

Surname

Forename(s)

Centre Number

Candidate Number



For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

PHYSICS

PAPER 2 Theory

5055/2

NOVEMBER 2016 SESSION

1 hour 45 minutes

Candidates answer on the question paper.

Additional materials: Electronic calculator and/or Mathematical tables

Allow candidates 5 minutes to count pages before the examination

This booklet should not be punched or stapled and pages should not be removed.

TIME 1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and Centre number and candidate number on top of the right corner of every page of this paper. Check if the booklet has all the pages and ask the invigilator for a replacement if there are duplicate or missing pages.

Section A

Answer **all** questions.

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

Section B

Answer any **two** questions.

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

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question paper.

Candidates are reminded that **all** quantitative answers should include appropriate units.

Candidates are advised to show **all** working.

This question paper consists of 18 printed pages.

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Section A

Answer all questions in this section.

- 1 **Fig. 1.1** represents the motion of cyclists, **P** and **Q**, travelling along a straight path in the same direction.

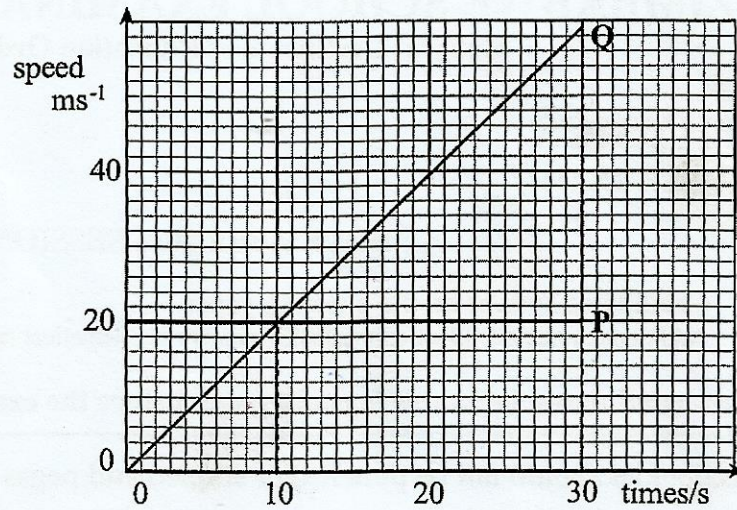


Fig. 1.1

- (a) Calculate
- (i) the distance travelled by **P** in the first 10 s,

distance = _____ [1]

- (ii) the acceleration of **Q**,

acceleration = _____ [1]

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3

- 1 (a) (iii) the distance covered by Q in the first 10 s.

distance = _____ [1]

- (b) Q catches up with P when the cyclists would have travelled the same distance from $t = 0$.

Calculate the

- (i) speed of Q at the time of overtaking P,

speed = _____ [2]

- (ii) time at which Q overtakes P,

time = _____ [1]

- (iii) distance covered by each cyclist at this time.

distance = _____ [1]

4

2 The sun produces energy from a nuclear fusion reaction.

(a) Explain what is meant by *nuclear fusion*.

[2]

(b) State Einstein's mass-energy equivalence formula and define each symbol in it.

[2]

(c) Determine the decrease in the mass of the sun when it releases 1.8×10^6 J.

mass decrease = _____

[2]

3 Explain the following observations:

(i) the pressure inside a ball increases as air is pumped into it

[2]

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5

- 3 (ii) the pressure in a ball decreases when the ball is left outside overnight

[2]

- 4 Refraction of light occurs when it passes from one medium to another.

- (a) (i) Explain the term *refraction*.

[1]

- (ii) State the condition in which light would pass through a boundary unrefracted?

[1]

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6

- 4 (b) Fig. 4.1 shows wave fronts of light incident on a water-glass boundary.

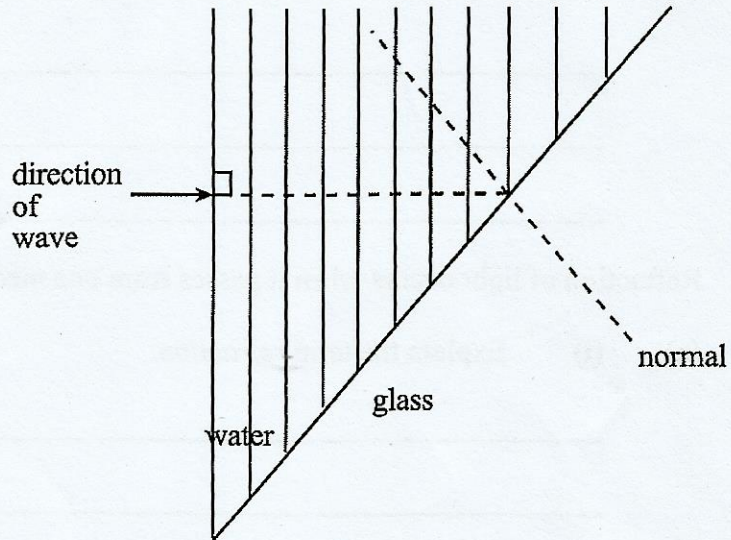


Fig. 4.1

Complete the diagram to show the wave fronts and the direction of travel in the glass block. [3]

