

Centre Number				Examination Number									



5124/1

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Science

Paper 1

2020

Additional materials

- Electronic calculator (non programmable)
- Graph paper
- Soft clean eraser
- Soft pencil (type B or HB is recommended)

Time: 2 hours

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 (3)** sections in this paper.

(i) Section A

There are **twenty (20)** questions in this section. Answer all questions. For each question, there are four possible answers, **A, B, C** and **D**. Choose the one you consider correct and record your choice by marking it with a cross (X) on the **answer grid provided** on the question paper.

(ii) Section B

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

(iii) Section C

Answer any **two** questions. Write your answers on a separate **Answer Booklet/Paper provided**.

Candidate's Use		Examiner's Use
Section A		
Section B		
Section C	1	
	2	
	3	
Total		

Information for candidates

- Any rough working should be done in this question paper.
- At the end of the examination:**
 - Fasten the separate answer booklet/papers used securely to the question paper.
 - Circle the numbers of the section **C** questions you have answered in the grid below.
- Cell phones are not allowed in the examination room.**

Centre Number				Examination Number									

ANSWER GRID FOR SECTION A

Put a cross (X) on the letter indicating your choice of answer.

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
----	---	---	---	---

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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Centre Number	Examination Number

SECTION A

Answer **all** the questions on the answer grid provided.

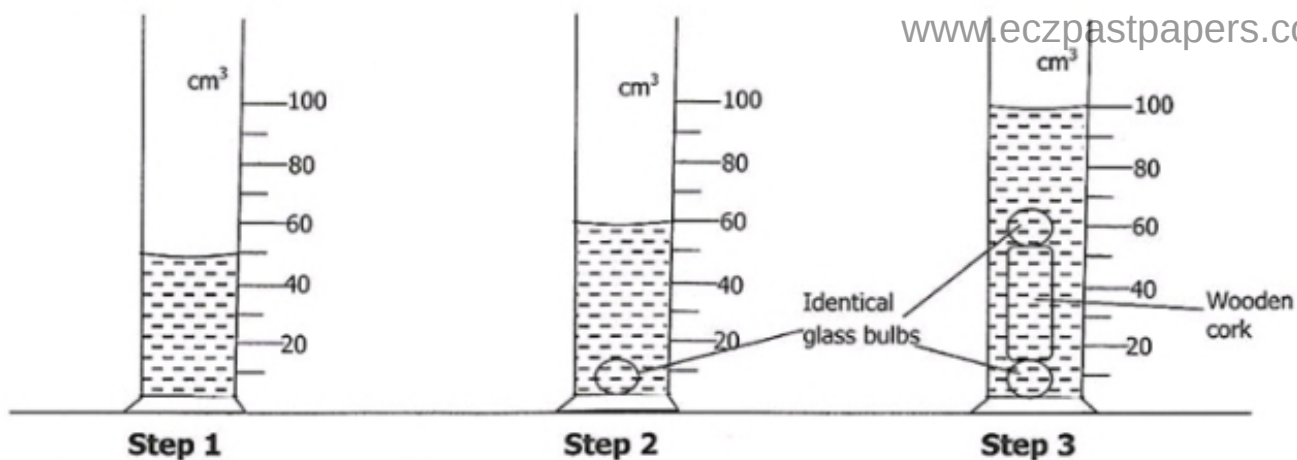
A1 How many significant figures are in 2.0800?

- A** 2
- B** 3
- C** 4
- D** 5

A2 Which of the following contains base physical quantities only?

- A** Length in kilometres, mass in tonnes
- B** Length in metres, mass in tonnes
- C** Length in kilometres, mass in kilograms
- D** Length in metres, mass in kilograms

A3 The following diagrams show steps that a learner carried out in order to determine the volume of a wooden cork.

