Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2014

Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

GSD61

THURSDAY 12 JUNE 2014, MORNING

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

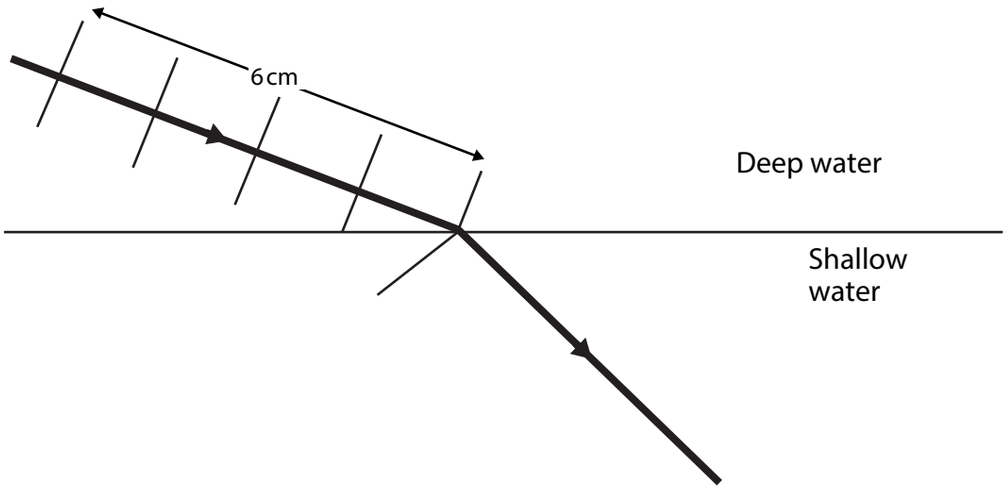
INFORMATION FOR CANDIDATES

The total mark for this paper is 90.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **4(c)(ii)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Only	
Marks	Remark

1 The following diagram (not to scale) shows water waves travelling through deep water.



(a) (i) Use the diagram to find the wavelength of the waves in deep water.
Remember the diagram is not to scale.

Wavelength = _____ cm [1]

(ii) 10 waves are produced every 5 seconds. What is the frequency of the waves?
Remember to include the correct unit.

Frequency = _____ [2]

(iii) Use your answers to parts **(a)(i)** and **(a)(ii)** to calculate the speed of waves in deep water in cm/s.
You are advised to show your working out.

Speed = _____ cm/s [3]

(b) The direction of the waves is shown in deep and in shallow water.

(i) Draw two wavefronts in the shallow water. [3]

(ii) What, if anything, happens to the speed and frequency of the waves as they enter **shallow** water?

Speed _____

Frequency _____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 Ultrasound waves have frequencies which are too high to be detected by the human ear.

(a) What type of waves are sound and ultrasound waves?

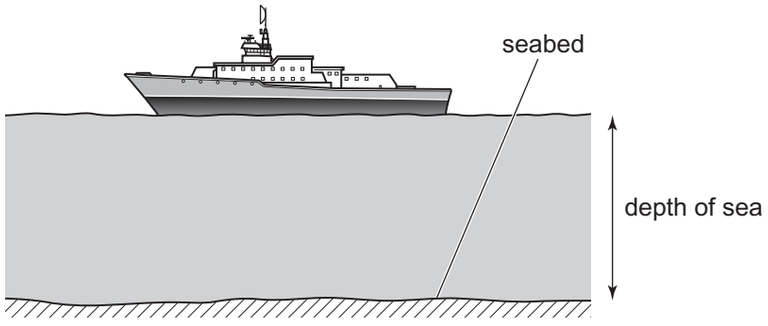
_____ [1]

(b) Describe a medical application of ultrasound waves.

_____

_____ [2]

Ultrasound waves are used to measure the depth of the sea.



The speed of ultrasound waves in water is 1500 m/s. The ship sends out a pulse of ultrasound and detects the reflection from the seabed 0.8 s after it is transmitted from the ship.

(c) Calculate the depth of the sea.
You are advised to show your working out.