- 5 (a) A light bulb is labelled 240 V; 60 W.

Calculate the

- (i) current that flows through the bulb when it is on,

$$\text{current} = \underline{\hspace{2cm}} \quad [1]$$

- (ii) charge that flows through the bulb in one minute,

$$\text{charge} = \underline{\hspace{2cm}} \quad [2]$$

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7

- 5 (a) (iii) resistance of the bulb.

resistance = _____ [1]

- (b) Three bulbs similar to those in (a) are then connected as shown in Fig. 5.1.

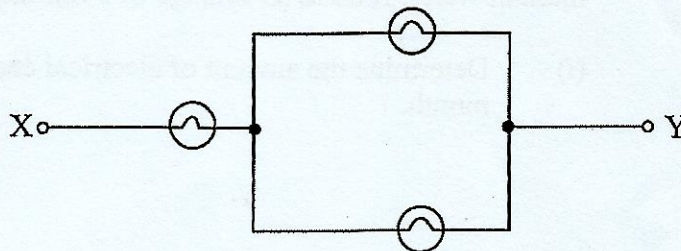


Fig. 5.1

Calculate the resistance between points X and Y.

resistance = _____ [2]

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8

6 (a) State

(i) any **three** effects of electricity,

1. _____

2. _____

3. _____ [3]

(ii) the commercial unit of electrical energy.

_____ [1]

(b) A 2 000 W electric kettle was used three times daily to boil a fixed mass of water. It takes an average of 5 minutes to boil the water.

(i) Determine the amount of electrical energy used in a 30 day month.

 $amount =$ _____ [2]

(ii) Calculate the cost of using the kettle per month if the cost per unit is 10 c.

 $cost =$ _____ [1]

- 7 Fig. 7.1 shows a current-voltage graph for an electronic device.

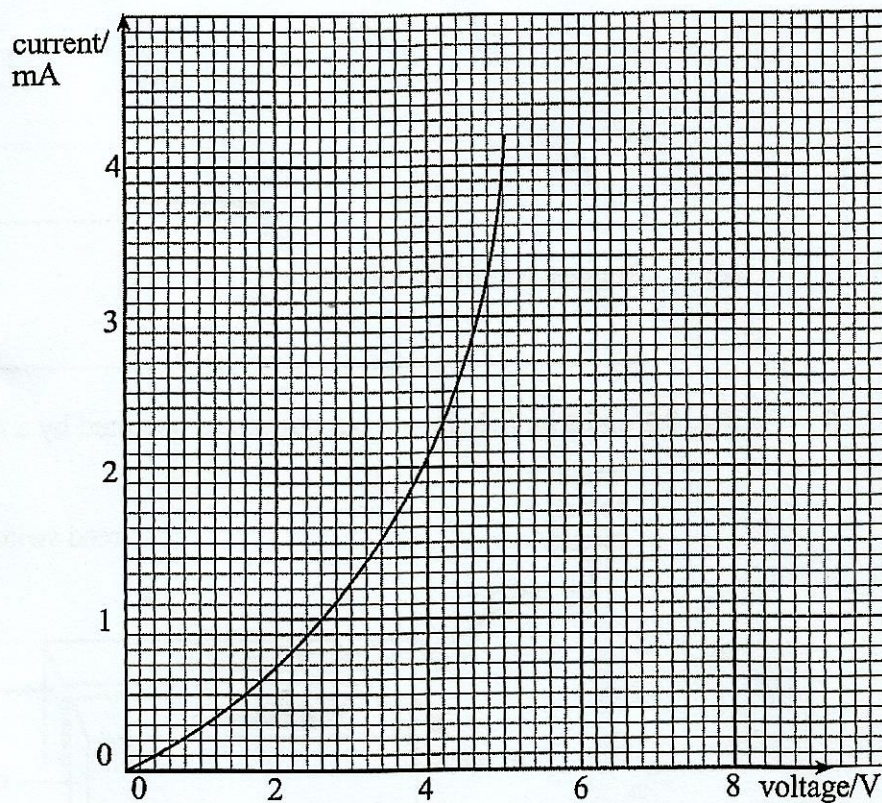


Fig. 7.1

- (a) Comment on the resistance of the device.

