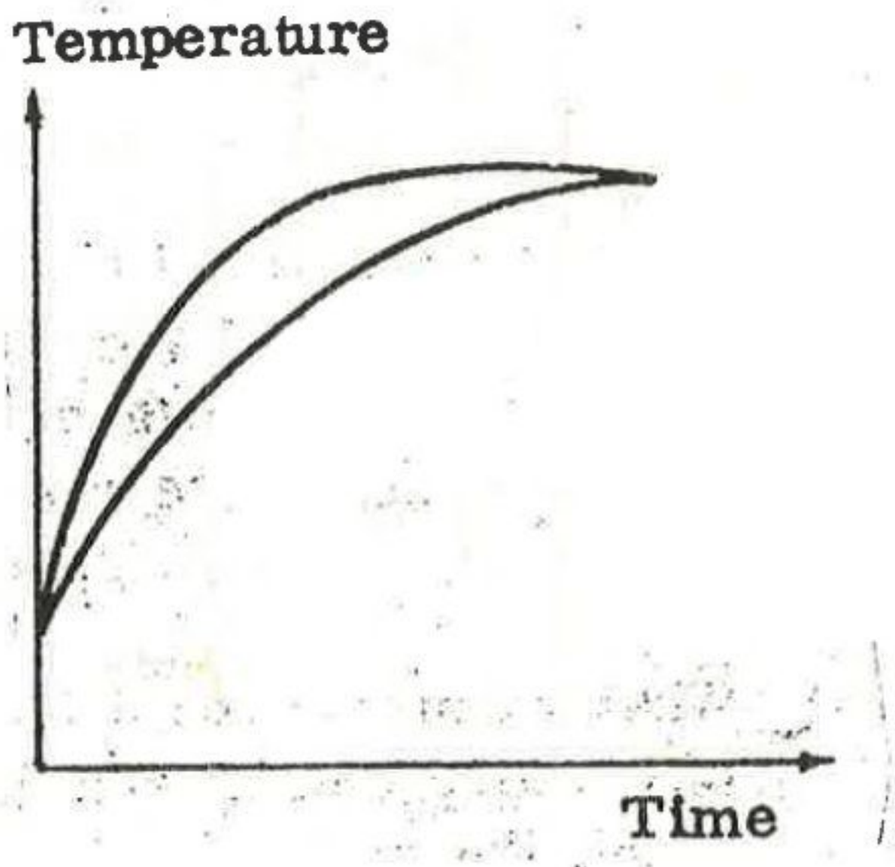
(c) Why is it not possible to boil eggs faster by turning up the gas or electricity supply ?

_____

_____ (2)

3 The diagram below shows two similar metal cans containing equal volumes of water. The cans are placed in direct sunlight. One can is painted white and the other black. Temperature readings are taken every minute and the readings are used to draw the graphs shown.





(a) Mark the letter "W" on the graph which should be obtained from the thermometer placed in the "white" can. (1)

