FORM TP 2026–107

TEST CODE **01238020**

MAY–JUNE 2026

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 02 – General Proficiency

2 hours 30 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of SIX questions in TWO sections. Answer ALL questions.
2. Write your answers in the spaces provided in this booklet.
3. Do NOT write in the margins.
4. All working MUST be shown. Where appropriate, ALL formulas MUST be clearly stated as part of your working.
5. You may use a silent, non-programmable calculator to answer questions, but you should note that the use of an inappropriate number of significant figures in answers will be penalized.
6. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra lined page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
7. **If you use the extra page(s), you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

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

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SECTION A

Answer ALL questions.

1. Figure 1 shows a model of a hydroelectric power station. Water from the reservoir flows down and turns the turbine, which is connected to the generator, to produce electrical energy.

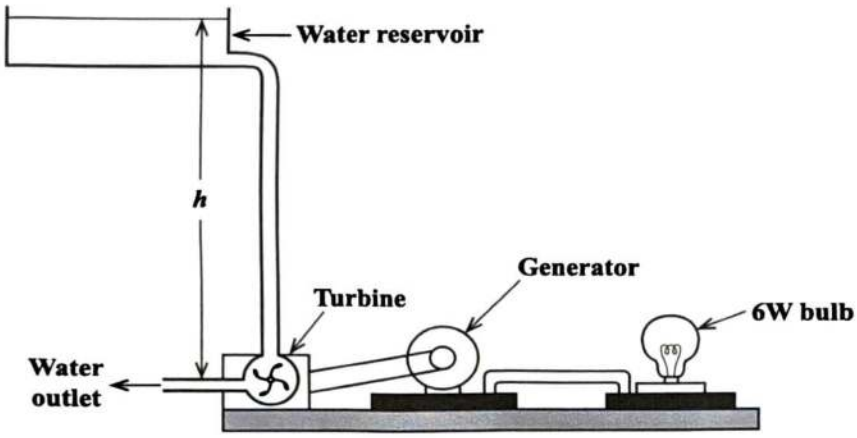


Figure 1. A model of a hydroelectric power station

(a) The chart in Figure 2 shows the energy changes that take place during the operation of the turbine in the generation of electricity to light the bulb. Complete the chart by filling in the missing energy types.

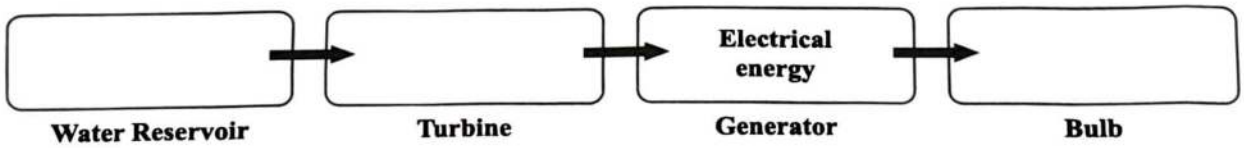


Figure 2. Energy changes that take place during the operation of the turbine in the generation of electricity

(3 marks)

(b) One 6 W bulb is connected as shown in Figure 1. Determine the amount of electrical energy supplied to the bulb in one second.

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(1 mark)

(c) Calculate the efficiency of the system if the total power input is 10 W, given that the lamp is at its normal brightness.

.....

(3 marks)

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(d) There is a relationship between the brightness of the bulb and the height of the water reservoir. To investigate the most appropriate height for the model, the following results were observed.

TABLE 1: RESULTS FOR POTENTIAL ENERGY OF THE WATER VS HEIGHT OF THE WATER RESERVOIR

Potential Energy E_p (J)	0	2.5	5.0	7.5	10.0	12.5	15.0	17.5
Height h (m)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5

(i) Plot a graph of potential energy of the water, E_p/J, against height, h/m, on the grid in Figure 3 **on page 7**. **(8 marks)**

(ii) Using your graph in (d) (i), calculate the slope, S, of the line.

.....

