

Centre Number	Examination Number

EXAMINATIONS COUNCIL OF ZAMBIA



Examination for General Certificate of Education Ordinary Level

Science

5124/1

Paper 1

Monday

31 JULY 2023

- Additional Materials:**
 Answer Booklet
 Electronic calculator (non programmable) and / or Mathematical tables
 Graph paper
 Soft clean eraser
 Soft pencil (type B or HB is recommended)

Time: 2 hours

ion Ordje-5: Marks: 85

Instructions to Candidates

- Write the **centre number** and your **examination number** on **every page** of this question paper and on the separate **Answer Booklet/Paper provided**.
- There are **three** sections in this paper; Section **A, B** and **C**.

(i) **Section A**
 There are **twenty** questions in this section. Answer **all**. For each question, there are four possible answers, **A, B, C** and **D**. Choose the best one and mark it with a cross (X) on the **Answer Grid provided** in this question paper.

(ii) **Section B**
 There are **nine** questions in this section. Answer **all** questions. Write your answers in the **spaces provided** in this question paper.

(iii) **Section C**
 There are **three** questions in this section. Answer any **two** questions. Write your answers on a separate **Answer Booklet/Paper provided**.

3 At the end of the examination:

- Enter the numbers of the questions you have answered from Section C in the grid provided.
- Fasten the separate Answer Booklet/Papers used securely to the question paper.

Information for Candidates

- Any rough working should be done in this question paper.
- Cell phones are **not allowed** in the examination room.

For Candidate's Use	For Examiner's Use	
	Marks Obtained	Examiner's Initials
Section A		
Section B		
1		
2		
3		
4		
5		
6		
7		
8		
9		
Section C		
Total		

03916488

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SECTION A: [20 MARKS]

Answer **all** the questions in this section on the answer grid provided. Choose the best answer from the letters **A, B, C** or **D** and then mark the letter with a cross (**X**).

For example, if the answer is **B**, it is shown as:

A	B	C	D
---	--------------	---	---

ANSWER GRID

1	A	B	C	D
---	---	---	---	---

2	A	B	C	D
---	---	---	---	---

3	A	B	C	D
---	---	---	---	---

4	A	B	C	D
---	---	---	---	---

5	A	B	C	D
---	---	---	---	---

6	A	B	C	D
---	---	---	---	---

7	A	B	C	D
---	---	---	---	---

8	A	B	C	D
---	---	---	---	---

9	A	B	C	D
---	---	---	---	---

10	A	B	C	D
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Total Marks	
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11	A	B	C	D
----	---	---	---	---

12	A	B	C	D
----	---	---	---	---

13	A	B	C	D
----	---	---	---	---

14	A	B	C	D
----	---	---	---	---

15	A	B	C	D
----	---	---	---	---

16	A	B	C	D
----	---	---	---	---

17	A	B	C	D
----	---	---	---	---

18	A	B	C	D
----	---	---	---	---

19	A	B	C	D
----	---	---	---	---

20	A	B	C	D
----	---	---	---	---

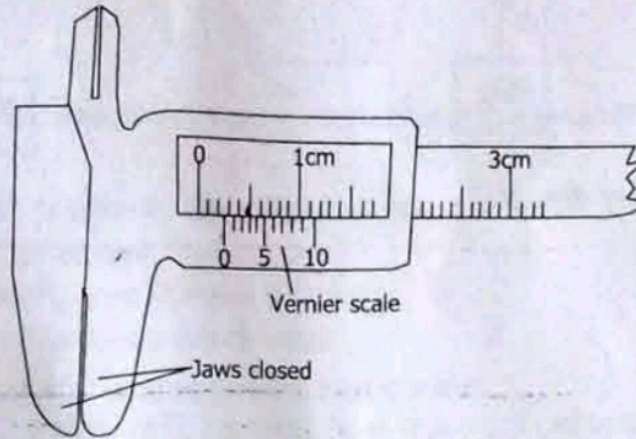
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SECTION A [20 marks]

Answer all the questions on the answer grid provided.

