YEAR 2008 PAPER 2 PHYSICS: 6 NOVEMBER 2008

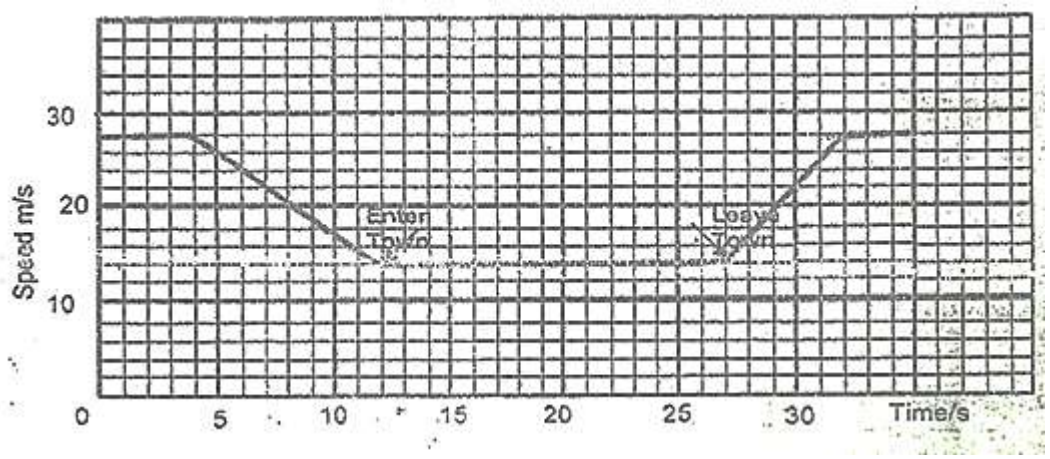
Section A

[46 MARKS]

Answer all the questions in this section.

Write your answers in the spaces provided.

1. Figure 1.1 represents the motion of a car along a straight road. As the car approaches a small town, it slows down. The car travels at a constant speed from the start of the town to the end of the town. After passing through the town, the car speeds up.



(i) What was the speed of the car in the town?

Speed = [1],

(ii) Determine the time taken by the car to pass through the town.

Time taken = [1].

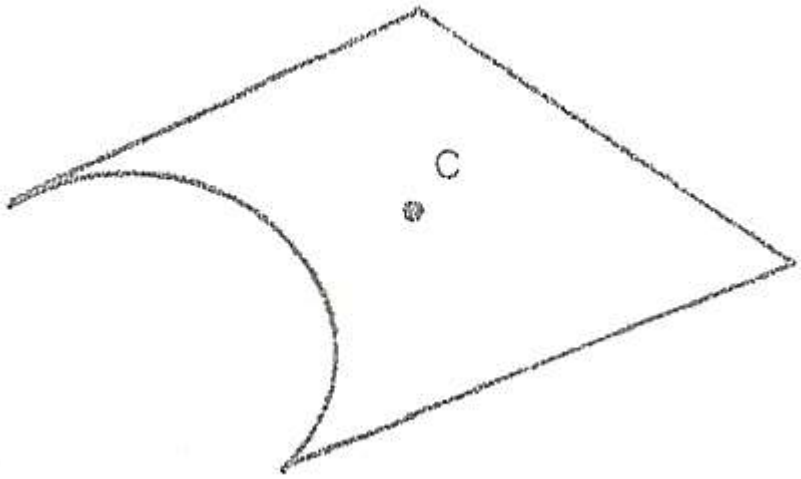
(iii) Calculate distance travelled by the car in the town.

Distance .= [1]

(b) The car accelerates after passing through the town. Calculate the acceleration. Give the units of your answer.

Acceleration-- [1]

2. A friend says that the centre of mass of an irregularly shaped lamina shown in the Figure below was at point C.



Outline how you would find the centre of mass of the lamina in order to check whether it was at point C. You may put more information on the diagram. [4]

3. Figure shows components in the electromagnetic spectrum in order of increasing wavelength.

Increasing wavelength ⟶

Gamma	X-ray	P	Light	Infra-red	microwave	Q

Two of the components have not been named.