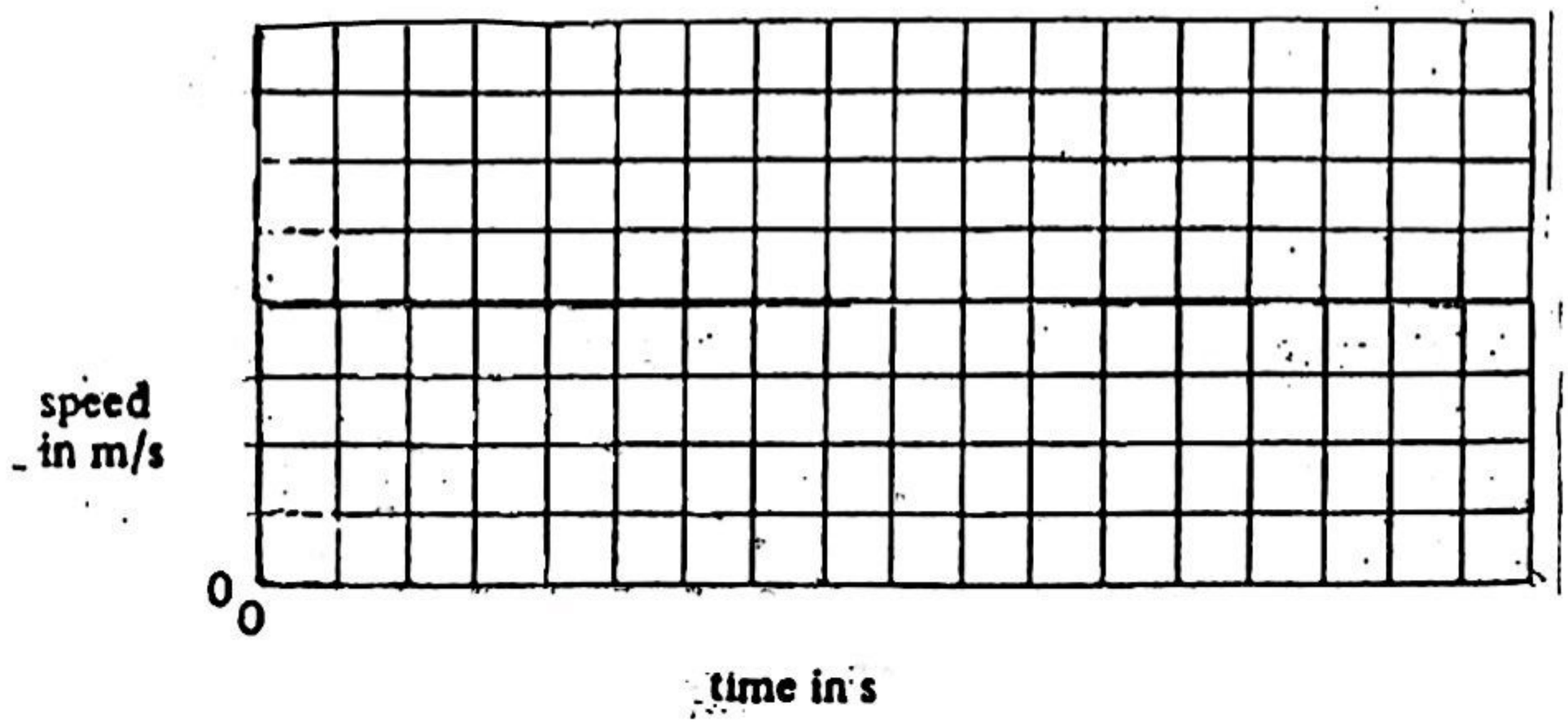
(b) Sketch, on the same axes given, the graphs you would expect to obtain if the two cans werenow allowed to cool to airtemperature once again. Label the graph "W" for thewhite can. (2)

(c) Name three ways in which the cans could be losing heat.

(3)

4 A boy drops a stone down a deep well and hears it hit the water 2 s later. Assuming that the acceleration of afreely falling body on the earth's surface, g = 10 m/s^2,

(a) Draw on the axes given below a speed-time graph of the motion, marking on it the time and the speed at which the stone hits the water. (3)