(5 marks)

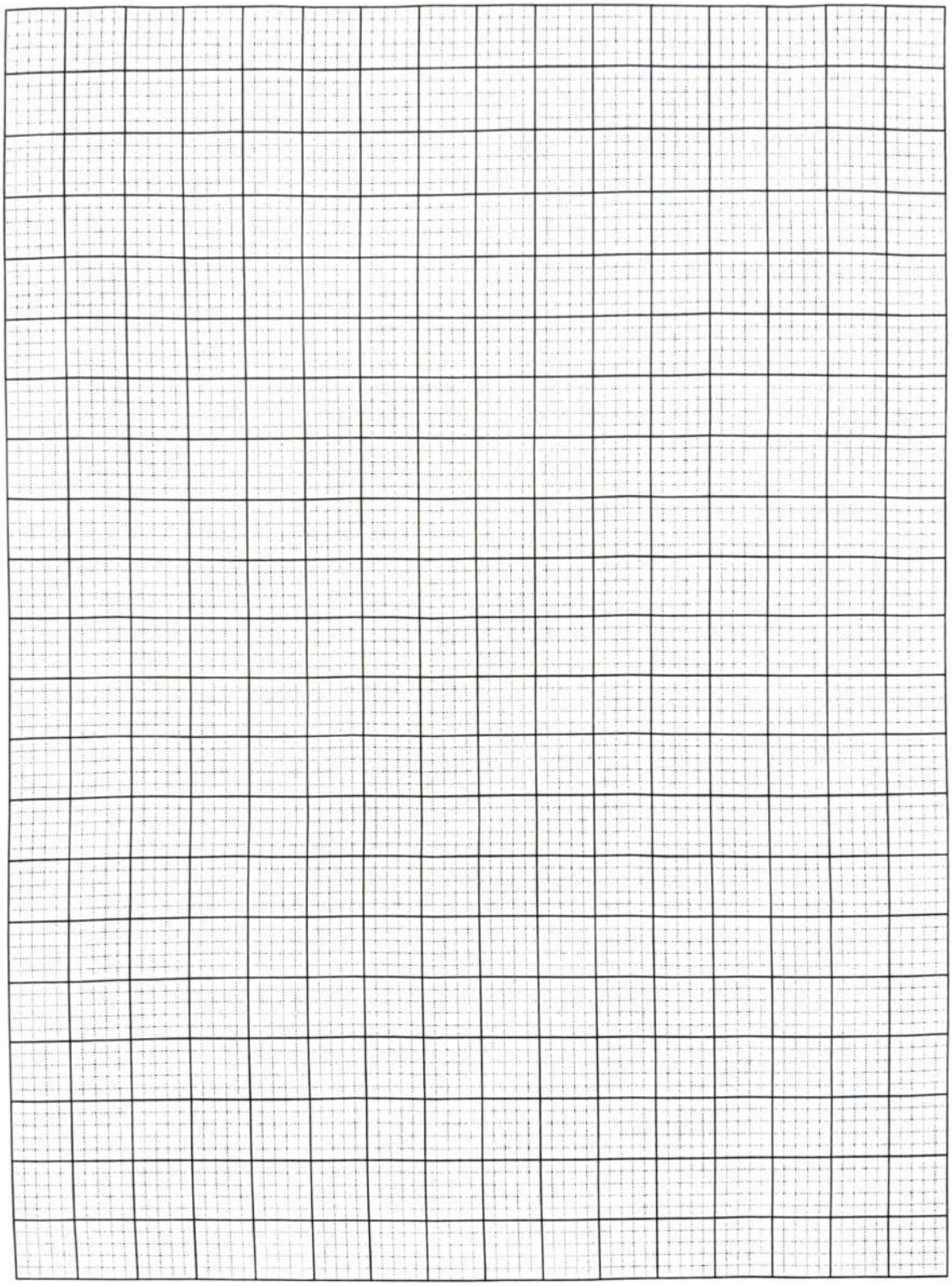


Figure 3. Graph of potential energy of the water, E_p/J, against height, h/m

(iii) State the conclusion that can be drawn from the graph with respect to the brightness of the lamp and the potential energy of the water in the reservoir. Explain your answer.

Conclusion

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Explanation

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(2 marks)

(e) Calculate the mass of the water in the reservoir given that the slope, S, is equal to mg, where m is the mass of the water and g is the acceleration due to gravity. Take g to be 10 N kg^{-1}.

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(3 marks)

Total 25 marks

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2. Figure 4 shows the motion (velocity–time graph) of a cyclist's journey during a short ride which is part of his exercise routine.