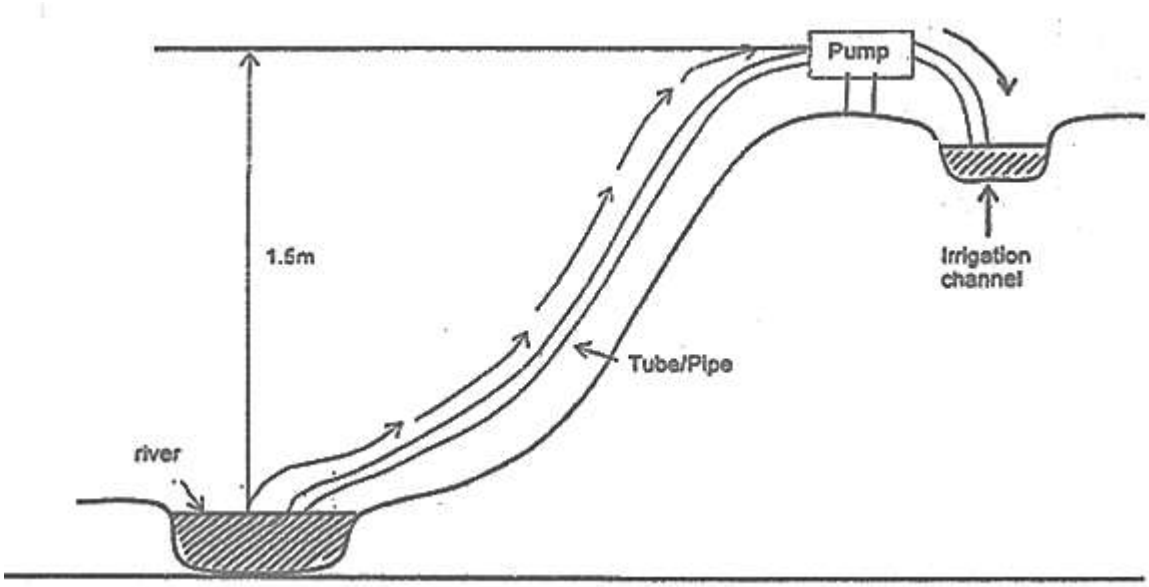
(a) Complete Figure 3,1 by adding the names of components P and G. [2]

(b) Define wavelength of a wave. [1]

(c) State the speed of these waves in a vacuum. [1]

(d) State one property other than speed that all electromagnetic waves have in common. [1]

4. Figure 4.1 shows water being pumped from a river into an irrigation channel. The water is lifted to a height of 1.5m. The pump is able to lift 50 kg of water each second. The gravitational field strength is 10N/kg.



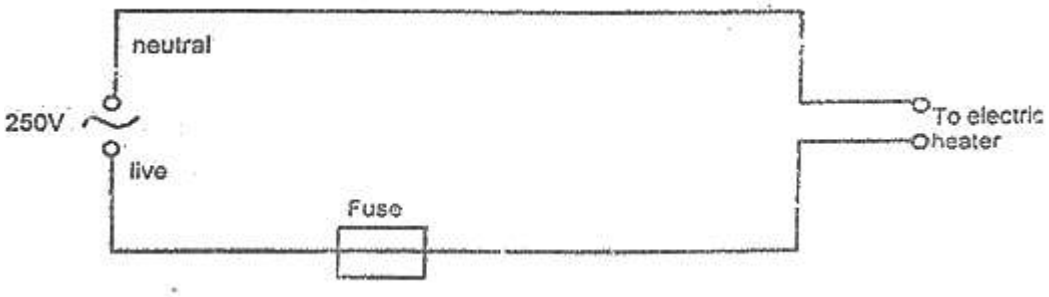
(a)) Calculate the work done when 50 kg of water is lifted to a height of 1.5m. [2]

(b) The pump used 1200J of energy to lift 50kg of water to a height of 1.5m. [1]

Explain the difference between this value of energy and the value calculated in (a).

(c) Calculate the efficiency of the pump. [2]

5. The figure shows part of the circuit connected to the electric heater.



(i) Explain why a fuse is included in the circuit and explain what happens when the fuse blows**[3]**