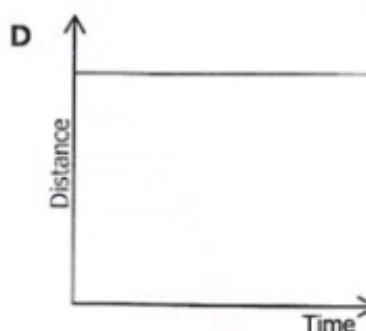
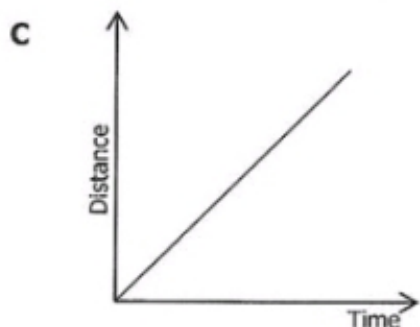
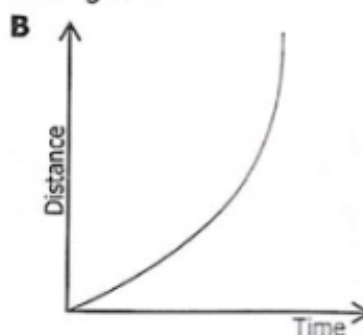
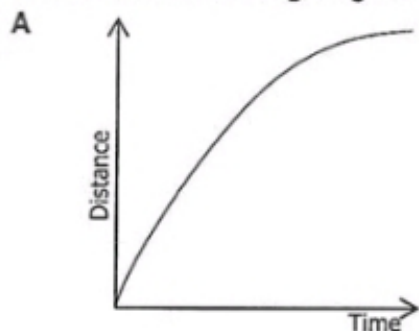


Which one is the volume of the wooden cork?

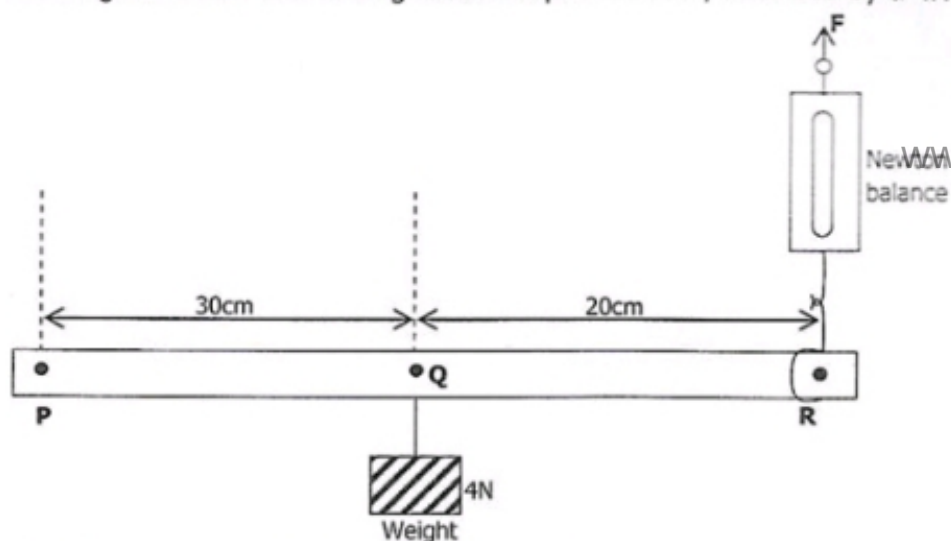
- A** 30cm³
- B** 40cm³
- C** 50cm³
- D** 100cm³

Centre Number				Examination Number									

A4 Which of the following diagrams show an accelerating car?



A5 The diagram below shows a light bar **PR** pivoted at **P**, balanced by a 4N weight and force **F**.



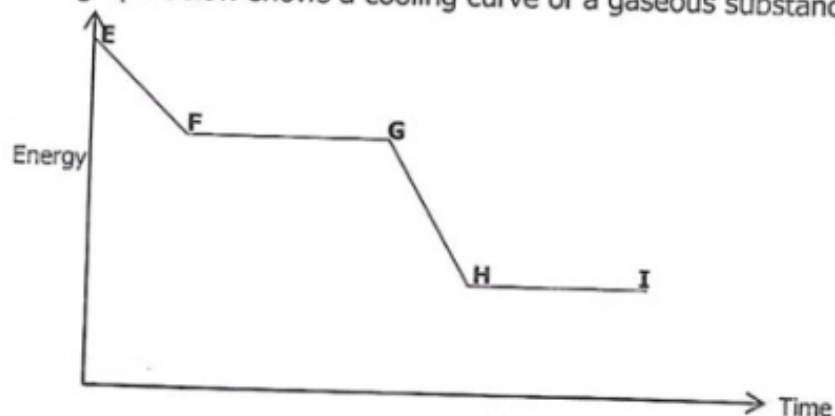
What is the reading on the Newton balance?