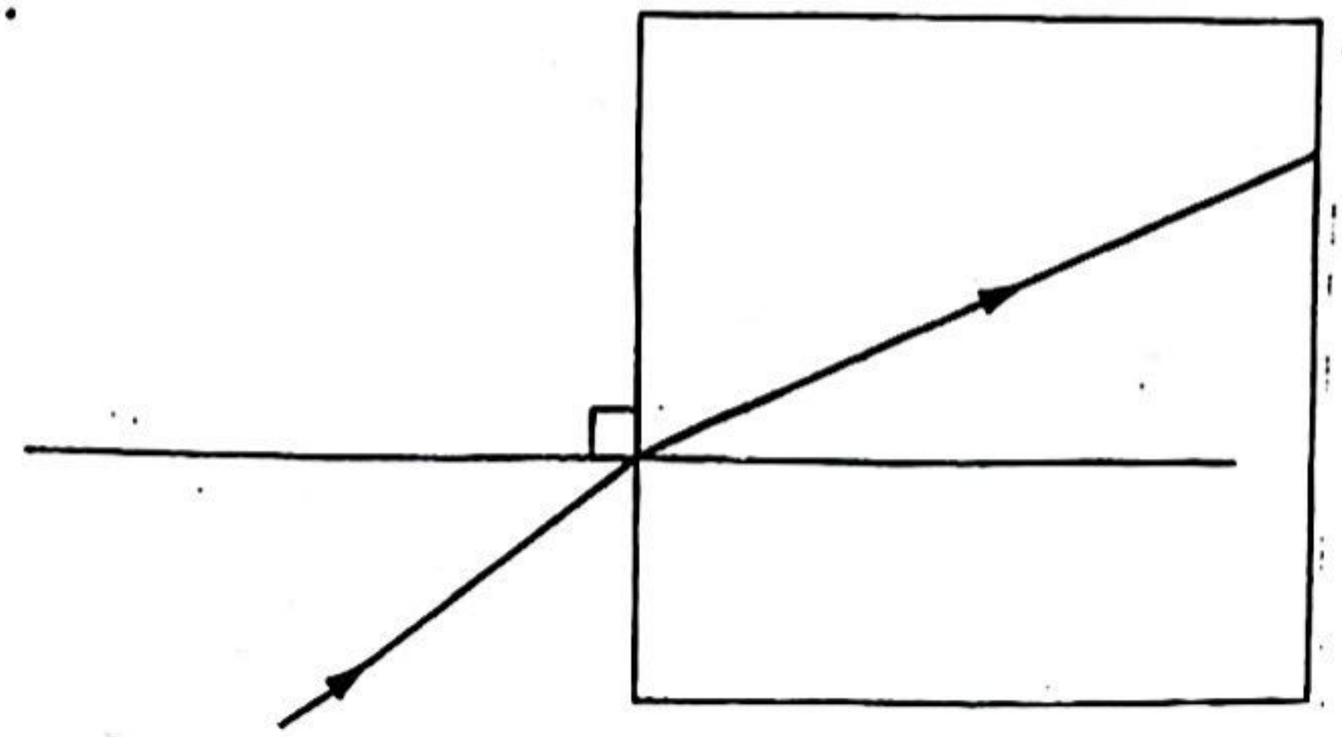


(b) State TWO assumptions that you make in your calculation in (a).

i) _____

ii) _____ (2)

5 The scale diagram below represents a ray of light passing from air to glass.



5 (continued)

(a) Measure the angle of incidence (i) and the angle of refraction (r).

i = _____

r = _____ (2)

(b) Calculate the refractive index of the glass.

Refractive index = _____ (2)

(c) At what angle of incidence is the angle of refraction zero ?