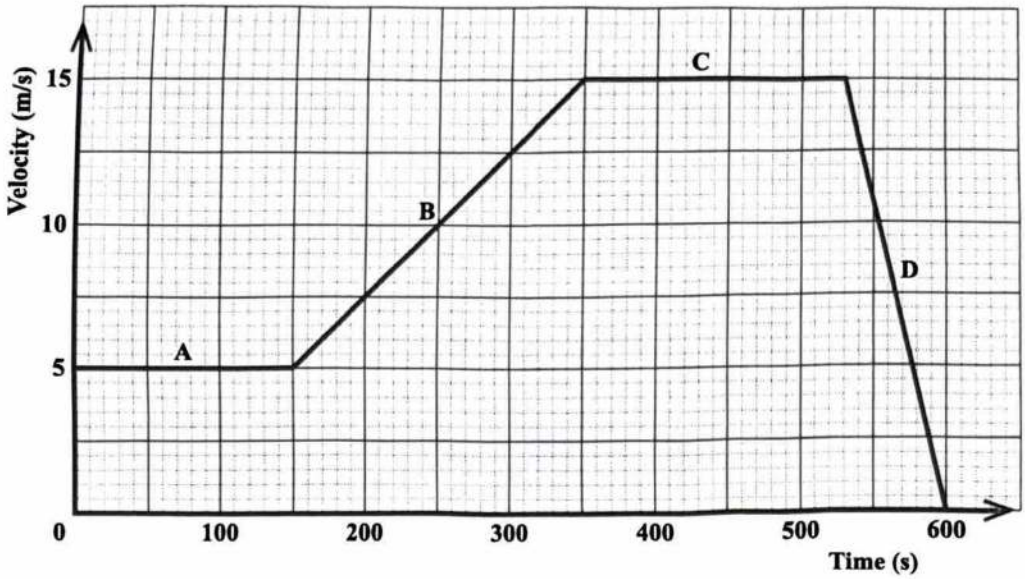


Figure 4. Velocity–time graph of cyclist's journey

(a) Define EACH of the following terms as it relates to motion.

(i) Displacement

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(2 marks)

(ii) Acceleration

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(2 marks)

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(b) The letters A, B, C and D on the graph in Figure 4 represent the various stages of the cyclist's motion during his journey.

Describe the motion of the cyclist at EACH of the stages labelled A, B and D.

Stage A .....

.....

Stage B .....

.....

Stage D .....

.....

(3 marks)

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(c) Calculate the TOTAL distance travelled by the cyclist during the ten-minute journey, as shown in Figure 4 **on page 9**.

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(4 marks)

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(d) Calculate the average speed of the cyclist during the ten-minute journey.

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(2 marks)

(e) Determine the deceleration of the cyclist.

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(2 marks)

Total 15 marks

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3. Figure 5 shows a 230 V a.c. mains circuit to which a number of appliances are connected.

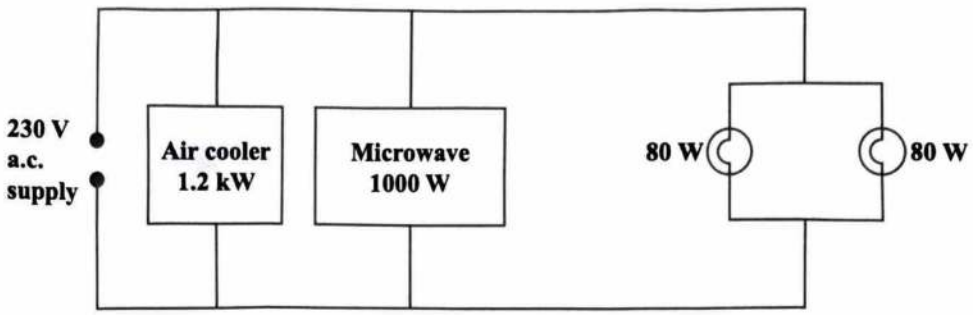


Figure 5. An a.c. mains circuit with appliances connected

(a) (i) Define the term 'power' as an electrical quantity and state the standard unit (SI unit) in which it is measured.

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(2 marks)

(ii) Calculate the total power which is supplied to the circuit.