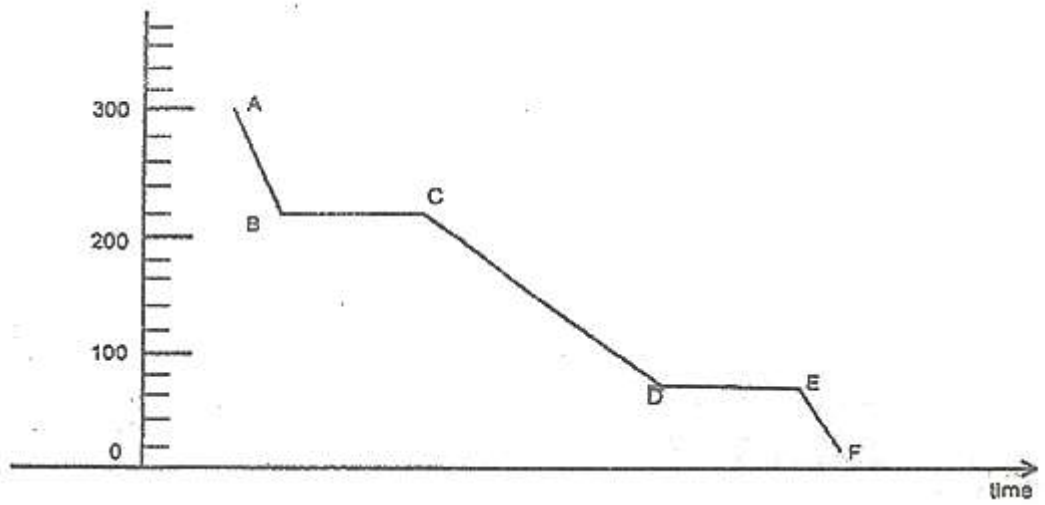
(ii) Explain why the fuse is placed on the live wire rather than on the neutral wire**[1]**

(a) The electric heater has a-power rating of 1000W. What is rating of the fuse used in the circuit? **[2]**

Total [6]

6. The speed of sound in human tissue is about 100m/s. If a baby in the womb is 10cm below an ultra sound probe, how long will it take the pulse of ultra sound to travel from probe to the baby and back to the probe? **[2]**

7. The graph shows a cooling curve of a substance as its temperature falls from 300°C to 20°C,



(a) At 250°C, is the substance solid, liquid or gas? **[1]**

(b) What is the boiling point of the substance? **[1]**

Boiling point =

(c) What is the melting point of the substance? **[1**

Melting point

(d) Why does the temperature stay constant over the sections BC and DE despite the fact that the substance is losing energy to the surrounding? **[3]**

8. A filament lamp has a power of 100VV at 240V. a 'low energy' lamp; has a power of 20W at.240V, The two lamps give out the same amount of light energy per second.

(a) Calculate the current-in the low energy' lamp.

Current = A [2]

(b) The cost of using electrical appliances in particular is K500 per Kilowatt-hour (kWh). Calculate the cost of using the 'low energy' lamp for 200 hours.

Cost = K **[2]**

(c) (i) Calculate the number **of** 'lower energy' **lamps that would transfer the** same electrical power as one filament lamp. **[2]**

Number =

(ii) In the space below, draw a circuit diagram to show how several "low energy" lamps are connected to the supply so that the lamps have their normal brightness. **[2]**

Total [8]

9. Radon 222, with an atomic number of 86, decays by alpha emission with a half-life of 52s.

(a) Explain what is' meant by half-life of 52s. [2]

(b) What is the structure of an alpha particle? **[1]**

(c) What are the atomic number and mass number of the nucleus left after the alpha decay?

(i) Atomic number **[1]**

(ii) Mass number **[1]**

Section B
[20 MARKS]

Answer any two questions.

Write your answers on the separate answer paper provided.

10. (a) Black surfaces absorb and emit infra-red radiation better than white surfaces.

(i) Describe an experiment that shows black surfaces absorb radiation better than white surfaces.

(ii) Describe an experiment that shows black surfaces emit radiation better than white surfaces.[6]

(b) (i) An electric kettle' is filled with water. The heating element is at the bottom. Explain why all the water becomes heated when the kettle is **switched** on. [3]

(ii) Explain why a shiny metal kettle loses energy more quickly when it becomes dirty. [1]

Total [10]

11. (a) Describe how you would use a rectangular **glass block to** determine **the** refractive index of the glass. [7]

(b) Given that the refractive index of the glass is 1.65, calculate the angle of refraction in the glass when the ray of light strikes one surface of the block at an angle of incidence of 60°. [3]

Total [10]

12. (a) Describe an experiment to determine values of voltage across a metallic conductor-and the Corresponding values of current in a conductor. Draw a labelled diagram of the circuit you would use and explain how you take the readings. **[5]**

(b) The results of the experiment are shown below.

Pd/V	0	1.0	2,0	3.0	**4.0**	5.0	6.0
I/A	0	0.5	1.0	1.5	2.0	2.5	3.0

Plot a graph of the potential difference against current and use it to find the resistance of the metallic conductor. **[5]**

Total [10]