A1 The following diagram shows a vernier caliper with its jaws closed.



What is the zero error of this vernier caliper?

- A 0.02cm
- B 0.03cm
- C 0.20cm
- D 0.23cm

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A2 Four objects **E, F, G** and **H** of different masses were placed at places with different gravitational field strengths. Which object has the largest weight?

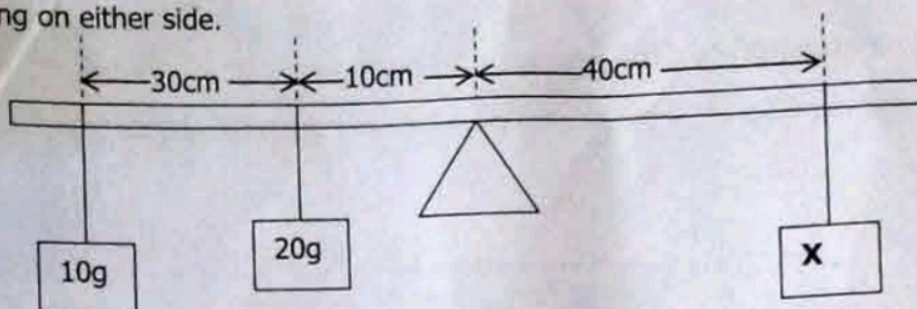
	Object	Mass(kg)	Gravitational field strength(N/kg)
A	E	8.0	10.4
B	F	8.5	9.8
C	G	9.0	10.2
D	H	9.5	9.5

A3 A coconut drops from the top of a palm tree 20m high. If air resistance is neglected, how long will it take the coconut to reach the ground? (Take $g = 10\text{N/kg}$)

- A 2.0s
- B 4.0s
- C 4.5s
- D 20.0s

[Turn over

A4 The following diagram shows a uniform metre rule in equilibrium when different masses are hung on either side.



Calculate the value of mass X.

- A 12.5g
- B 14.0g
- C 15.0g
- D 20.0g

A5 A bullet passes through a wooden block 0.80m thick. The velocity of a bullet reduces from 700m/s to 300m/s as it passes through the block. If the mass of the bullet is 10g, calculate the work done by the bullet in kJ.

- A 0.8kJ
- B 2.0kJ
- C 4.0kJ
- D 2 000kJ

A6 An elevator ascends at a constant speed of 1 metre per second. The total mass of the elevator is 1 000kg. (Take $g = 10\text{N/kg}$)

Calculate the power required to raise it to this speed.

- A 10 watts
- B 100 watts
- C 10 000 watts
- D 100 000 watts

A7 The following diagram shows a pulley system.



2 0 2 3

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<table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td><td style="width: 5%;"> </td> </tr> </table>																					

If a man using the pulley system pulls the rope at **E** 16m downwards, how high will the load **F** rise?

- A 2m
- B 4m
- C 8m
- D 16m

A8 What is the main reason why food is cooked faster in a pressure cooker than in an ordinary pot?

- A It is not affected by the atmospheric air.
- B Less heat escapes from the pot.
- C The boiling point of water is raised.
- D The vapour pressure is constant.

A9 In a thermos flask, a vacuum reduces heat transfer. What method or methods of heat transfer is or are reduced by the use of a vacuum?