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(2 marks)

(b) (i) *Fill in the blank spaces in the statements below which relate to the manner in which the appliances are connected.*

The appliances are connected in .....

As a result, the voltage across each appliance is .....

(2 marks)

(ii) Suggest ONE advantage of connecting the appliances as shown in Figure 5 **on page 12**.

.....

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(1 mark)

(c) (i) Calculate the current in the microwave.

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(2 marks)

(ii) A fuse must be used with the microwave. Briefly explain the purpose of the fuse in the electrical circuit.

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(2 marks)

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3. Figure 5 shows a 230 V a.c. mains circuit to which a number of appliances are connected.

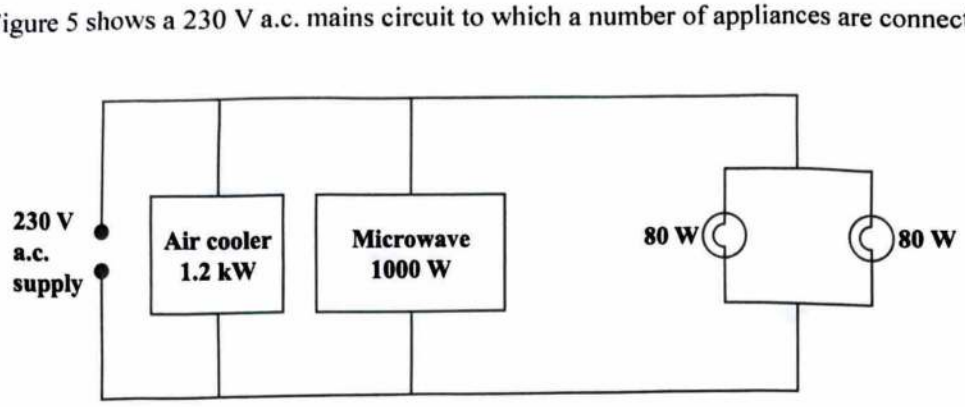


Figure 5. An a.c. mains circuit with appliances connected

(a) (i) Define the term 'power' as an electrical quantity and state the standard unit (SI unit) in which it is measured.

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(2 marks)

(ii) Calculate the total power which is supplied to the circuit.

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(2 marks)

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(b) (i) Fill in the blank spaces in the statements below which relate to the manner in which the appliances are connected.

The appliances are connected in .....

As a result, the voltage across each appliance is .....

(2 marks)

(ii) Suggest ONE advantage of connecting the appliances as shown in Figure 5 **on page 12**.

.....

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(1 mark)

(c) (i) Calculate the current in the microwave.

.....

(2 marks)

(ii) A fuse must be used with the microwave. Briefly explain the purpose of the fuse in the electrical circuit.

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(2 marks)

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(d) Calculate the

(i) energy in joules used by the air cooler in 30 minutes

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(2 marks)

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(ii) current in one of the filament lamps.

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(2 marks)

Total 15 marks

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NOTHING HAS BEEN OMITTED.

SECTION B

Answer ALL questions.