[1]

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10

- 7 (b) Calculate the resistance of the device when the voltage is 4.8 V.

resistance _____ [2]

- (c) Suggest a suitable identity of this device.

_____ [1]

- 8 Fig. 8.1 and Fig. 8.2 show a burglar alarm operated by a reed switch.

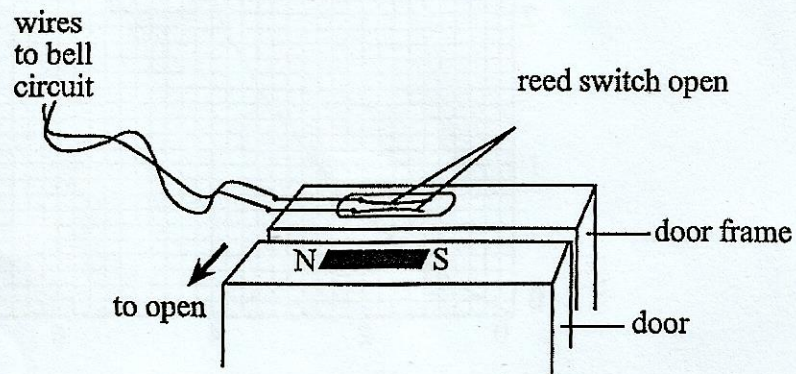


Fig. 8.1

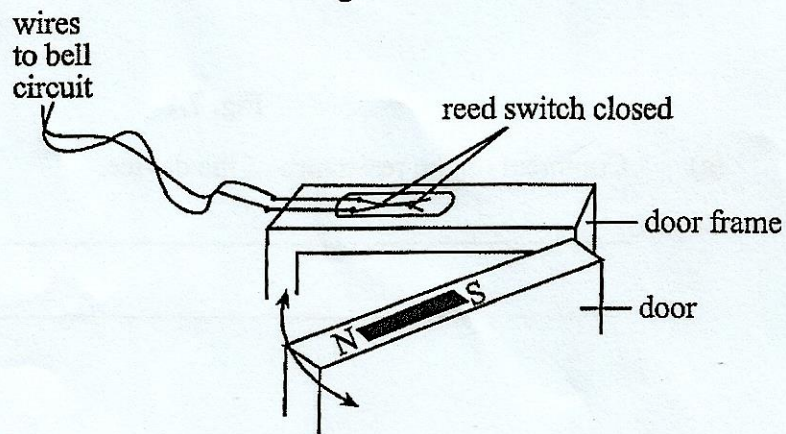


Fig. 8.2

- (a) Name the material used to make reeds.

_____ [1]

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11

8 (b) Explain

(i) why the reed switch contacts are open in Fig. 8.1.

[2]

(ii) how, by opening the door, the burglar alarm is activated.

[3]

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Section B*Answer any two questions from this section.*

- 9 (a) (i) Draw a ray diagram to illustrate the formation of a virtual image of an object by a thin converging lens. Mark optical centre, C, and the principal focus, F, of the lens.

[3]

- (ii) Name, with a reason, an instrument that makes use of such an arrangement.

[2]

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- 9 (b) Describe an experiment to determine the speed of sound in air.

[5]

- (c) A fishing boat using sonar to detect a shoal of fish emits a short pulse of sound and detects the echo from the shoal 0.1 s later. The sound travels through sea water at $1\,500\text{ ms}^{-1}$.

- (i) Calculate the depth of the shoal of fish.

depth = _____ [2]

- (ii) Suggest a reason why several echoes are detected.

[1]

- (iii) State **two** changes that would be observed when the sonar emits sound of lower amplitude and higher frequency.

[2]

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15

- 10 (b) (ii) Sketch a decay curve for a sample of the radium isotope, with N atoms, over a period of 60 days.

[3]

- (iii) State the fraction of N left at the end of the 60 days.

fraction = _____ [1]

- (c) State **two** reasons why iodine-131, a beta-emitter with a half life of 2 hours, is used for medical purposes.