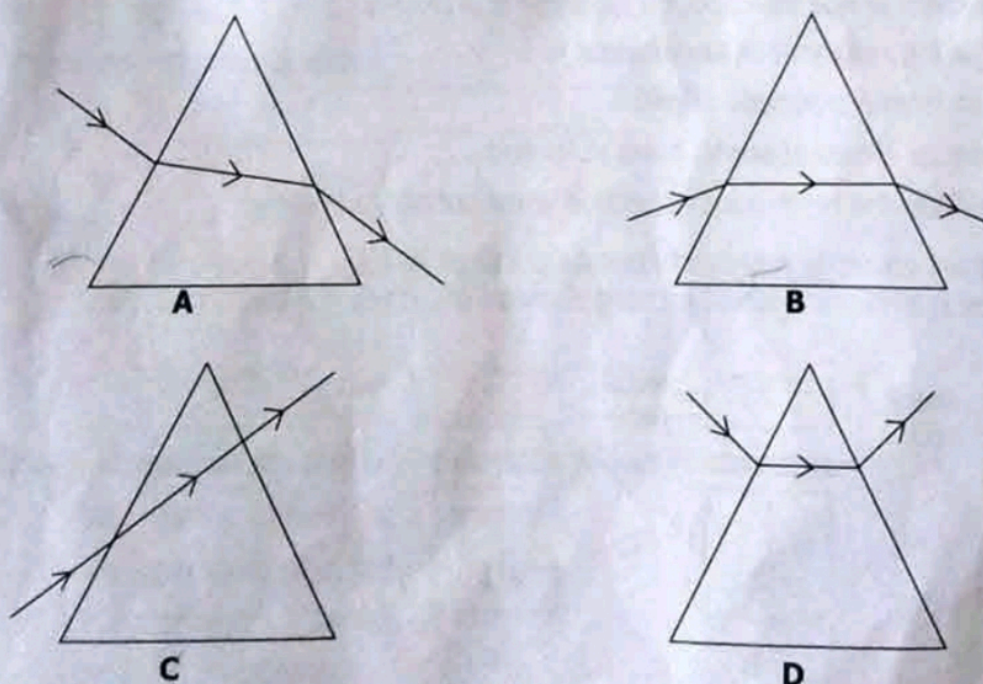
- A Convection only.
- B Convection and conduction.
- C Radiation and convection.
- D Radiation only.

A10 Which feature of a liquid in glass thermometer increases its sensitivity?

- A Narrow capillary bore
- B Wide capillary bore
- C Small bulb
- D Wide range

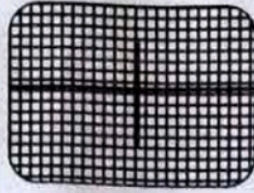
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A11 Which of the following diagrams shows the correct path of ray of white light passing through a glass prism?



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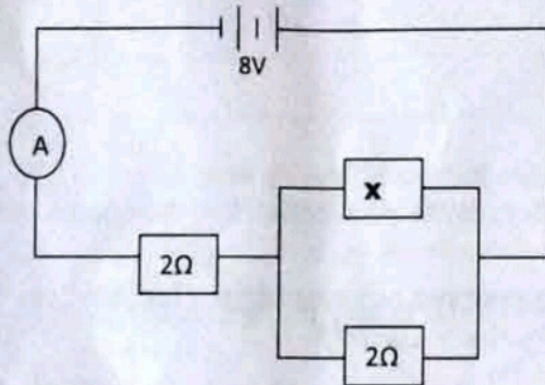
A16 The following diagram shows a Cathode Ray Oscilloscope (C.R.O) with a bright spot formed from an a.c. generator.



Which part of the C.R.O brings the movement observed?

- A** Y-plates
- B** X-plates
- C** Cathode
- D** Anode

A17 Study the circuit diagram shown.

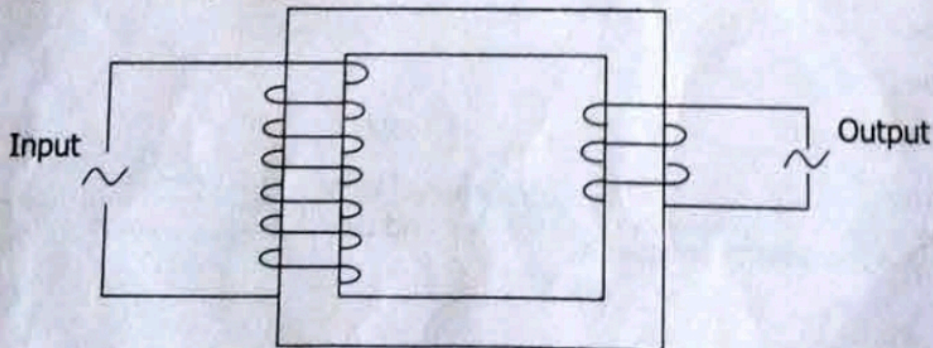


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Calculate the value of resistor **x** given that the ammeter reading is 2.5A.