- A 2.0N
- B 2.4N
- C 3.0N
- D 6.0N

A6 A car is travelling on a level road. Suddenly the driver of the car sees a cow crossing the road and decides to apply brakes. What are the energy changes as the car slows down?

- A Chemical to kinetic and sound
- B Heat to kinetic and sound
- C Kinetic to chemical and sound
- D Kinetic to heat and sound

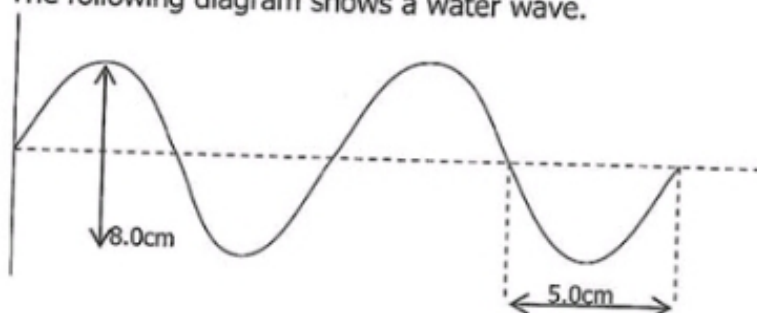
A7 The graph below shows a cooling curve of a gaseous substance.



In which state(s) of matter will the substance be between point F and G?

- A** Gas only
- B** Liquid only
- C** Gas and liquid
- D** Solid and liquid

A8 The following diagram shows a water wave.

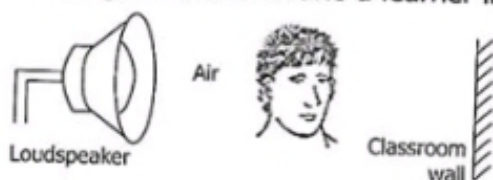


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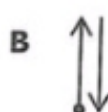
Which row gives the correct values for the wave amplitude and wavelength?

	Amplitude/cm	Wavelength/cm
A	4.0	10
B	4.0	5.0
C	8.0	5.0
D	8.0	10

A9 The diagram below shows a learner in front of a loudspeaker that produces sound.

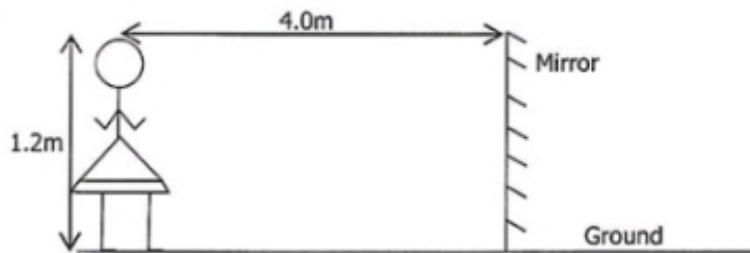


Which of the following diagrams best shows how the gaseous air molecules between the learner and the loudspeaker will move?



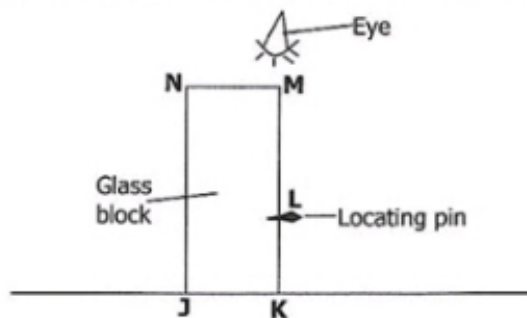
Centre Number				Examination Number									

- A10** A girl of height 1.2 metres stands 4.0 metres in front of a plane mirror as shown in the following diagram:



How far is the girl away from her image?

- A** 1.2m
B 2.4m
C 4.0m
D 8.0m
- A11** A line JK drawn on a piece of plain paper on which a glass block is placed was viewed through the top and its image was located using a pin as shown in the following diagram.

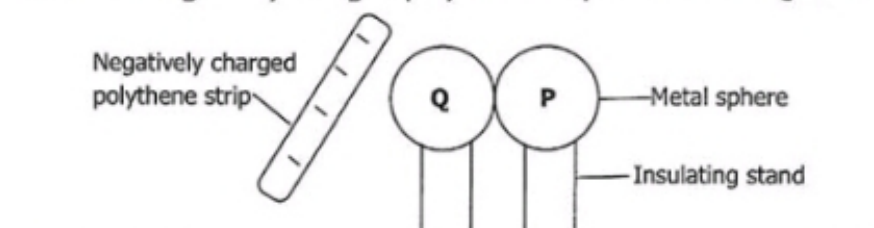


If $KL = 1.8\text{cm}$ and $KM = 4.8\text{cm}$, what is the refractive index of the glass?