4. Figure 6 shows the diagrams of three thermometers, A, B and C.

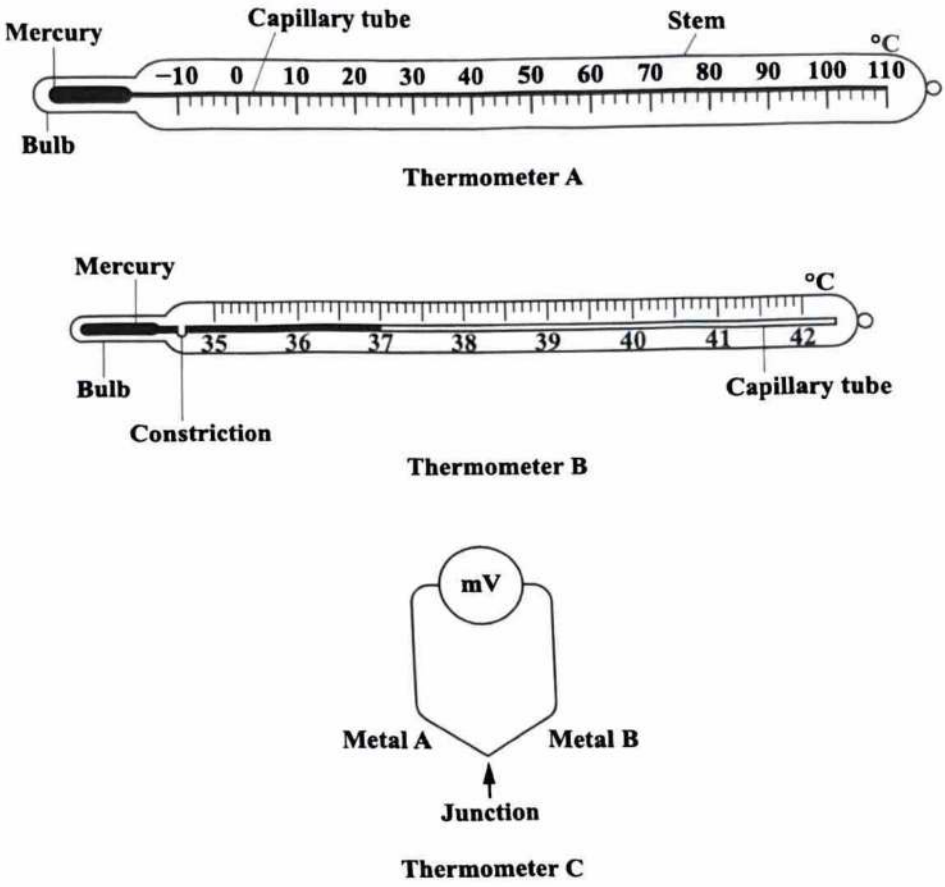


Figure 6. Three different thermometers, A, B and C

(a) (i) Identify the three types of thermometers shown in Figure 6.

A .....

B .....

C .....

(3 marks)

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(ii) State TWO features of Thermometer A which determine the time taken for the thermometer to respond to changes in temperature.

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(2 marks)

(iii) Determine the physical property employed by Thermometer B, that varies with temperature.

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(1 mark)

(b) Using the kinetic theory, explain why the

(i) rate of evaporation of water increases with temperature

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(2 marks)

(ii) pressure exerted by a given mass of gas increases when its temperature is raised and its volume is kept constant.

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(3 marks)

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(c) A metal cylinder containing gas is taken out of a refrigerated store maintained at – 23 °C. The pressure in the cylinder was 75 Pa before it was removed.

Calculate the pressure in the cylinder when the surrounding temperature rises to 27 °C, assuming that the cylinder itself does not expand.

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(4 marks)

Total 15 marks

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5. (a) Figure 7 shows a representation of the electromagnetic spectrum.

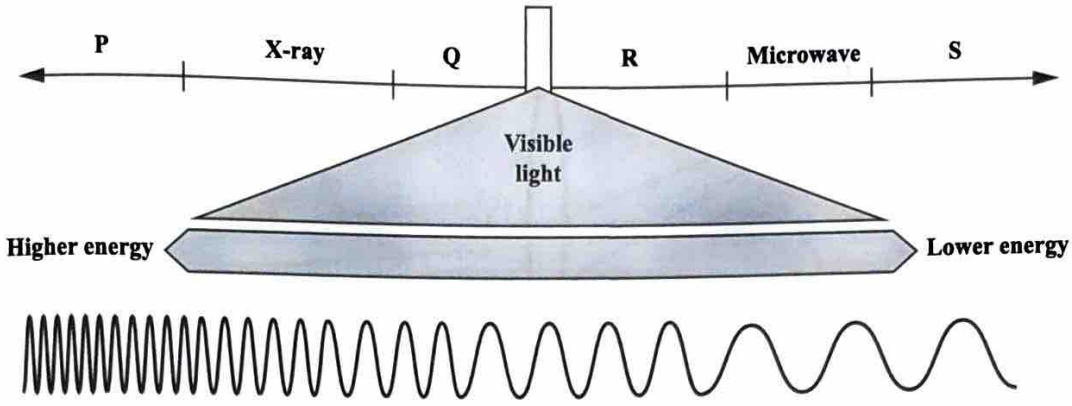


Figure 7. The electromagnetic spectrum

(i) Identify the type of radiation in EACH of the regions represented by P, Q, R and S in Figure 7.

P .....

Q .....

R .....

S .....