[2]

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16

- 11 (a) (i) In an experiment to investigate the behaviour of a spring under a force, the following measurements were obtained.

mass hung from spring (g)	0	100	200	300	400	500	600	700	800
stretching force (N)									
length of spring (mm)	60	72	84	96	108	120	132	150	180
extension (mm)									

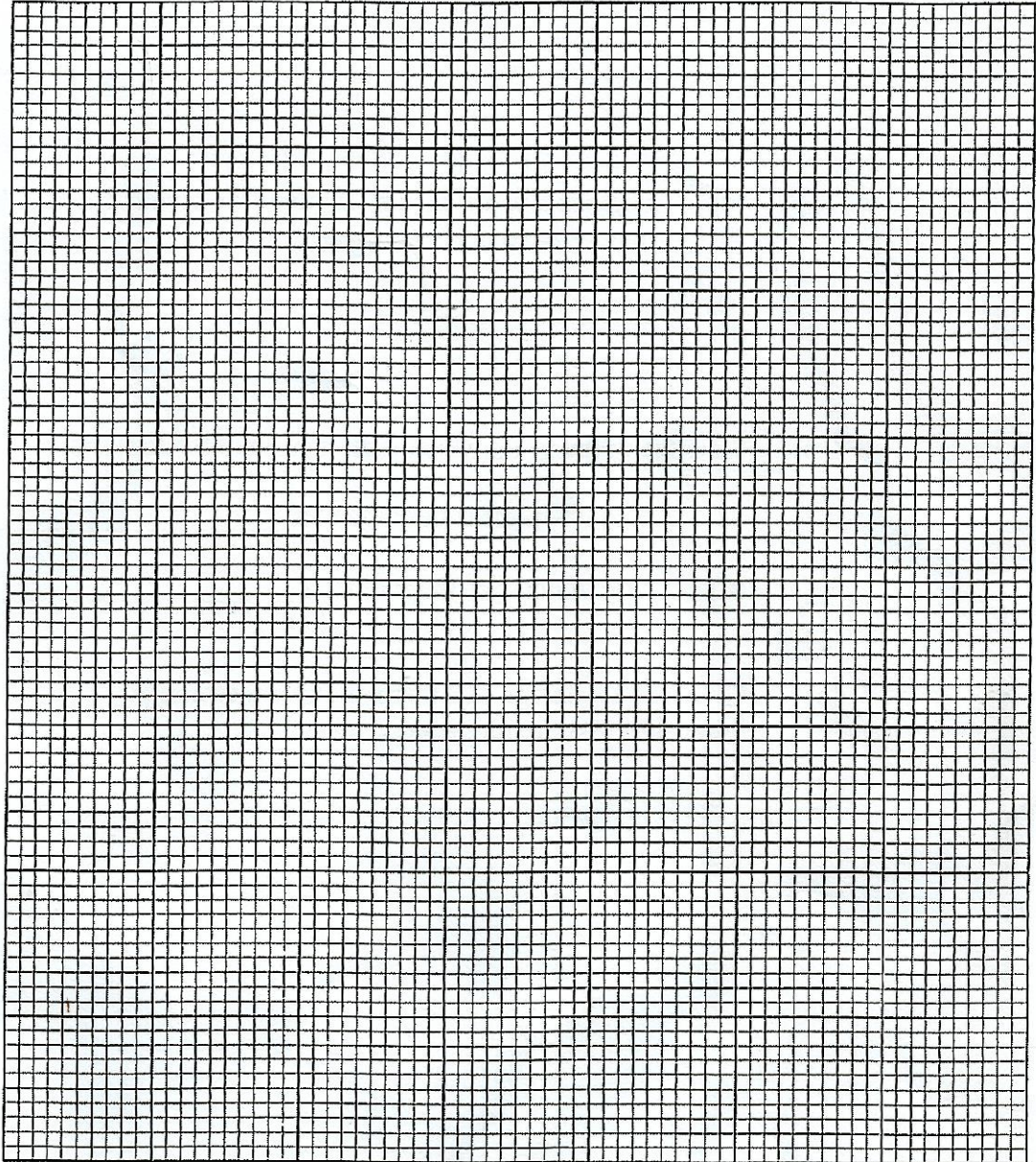
Complete the table.

[4]

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- 11 (a) (ii) Plot a graph of stretching force against extension.



[4]

- (iii) Indicate, with a letter E on the graph, the limit of proportionality.

[1]

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18

- 11 (a) (iv) Deduce the relation between stretching force and extension of the string.

_____ [2]

- (v) Suggest a value for the length of the spring after all the masses have been removed.

_____ [1]

- (b) State the property on which each thermometer depends.

(i) a liquid-in-glass thermometer _____

(ii) a thermocouple thermometer _____

[2]

- (c) Give **one** advantage of a thermocouple thermometer over a liquid-in-glass thermometer.

_____ [1]