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- A** 0.63
B 1.50
C 1.60
D 2.66
- A12** Which of the following materials would be most suitable for constructing the core of an electromagnet?
- A** Carbon
B Copper
C Iron
D Steel

- A13** Two uncharged metal spheres Q and P are placed on insulating stands and are separated while the negatively charged polythene strip is held near Q as shown in the diagram.

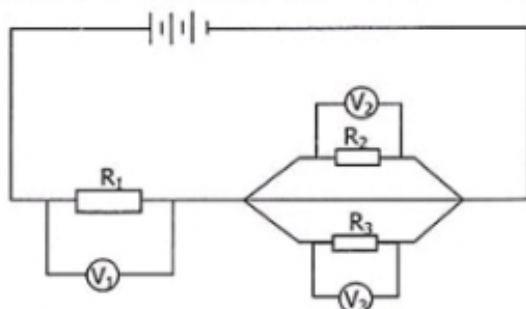


Centre Number	Examination Number

What would be the charges on **Q** and **P**?

	Q	P
A	+	+
B	+	-
C	-	+
D	-	-

- A14** The following diagram shows a network of 3 resistors R_1 , R_2 and R_3 connected to a battery. Voltmeters V_1 , V_2 and V_3 are connected to R_1 , R_2 and R_3 respectively.

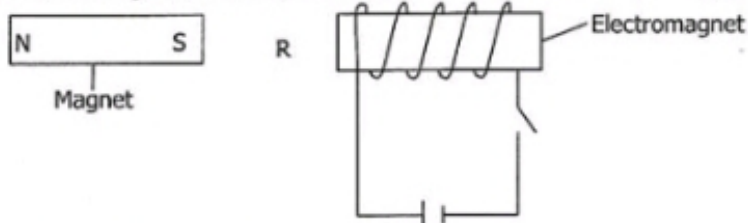


Which of the following expressions show the potential difference (p.d.) supplied by the battery?

- A** $V_1 + V_3$
B $V_2 + V_3$
C $V_1 + V_2 + V_3$
D $V_1 - (V_2 + V_3)$
- A15** An electric kettle is rated '230V, 3 000W'. What is the suitable fuse to use on this kettle?
- A** 2A
B 5A
C 10A
D 15A

- A16** Below are 3 statements on electromagnetism.

1. An electromagnet consists of a coil of wire wound on a soft iron core.
2. The strength of the magnetic field produced by an electromagnet increases if the strength of the current and/or number of turns of wire is increased.
3. In the diagram below, when the switch is closed, the gap, **R**, increases.

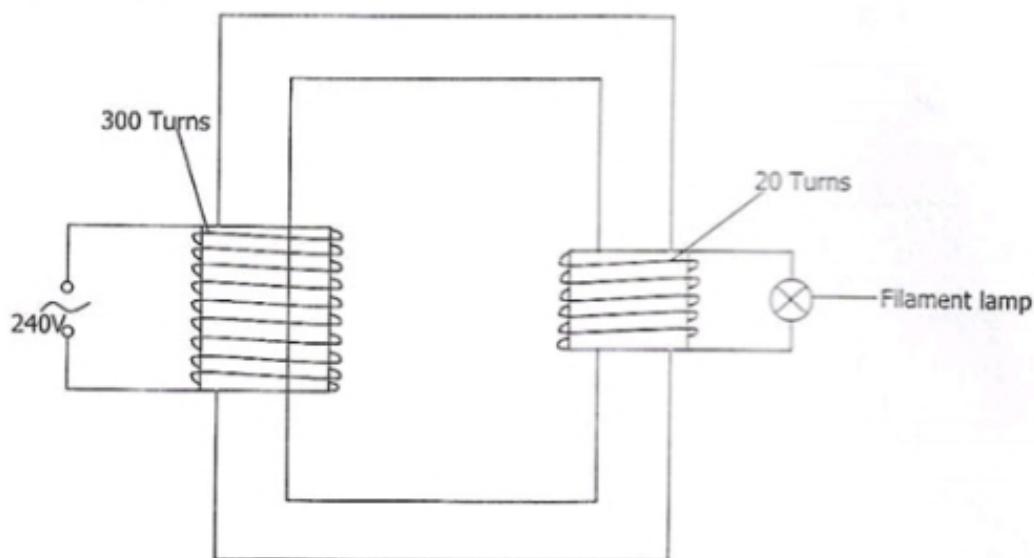


Which of the above statements are true?