- A** 1.2Ω
- B** 2.0Ω
- C** 2.2Ω
- D** 3.0Ω

A18 Study the following diagram.



What name is given to the electrical device shown in the diagram?

- A** Alternating current (a.c.) generator.
- B** Direct current (d.c) generator.
- C** Step down transformer.
- D** Step up transformer.

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- ✓ **A19** Which radiation is used to increase the shelf life of fruits and vegetables?
- A** Gamma
 - B** Infra-red
 - C** Rountgen
 - D** Ultraviolet
- ✓ **A20** Iodine is a radioactive substance with a half-life of 8 days. What fraction of iodine will remain after undergoing a series of disintegration for 32 days?
- A** $\frac{1}{8}$
 - B** $\frac{7}{8}$
 - C** $\frac{1}{16}$
 - D** $\frac{15}{16}$

SECTION B: [45 MARKS]

Answer **all** questions in this section. Write your answers in the spaces provided in this question paper.

- B1** A learner carried out an experiment and obtained the following results as shown. (where necessary take density of water = 1g/cm^3)
- Mass of an empty bottle = 8g
 - Mass of the bottle full of water = 20g
 - Mass of the bottle full of liquid **X** = 25g

(a) Name the instrument that can be used to obtain the results of mass.

..... [1]

(b) Calculate the volume of the bottle.

Volume: [2]

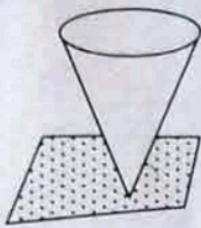
(c) Calculate the density of liquid **X**.

Density: [2]

[Total: 5 marks]

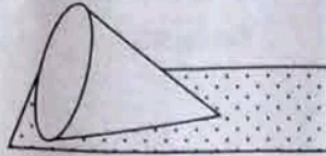
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B2 Figure B2.1 shows the same cone being placed in three different positions X, Y and Z on a flat surface.



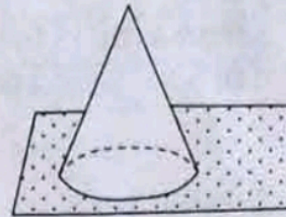
X

Tip of the cone resting on the surface



Y

Cone laying on the surface



Z

Base of the cone resting on the surface

Figure B2.1

(a) Define centre of mass.

.....
 [1]

(b) Identify the cone in a neutral equilibrium position.

..... [1]

(c) State **two** factors that affect stability of an object.

(i) [1]

(ii) [1]

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[Total: 4 marks]

B3 Figure B3.1 shows the direction of four forces acting on a car whose weight is 8 000N, as it travels in a horizontal straight line.

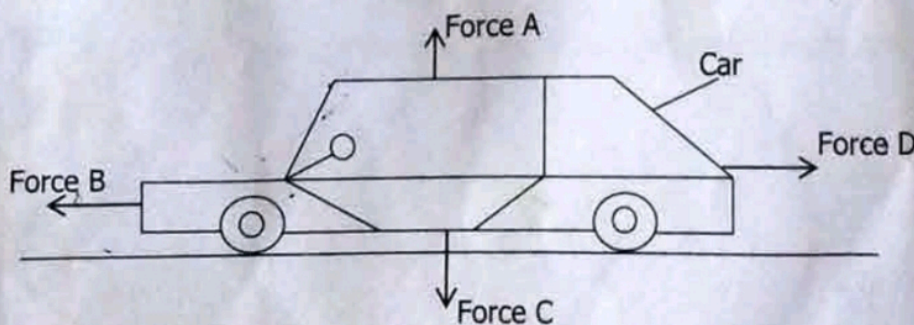


Figure B3.1

(a) Which **two** forces should be equal for the car to move at constant velocity?