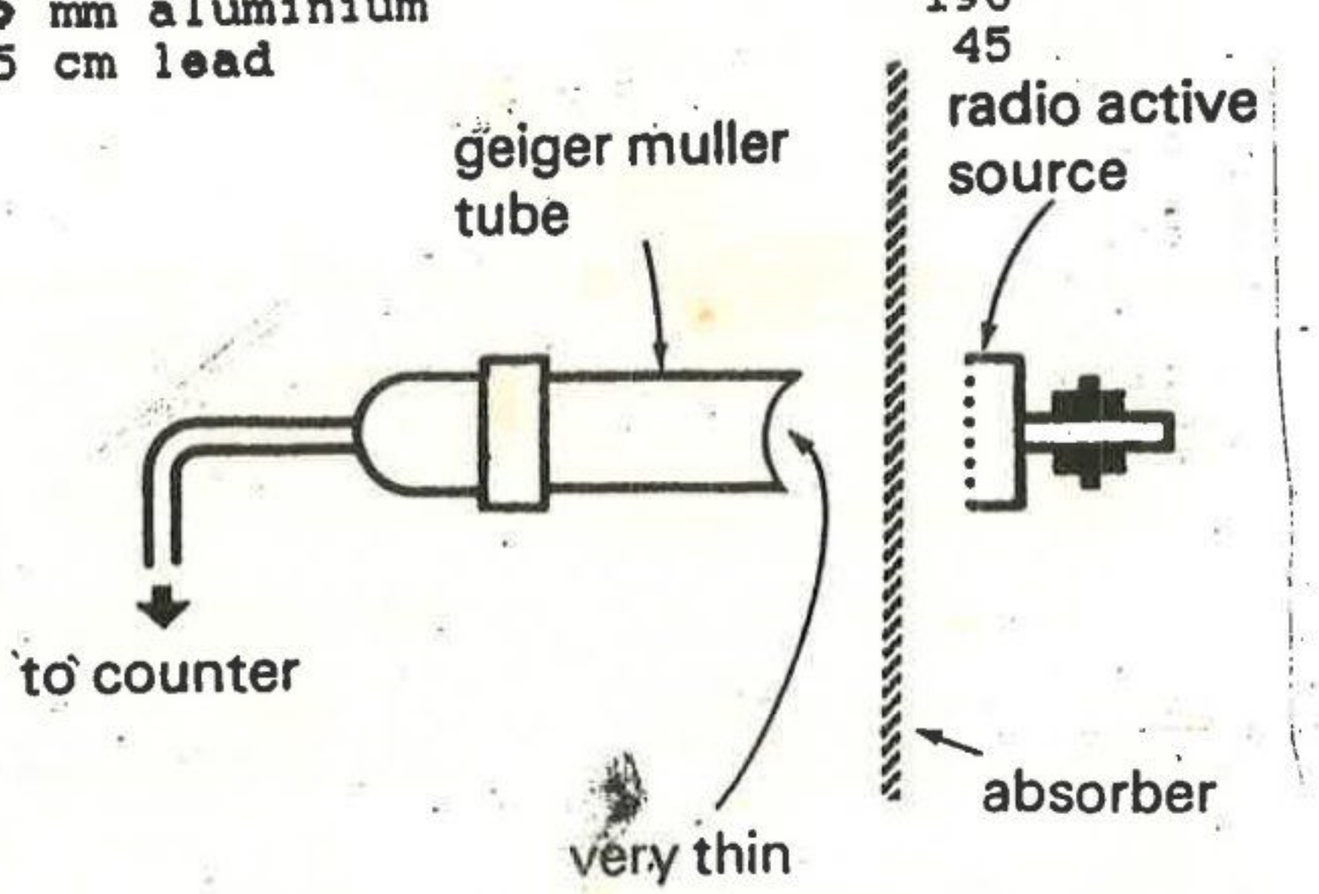
_____ (1)

(d) Given that the speed of light in air is 3×10^8 m/s, calculate the speed of light in the glass.

Speed of light in glass= _____ m/s (2)

6 Using thearrangement shown below the count ratesfrom a radioactive source are measured, using a series of absorbers between source and detector. The following readings are obtained :

Absorber	Count rate (count/minute)
vacuum (no absorber)	400
thin paper	196
5 mm aluminium	196
5 cm lead	45



6 (continued)

(a) Name the two types of radiations which are emitted, giving reasons for your answers.

(i) _____

_____

(ii) _____

_____

(4)