- A** 1 and 2
B 2 and 3
C 1 and 3
D 1, 2 and 3

Centre Number				Examination Number									

- A17** The diagram below shows a filament lamp rated 6.0V connected to the output of a transformer.



What happens to the lamp when the circuit is switched on?

- A** Lights dimly
 - B** Does not light at all
 - C** Lights at normal brightness
 - D** Lights up brightly and then blows off
- A18** Which component used in electronic circuits allows current to flow through in one direction only?
- A** Diode
 - B** Resistor
 - C** Thermistor
 - D** Transformer
- A19** An atom of uranium-235 has 92 electrons. How many protons are there in one atom of uranium-235?
- A** 92
 - B** 143
 - C** 235
 - D** 327
- A20** A radioactive material gives a count rate of 8 000 counts per minute. After 20 days it gives a count rate of 500 counts per minute. What is the half-life of the material?
- A** 4 days
 - B** 5 days
 - C** 20 days
 - D** 50 days

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Centre Number	Examination Number

Section B [45 marks]

Answer **all** questions in this section.

Write your answers in the spaces provided on the question paper.

B1 Figure B1.1 below shows a simple pendulum suspended from a fixed point.

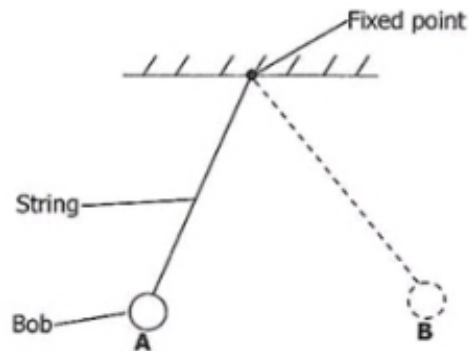


Figure B1.1

The bob is slightly pulled to position **A** and then released.

(a) State **one** factor that does **not** affect the period of the pendulum.

..... [1]

(b) If the values of time for 20 oscillations obtained were

16.1s, 15.9s, 16.0s, 16.2s and 15.8s, calculate the period of the pendulum.

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Period of pendulum = [3]

(c) Calculate the frequency of the pendulum.

Frequency = [2]

[Total: 6 marks]

Centre Number				Examination Number									

B2 A car has a mass of 900kg. It accelerates from rest at a rate of 1.2m/s^2 .

Calculate the

(i) time taken to reach a velocity of 30m/s ,

Time = [2]

(ii) force required to accelerate the car at a rate of 1.2m/s^2 .

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Force = [2]

[Total: 4 marks]

Centre Number	Examination Number

B3 Figure B3.1 below is a diagram showing a load being moved using a wheelbarrow.

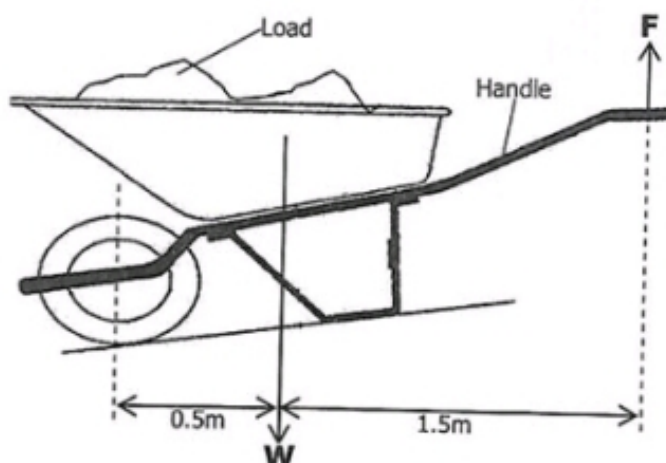


Figure B3.1

The total mass of the wheelbarrow and the load is 80kg. (Take $g = 10\text{N/kg}$)

(a) Calculate the

(i) weight of the wheelbarrow and the load,

Weight = [2]

(ii) force, F , required to lift the wheelbarrow.