(4 marks)

(ii) X-rays and ultrasound can both be used for scanning internal organs. Explain why ultrasound can be used to scan unborn babies whereas X-rays are NOT used.

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(2 marks)

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(b) Figure 8 is a diagram (not drawn to scale) which shows three rays emerging from the top of an object. The path of one ray through the lens has been completed on the diagram.

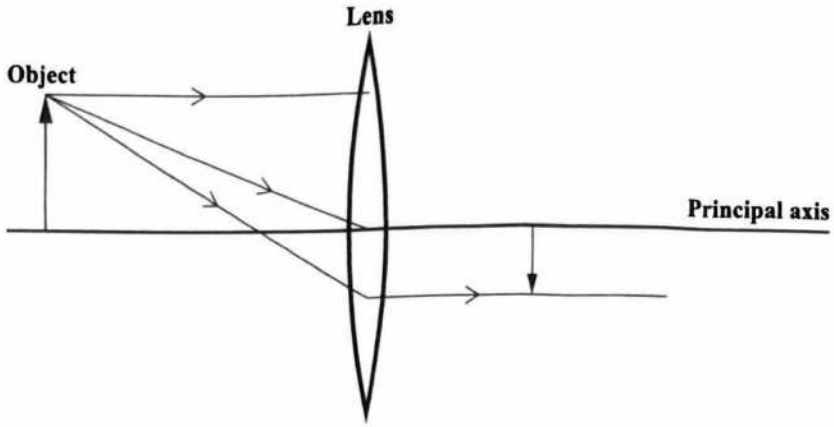


Figure 8. Path of three rays emerging from the top of an object

(i) Define the term 'focal length' with respect to a converging lens.

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(2 marks)

(ii) On the diagram in Figure 8, complete the paths of the other two rays.

(2 marks)

(c) Figure 9 shows a ray of red light from a source incident on the face *PR* of a glass prism at point *S*. The source emits visible light.

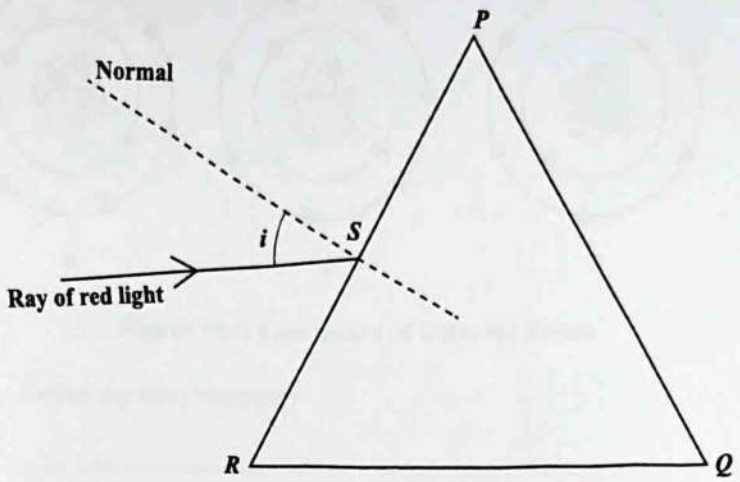


Figure 9. A glass prism

The angle of incidence, *i*, of the ray is 42°. The refractive index of the glass for red light is 1.5.

(i) Calculate, **to 3 significant figures**, the angle of refraction in the glass at *S*.

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(3 marks)

(ii) On Figure 9, draw the refracted ray at face *PR* and the ray emerging from face *PQ* of the prism. Label this ray *T*. **(2 marks)**

Total 15 marks

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6. (a) Figure 10 shows three nuclei, *E*, *F* and *G*, of different atoms, two of which are isotopes.

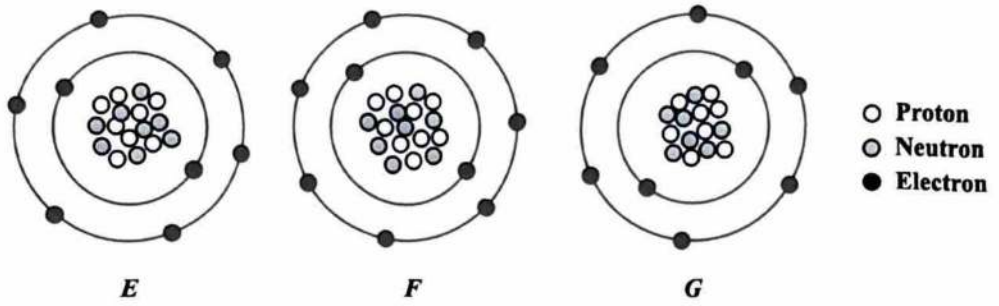


Figure 10. Three nuclei of different atoms

(i) Define the term 'isotope'.