Depth of the sea = _____ m [4]

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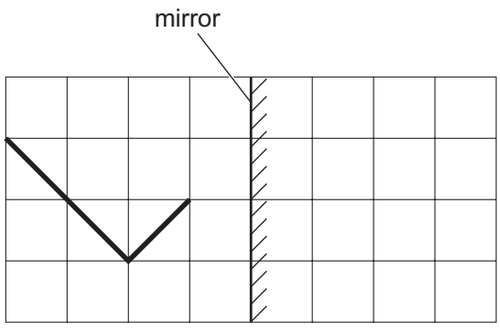
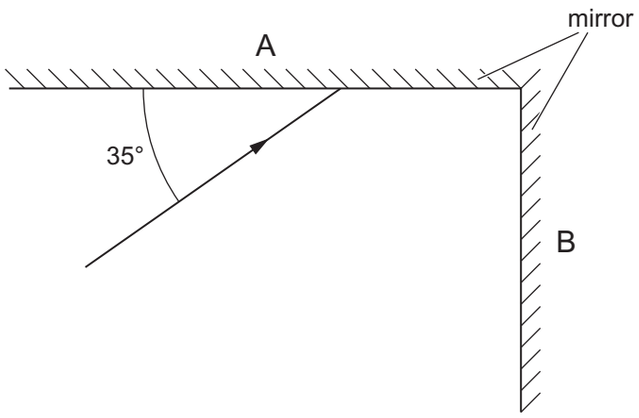
Examiner Only	
Marks	Remark

3 A letter L is placed in front of a mirror as shown below.



(a) Use the grid to draw the image of the letter L in the mirror. [2]

Two mirrors are arranged at 90° as shown below. A ray of light is incident on mirror A.



(b) **(i)** Draw a normal where the incident ray strikes mirror A. Label it N.

[1]

(ii) What is the angle of incidence at mirror A?

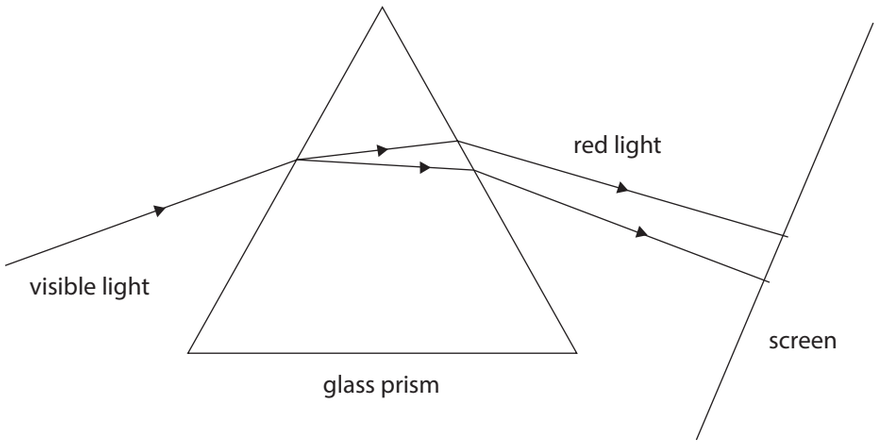
Angle of incidence = _____ [1]

(iii) Continue the ray showing reflection at mirror B. [2]

(iv) Calculate the angle of reflection at mirror B.

Angle of reflection = _____ [2]

(c) Visible light enters a glass prism.



The visible light is split into different colours.

(i) Name this process.

_____ [1]

(ii) Starting with red, list the colours, in order, that you would observe on the screen.

Red _____

_____ [1]

(iii) Visible light is a member of the electromagnetic spectrum. Name a member with a wavelength shorter and a member with a wavelength longer than visible light.

1. Shorter wavelength than visible light _____

2. Longer wavelength than visible light _____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 Some solids are electrical conductors while others are insulators.

(a) Explain the difference between electrical conductors and insulators.

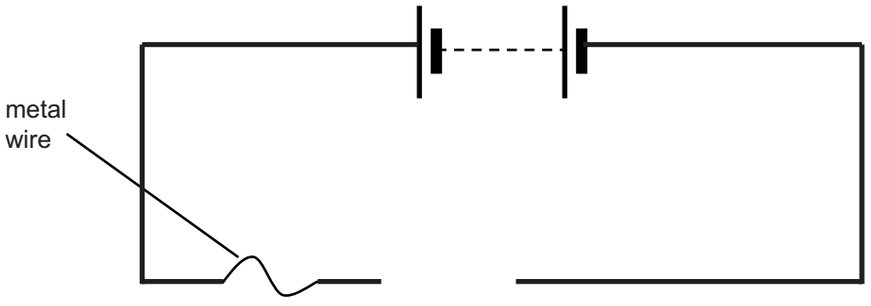
_____

_____ [1]

(b) A charge of 15 C passes through a resistor in a time of 50 s.
How much current flows through the resistor?
You are advised to show your working out.

Current = _____ A [3]

(c) Jenny sets up a circuit to measure the resistance of a metal wire.



(i) Complete the diagram of the circuit Jenny would set up to find the resistance of the metal wire. [3]

(ii) Describe the experiment Jenny would carry out to investigate how the resistance of a wire would depend on its length. Your description should include:

- measurements to be taken,
- calculations to be made,
- the conclusion.