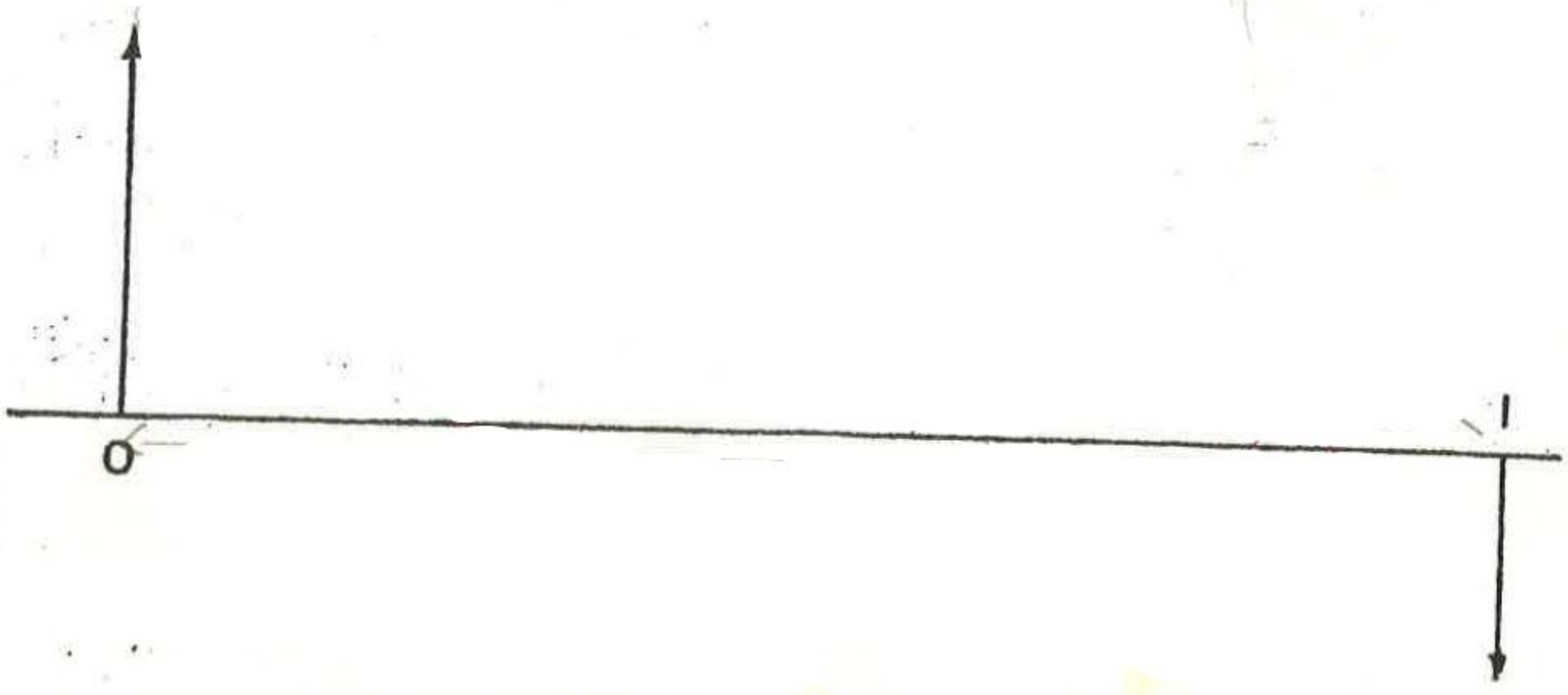
(b) Even when there is no source present, a detector will register a count of about 25 per minute. Suggest 2 reasons for this.

_____

_____

(2)

7 The diagram belowshows the image I of an object Oproduced by a thin converging lens.



(a) Using a ray drawing method, mark on the diagram, mark on the diagram
(i) the position of the lens (L);
(ii) the position of the principal focus (F). (5)

(b) What is the focal length of the lens ?

_____ cm

8 (a) A force acting on an object may produce a change in velocity. State TWO other changes which may be produced.

(i) _____

(ii) _____ (2)

(b) A body of mass 2 kg, initially at rest, is acted upon by a force of 6 N.
(i) Calculate its speed after 4 s.

_____

_____

Ans: _____ (2)

(ii) What is the work done on the body if it moves a distance of 3 m ?

_____

Ans: _____ (2)

Section B
[20 marks]

Answer any TWO questions.