..... [1]

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B4 Figure B4.1 shows a crane at a construction site raising a steel block of mass 100kg through a vertical height of 16m in 20 seconds.

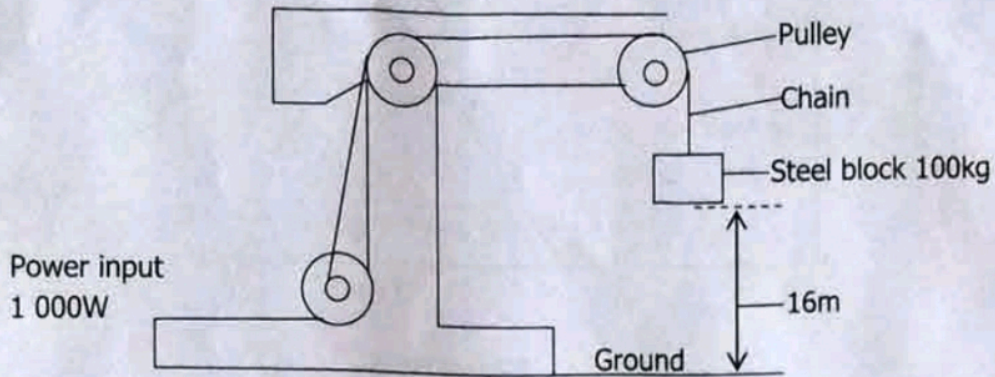


Figure B4.1

- (a) Calculate the
- (i) work done by the crane,

Work: [2] www.eczpastpapers.com

- (ii) power developed by the crane.

Power: [2]

- (b) Given that the power input to the motor is 1 000W, calculate the efficiency of the crane.

Efficiency: [2]

[Total: 6 marks]

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B6 Figure B6.1 shows a ray of light travelling from glass to air at an angle. The refractive index of glass is 1.52.

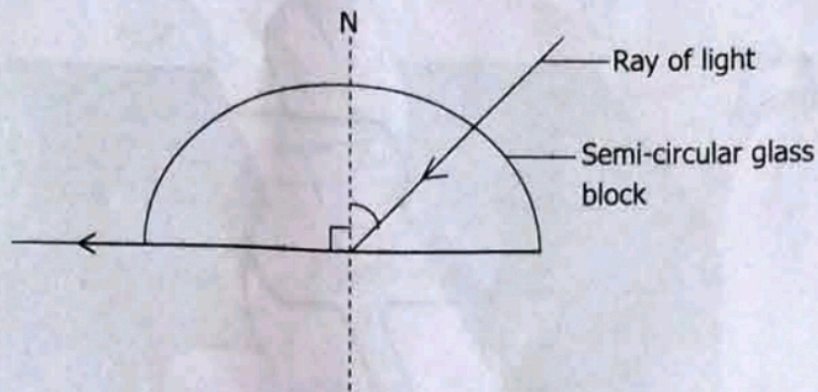


Figure B6.1

(a) Define critical angle.

.....
 [1]

(b) Calculate the critical angle in Figure B6.1.

Critical angle: [2]

(c) State **two** conditions for total internal reflection to occur.

(i) [1]

(ii) [1]

(d) Give **one** application or use for total internal reflection.

..... [1]

[Total: 6 marks]

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B7 Figure B7.1 shows an AC generator with its main components labeled **A** and **B**.