In this part of the question you will be assessed on your written communication skills, including the use of specialist scientific terms.

_____

_____

_____

_____

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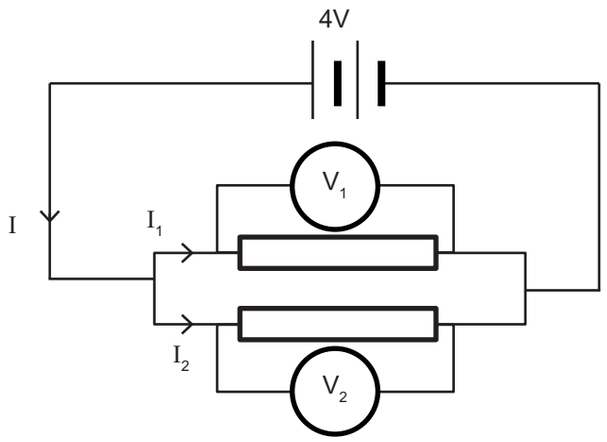
_____

_____ [6]

Examiner Only	
Marks	Remark

5 A 4 V battery is connected to two equal resistors in parallel.

Examiner Only	
Marks	Remark



(a) **(i)** What is the reading on voltmeter V_1?

Voltmeter V_1 = _____ V [1]

(ii) What is the reading on voltmeter V_2?

Voltmeter V_2 = _____ V [1]

The battery supplies a total current I which divides into currents I_1 and I_2 as shown above.

Current I_1 is 0.4 A.

(iii) What is current I_2?

Current I_2 = _____ A [1]

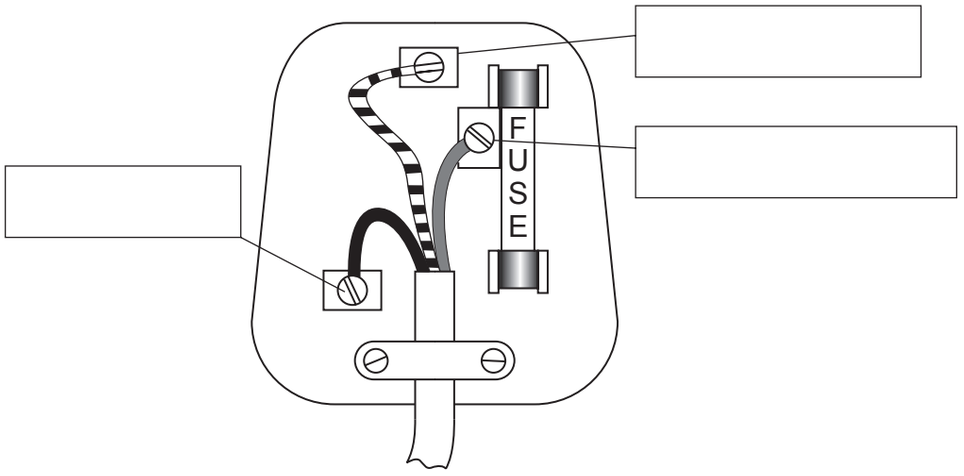
(iv) What is current I?

Current I = _____ A [1]

(v) Each resistor has a resistance of 10 Ω. Calculate their combined resistance.
You are advised to show your working out.

Combined resistance = _____ Ω [2]

(b) (i) The diagram shows an electrical three pin plug.
In the boxes label the pins live, neutral or earth.



[3]

(ii) State the colour of the live wire.

Colour: _____ [1]

(iii) Wires are connected to the three pins. Which wire protects the user from electric shock?

_____ wire [1]

(iv) The plug is connected to a kettle and a current of 6.0A flows through the live wire. What current flows in the earth wire?

Current = _____ A [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(i)** What do you understand by the term “direct current”?

_____ [1]

(ii) Name a source of direct current.

_____ [1]

(iii) What do you understand by the term “alternating current”?