Force = [2]

(b) State whether force, F , would increase or reduce when the handles of the wheelbarrow are made longer.

..... [1]

[Total: 5 marks]

Centre Number				Examination Number											

- B4** Figure B4.1 below is a diagram showing a stone of mass 2kg that was pushed up a slope from **Q** to **R**.

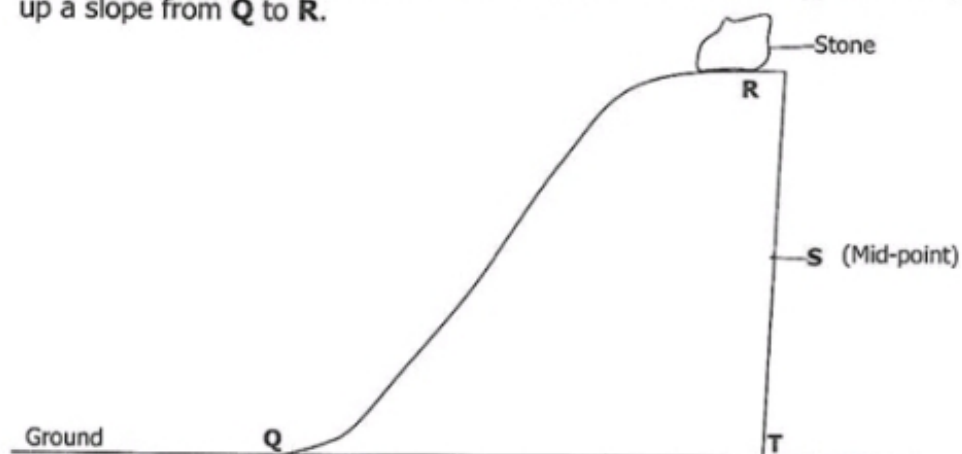


Figure B4.1

72 joules of work was done in moving the stone up the slope from **Q** to **R**.

- (a) What is the potential energy of the stone at **R**?

..... [1]

- (b) If the stone falls through side **RT**, what would its potential energy be at **S**, the mid-point of its fall?

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Potential energy = [1]

- (c) Calculate the
(i) height **TR**,

Height = [2]

- (ii) velocity of the stone just before it strikes the ground.

Velocity = [2]

[Total: 6 marks]

Centre Number	Examination Number

- B5** Figure B5.1 below is a diagram showing a wave travelling along a spring in the direction shown.

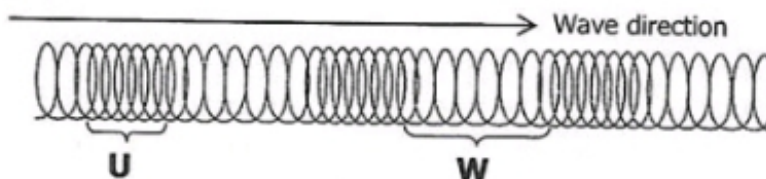


Figure B5.1

- (a) In what way is this wave the same as a sound wave?
.....
..... [1]
- (b) What are regions **U** and **W** called?
(i) **U** [1]
(ii) **W** [1]
- (c) Explain why sound waves travel faster in liquids than in gases.
.....
.....
..... [2]

[Total: 5 marks]

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- B6** A ray of light travels from air into water at an angle of 40° between the normal and the incident ray.

If this ray produces an angle of refraction of 29° , calculate

- (i) the refractive index of water,

Refractive index = [2]

- (ii) the critical angle of water.

Critical angle = [2]

[Total: 4 marks]

Centre Number				Examination Number									

- B7** Figure B7.1 is a diagram showing a 240V mains supply connected to a television set and two lamps.

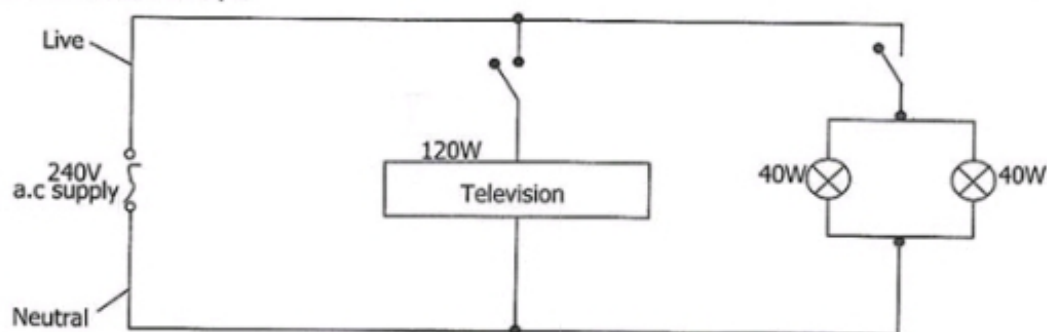


Figure B7.1

The power supplied to each lamp and television is 40W and 120W respectively, when the switches are closed.