8 (a) State the meanings of the terms "mass" and "weight". In what circumstances, if any, do these quantities vary ? (3)

(b) An astronaut on the Moon measures the mass of some rock by comparison with standard masses on a lever balance and found it to be 0.44 kg.
If a spring balance calibrated in Newtons had been used instead of a balance which compared masses, what would the reading on the spring balance be (i) on the Earth and (ii) on the Moon ?

(Take the acceleration of free fall on earth and on the Moon to be 10.0 m/s^2 and 1,7 m/s^2 respectively.) (3)

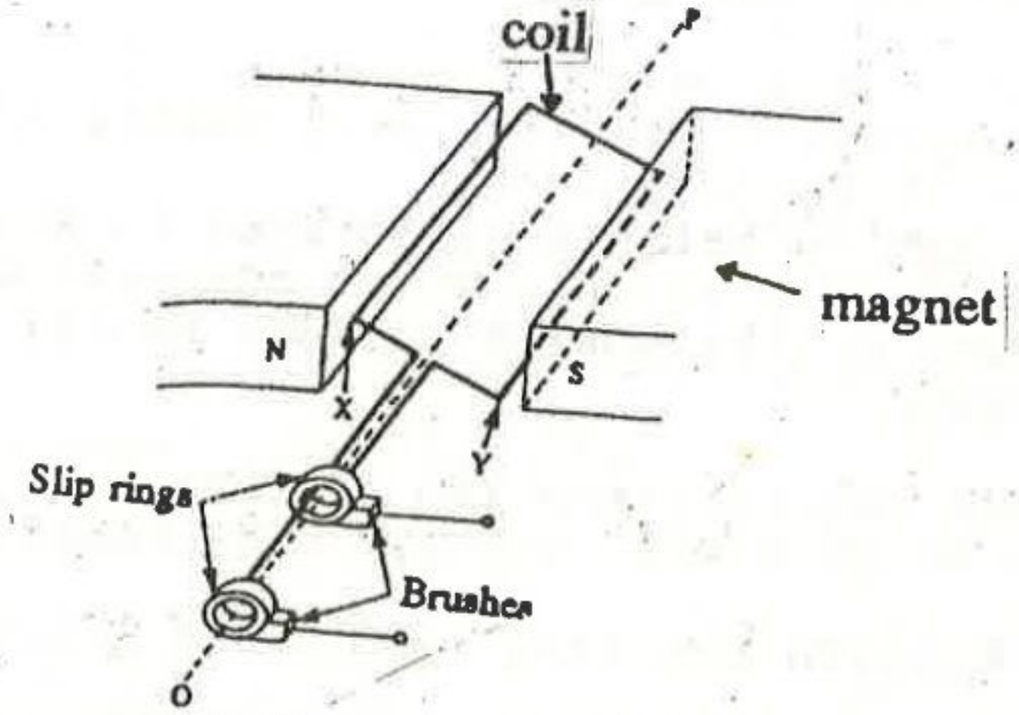
(c) (i) Explain the term "centre of gravity" of an object. (1)

(ii) A double-decker bus is morelikely to topple over when the upper deck is heavily loaded than when it is empty. Explain. (3)

9 (a) Describe an experiment you would carry out to determine the electrical resistance of a resistor. Include a circuit diagram in your answer andexplain how the resistance wouldbe calculated from the readings you take. (5)

(b) A 60 W lamp operates normally from a 240 V supply.
Calculate the following:
(i) the current through the lamp,
(ii) the resistance of the lamp,
(iii) the heat produced in five minutes,
(iv) the cost of using two such lamps for 45 hours at 4.8 cents per kWh. (5)

11) The diagram below shows a simple form of a.c. generator.



(a) Explain how such a generator changes mechanical energy into electrical energy. (3)

(b) The voltage produced by an a.c. generator may be changed by atransformer. Draw a labelled diagramof a simple transformer which could be used to step up the voltage of ana.c. supply. Explain how it works. (5)

(c) Ina real transformer, the powerdrawn from the supply exceeds the power dissipated in the secondary circuit. Give TWO reasons for this. (2)

END