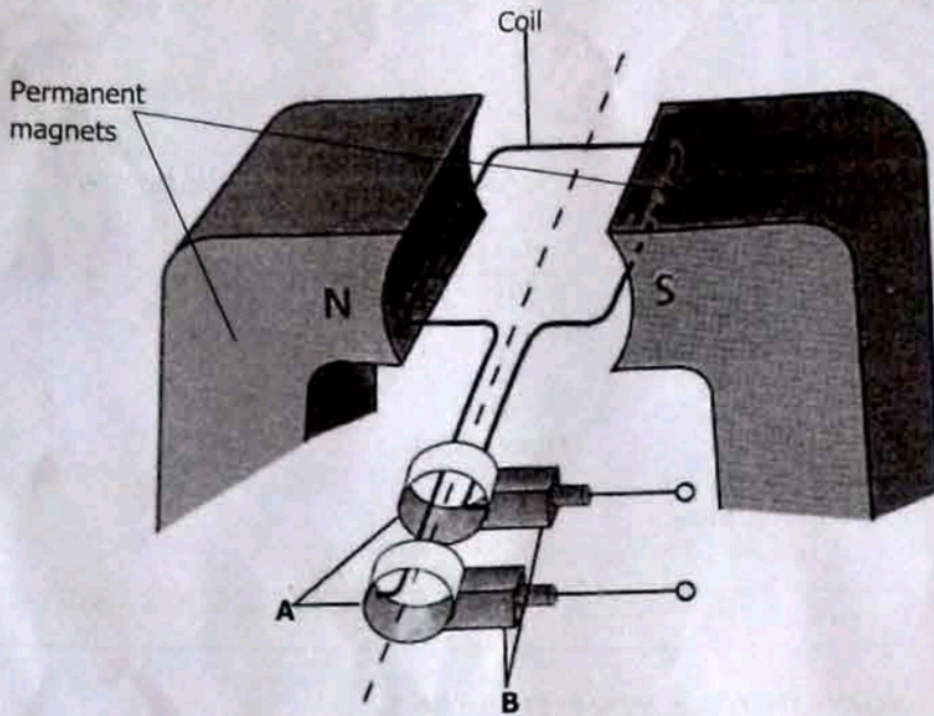


Figure B7.1

(a) Write down the names of the components **A** and **B**.

(i) **A** [1]

(ii) **B** [1]

✓ (b) State **three** factors that increase the magnitude of the electromotive force (e.m.f) produced by the generator.

(i) [1]

(ii) [1]

(iii) [1]

[Total: 5 marks]

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B8 Figure B8.1 shows an electric circuit with a 5Ω resistor **R** connected to a 12V supply.

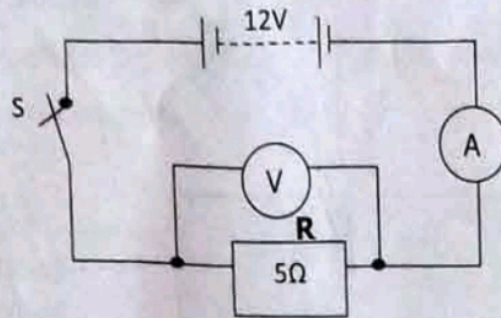


Figure B8.1

(a) State Ohm's Law.

.....
 [1]

(b) (i) Calculate the reading of the instruments labeled **A** and **V**.

A: [1]

V: [1]

(ii) What is the cost of using resistor **R** for 6 hours a day for 30 days if power costs 15n per kWh?

Cost: [3]

[Total: 6 marks]

B9 Figure B9.1 shows radiations P, Q and R passing through an electric field.

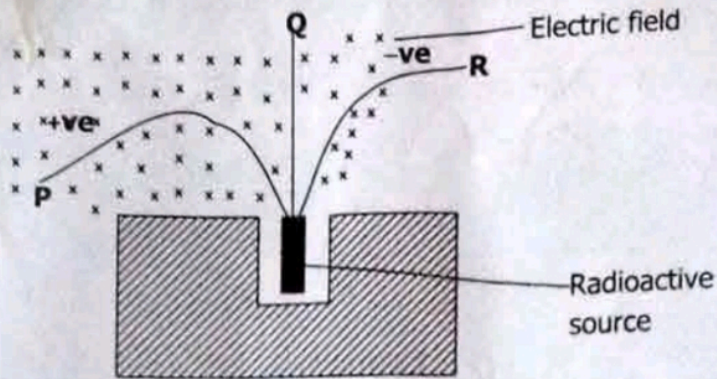


Figure B9.1

- (a) Identify the emission P and Q.
 - (i) P [1]
 - (ii) Q [1]
- (b) Give **one** use of emission Q.