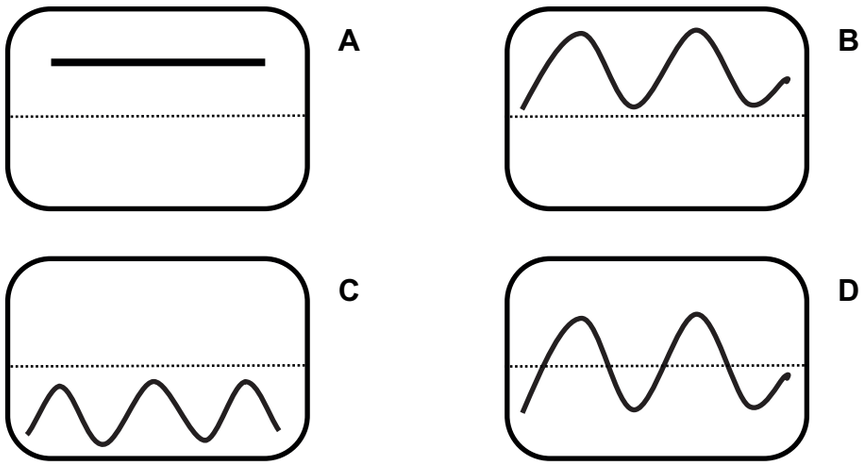
_____

_____ [2]

(iv) Name a source of alternating current.

_____ [1]

Four traces, A, B, C and D, are shown and the dotted line represents zero voltage.



(v) 1. Which trace (or traces) represent a.c.?

Trace(s): _____

2. Which trace (or traces) represent d.c.?

Trace(s): _____ [3]

(vi) What instrument would you use to display the above traces?

_____ [1]

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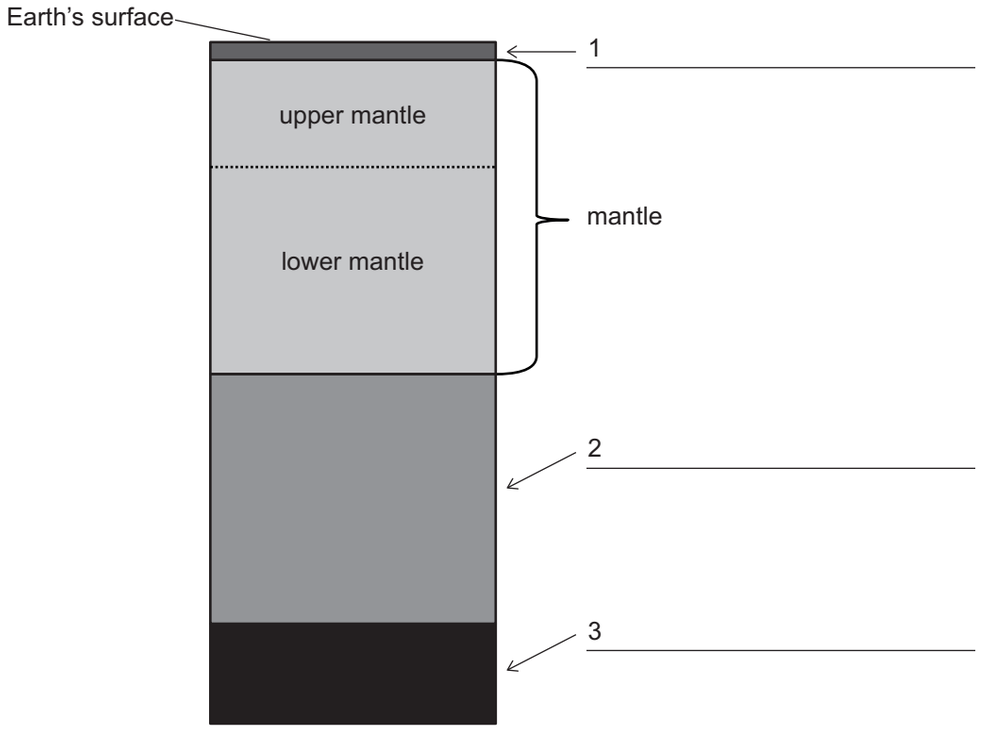
Examiner Only	
Marks	Remark

7 The questions below are concerned with the structure of the Earth.
The diagram represents a cross section (not to scale) through the Earth.



(a) The mantle has been labelled for you. Label the layers 1, 2 and 3. [3]

(b) Name two major elements found below the mantle.

1. _____

2. _____ [2]

The lithosphere is the layer of the Earth which is divided into plates, called tectonic plates.

Examiner Only	
Marks	Remark

(c) (i) What do you understand by the term “lithosphere”?

_____

_____ [2]

(ii) What allows the tectonic plates to move?

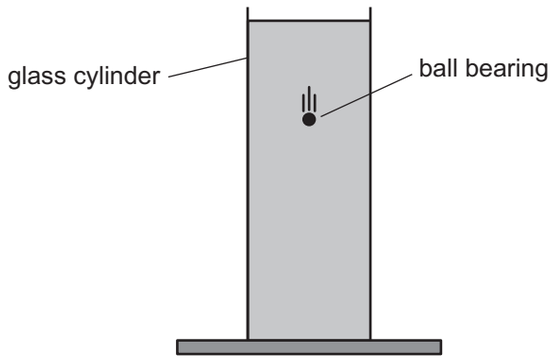
_____ [1]

(iii) Name two large-scale processes which occur because of the movement of the plates that make up the lithosphere.