- (a) Calculate the
- (i) total power supplied,

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Power = [2]

- (ii) total number of kilowatt hours (kWh) of energy supplied to the circuit in 3.0 hours,

Energy = [2]

- (iii) p.d. across the television set.

P.d = [2]

[Total: 6 marks]

Centre Number	Examination Number

- B8** Figure B8.1 is a diagram showing a coil of wire wound on a soft iron core, with current flowing in the direction indicated by the arrows.

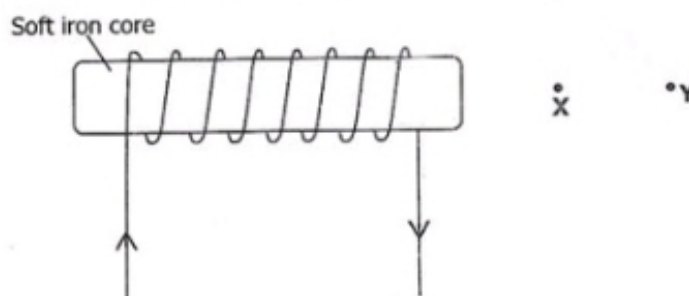


Figure B8.1

- Mark the **N** and **S** poles induced on the iron core. [1]
- Show by an arrow the direction in which a plotting compass needle would point when placed at point **X**. [1]
- A beam of electrons flows through point **Y** in a direction perpendicularly downwards into the paper. Show clearly using an arrow labelled **F**, the direction of the force exerted by the magnetic field on the electron beam. [1]

[Total: 3 marks]

- B9** Phosphorus-32 (P-32) can decay by emitting beta particles.

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- What is a beta particle?
..... [1]
- If the proton number of phosphorus-32 is 15,
 - state the new values of proton and mass numbers of the nuclide just after it emits a beta particle,
Proton Number: [1]
Mass Number: [1]
 - write the decay equation for P-32 after emitting two beta particles.
..... [2]
- Phosphorus-32 can be used to prove that plants absorb phosphorus nutrient from the soil around them. State **one** safety precaution which should be taken into consideration when doing experiments with phosphorus-32.
..... [1]
.....

[Total: 6 marks]

Centre Number				Examination Number							

SECTION C [20 marks]

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

- C1** Figure C1.1 below is a velocity time graph representing motion of a motor cycle travelling along a straight road.