..... [1]
- (c) Mention **two** differences between emissions P and R.
 - (i) [1]
 - (ii) [1]

[Total: 5 marks]

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SECTION C: [20 MARKS]

Answer any **two (2)** questions from this section in the separate Answer Booklet provided.

C1 Figure C1.1 shows a velocity-time graph of a car of mass 1 200kg.

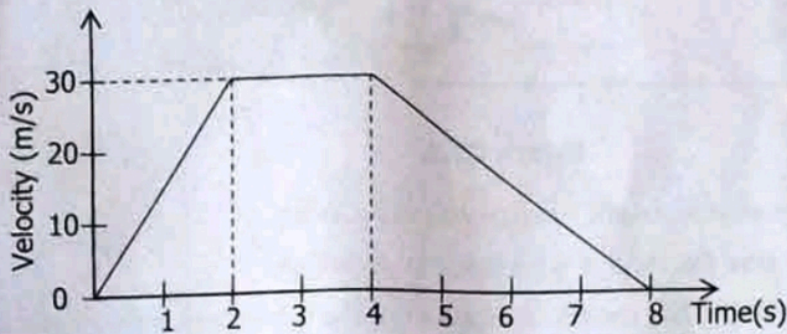


Figure C1.1

- (a) Calculate the acceleration of the car in the first 2 seconds. [2]
- (b) Explain why the acceleration is 0 m/s² between 2s and 4s. [1]
- (c) Calculate the displacement of the car while its velocity was increasing. [2]
- (d) Calculate the resultant force on this car during its acceleration. [2]
- (e) Distinguish between speed and velocity. [1]
- (f) Calculate the displacement of the car for the whole journey. [2]

[Total: 10 marks]

C2 Table C2.1 shows data collected from an experiment to determine the resistance of a conductor.

Voltage (V)	0	4	10	16	26	42	80
Current (A)	0	2	4	6	8	10	12

Table C2.1

- (a) Plot a graph of voltage (V) against current (A). [4]
- (b) Use the graph to estimate the resistance when the current is 5A. [2]
- (c) (i) Does the conductor obey Ohm's Law? [1]
(ii) Justify your answer in C (i). [1]
- (d) What term is used to describe such type of conductor? [1]
- (e) Give an example of a conductor that behaves like this. [1]

[Total: 10 marks]

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C3 **Figure C3.1** shows an apparatus used by a Grade 12 learner to detect radioactive emissions. Background radiation was among the emissions detected.

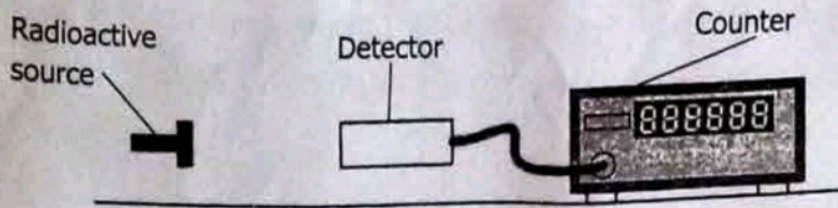


Figure C3.1

- (a) (i) State what is meant by background radiation. [1]
- (ii) Give **one** example of a background radiation. [1]
- (b) **Table C3.2** shows the results obtained from the experiment after taking account of background radiation.

Count Rate (counts/minute)	200	100	50	25	12.5
Time (minutes)	0	30	60	90	120

Table C3.2

- (i) Plot a graph of count rate (count/minute) against time (minutes). [4]
- (ii) From the graph, determine the half-life. [2]
- (iii) What fraction will have decayed at 120 minutes? [1]
- (c) A nucleus of uranium-235 [${}^{235}_{92}\text{U}$] emits one alpha particle to form thorium (Th). Write an equation for this decay. [1]

[Total: 10 marks]