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(2 marks)

(ii) Assuming that the chemical element symbol of the three nuclei are *E*, *F* and *G*, as shown in Figure 10, write the nuclide notation of each in the form ${}^{A}_{Z}X$.

E

F

G

(3 marks)

(iii) From Figure 10, identify which atoms are isotopes.

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(1 mark)

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(b) A certain radioisotope is administered just prior to a severe medical procedure. The graph in Figure 11 shows the activity of the sample of the radioisotope given to the patient over a few hours.

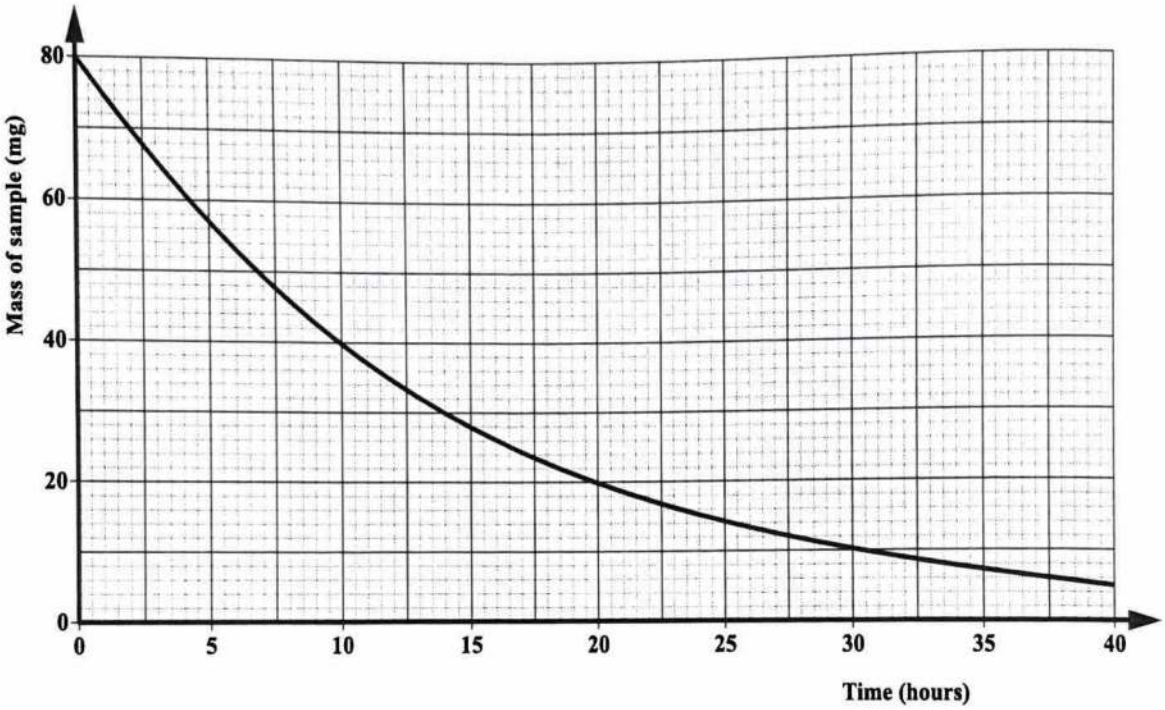


Figure 11. Graph of radioactive decay

(i) Define the term 'half-life' of a radioactive nuclide.

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(2 marks)

(ii) Using the graph in Figure 11, and assuming that all the radioactive substance stays in the patient's body, state the original mass of the sample.

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(1 mark)

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(iii) Determine the average half-life of the radioactive substance. Draw lines on the graph, or otherwise, to illustrate your answer.

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(4 marks)

(iv) Estimate the **mass** of the radioactive substance that remains after four half-life periods. Show your working.

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(2 marks)

Total 15 marks

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

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