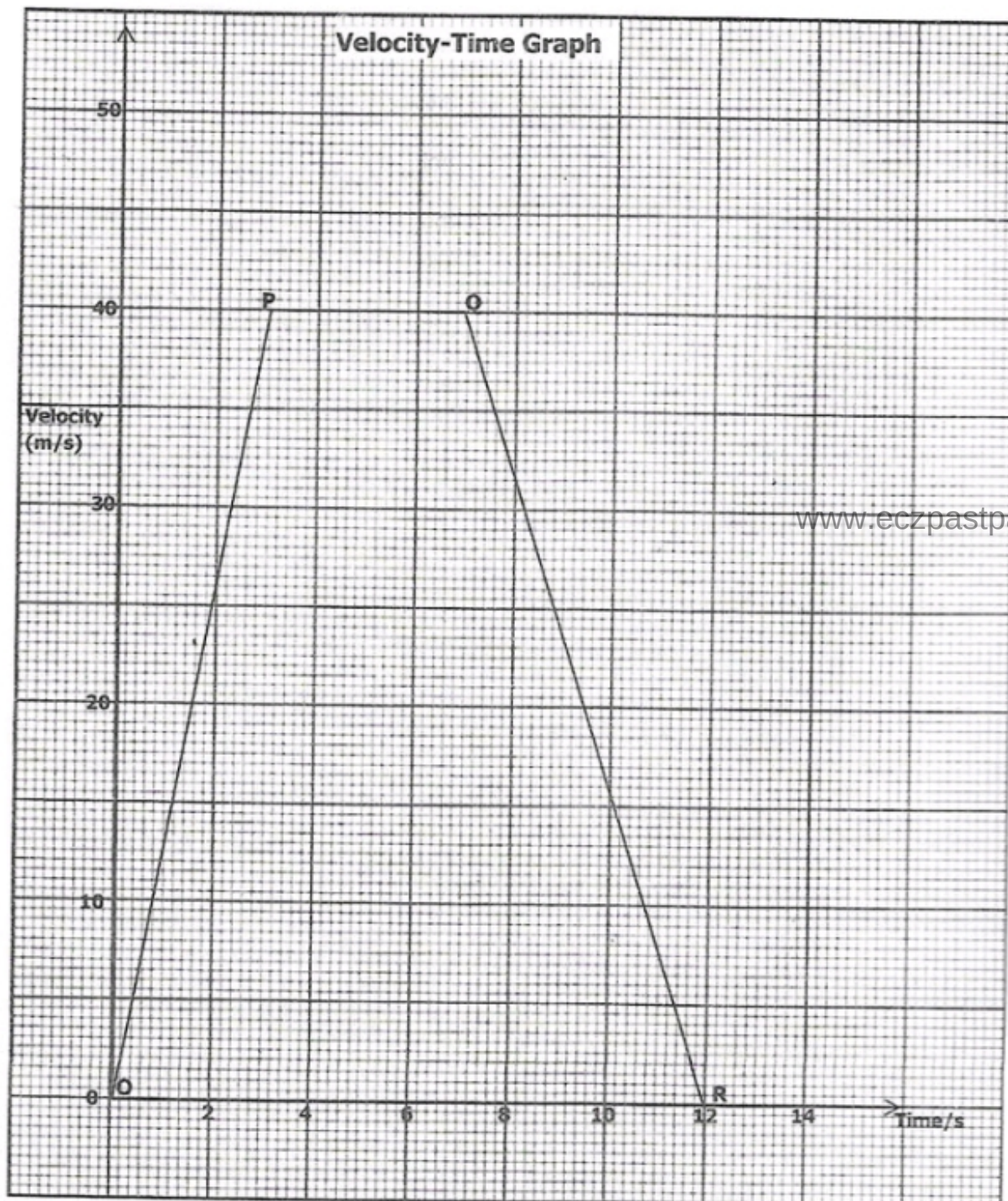


Figure C1.1

Centre Number	Examination Number									

- (a) Describe the motion of the motor cycle between the points
- (i) O and P, [3]
- (ii) P and Q, [1]
- (iii) Q and R. [1]
- (b) What is the maximum speed of the motor cycle? [3]
- (c) How long did it take the motor cycle to retard to rest? [2]
- (d) Calculate the total distance travelled by the motor cycle. [2]
- (e) Calculate the average velocity for the whole motion. [2]

[Total: 10 Marks]

C2 A learner carried out a Hooke's Law experiment and obtained the following results:

Table C2.1

Mass/kg	0	0.02	0.04	0.06	0.08	0.10
Length of loaded spring/cm	11	12.1	13.2	14.3	15.4	16.5
Applied force/N						
Extension/mm						

- (a) Copy and complete **table C2.1** by finding values of applied force (N) and extension (mm) produced. [2]
- (b) Plot a graph of applied force (N) against extension (mm). [4]
- (c) From the graph determine the spring constant. [2]
- (d) (i) Did the spring reach its elastic limit? [1]
- (ii) Explain your answer in (d)(i) above. [1]

[Total: 10 Marks]

Centre Number				Examination Number									

C3 Figure C3.1 is a chart showing some components of the electromagnetic spectrum.

			Blue	Green			Microwaves	
--	--	--	------	-------	--	--	------------	--

Figure C3.1

- (a) (i) Use the list below to copy and complete the electromagnetic spectrum chart.
Radio waves, x-rays, ultraviolet, gamma rays, infra-red and red light [2]
- (ii) State **two** properties common to all members of the electromagnetic spectrum. [2]
- (b) Name a component of the spectrum that
- (i) has the longest wavelength,
- (ii) is emitted by hot bodies. [2]
- (c) Microwaves have a frequency of 10^{10} Hz and velocity of 3×10^8 m/s.
- (i) Calculate the wavelength of microwaves. [2]
- (ii) State **two** practical uses of microwaves. [2]

www.ezpastpapers.com [Total 10 Marks]