_____ and _____ [2]

8 A ball bearing is released at the surface of a liquid contained in a tall glass cylinder.

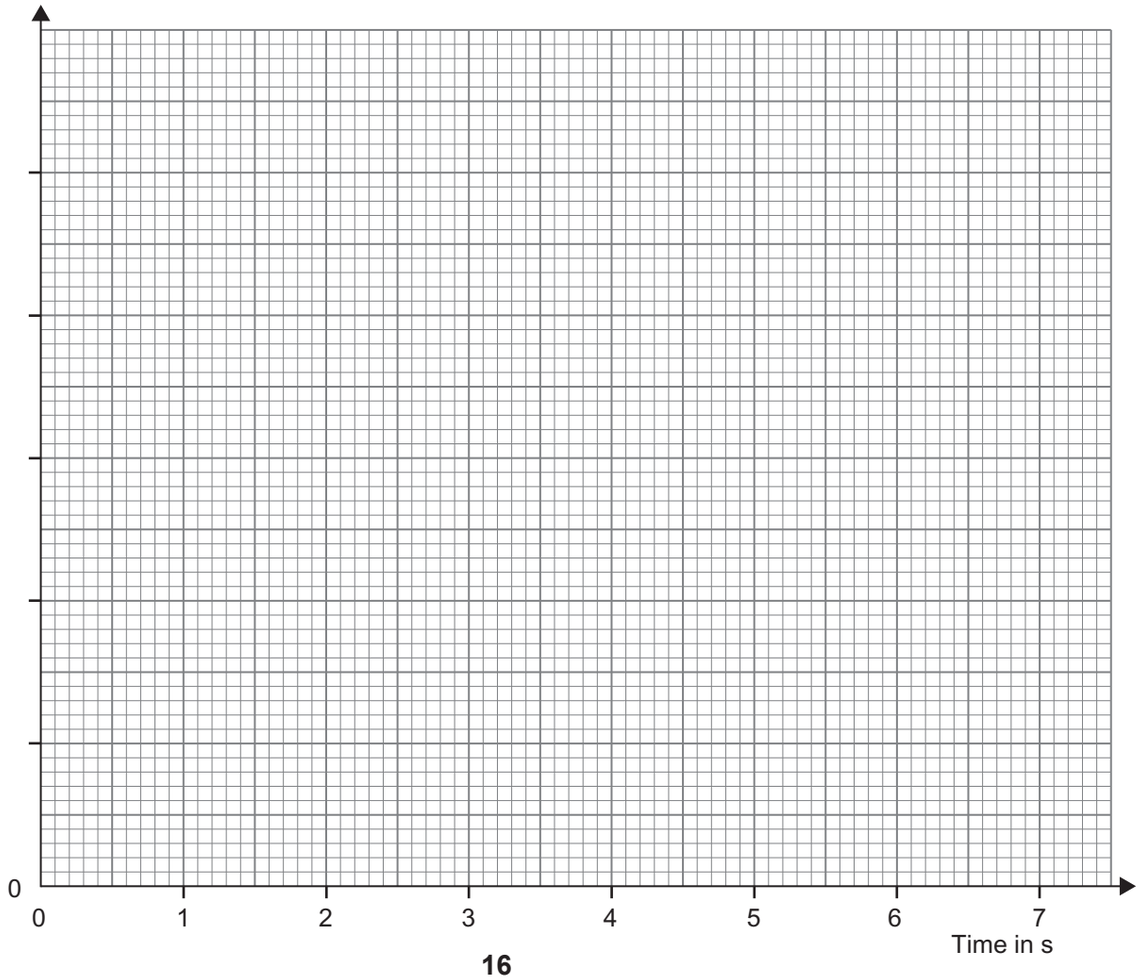
Examiner Only	
Marks	Remark



Its velocity is measured every second as it falls through the liquid and the results are recorded in the table.

Time in s	0	1	2	3	4	5	6	7
Velocity in cm/s	0	0.2	0.4	0.6	0.8	1.0	1.0	1.0

(a) On the graph below choose and label a suitable scale on the vertical axis.
Plot points of velocity against time. [4]



(b) Draw the graph. [2]

(c) **(i)** Over what time interval is there direct proportion between the two quantities?

_____ [1]

(ii) Explain the reason for your choice.

_____

_____ [2]

(iii) Find the gradient of the graph during the first four seconds and give its unit.

You are advised to show your working out.

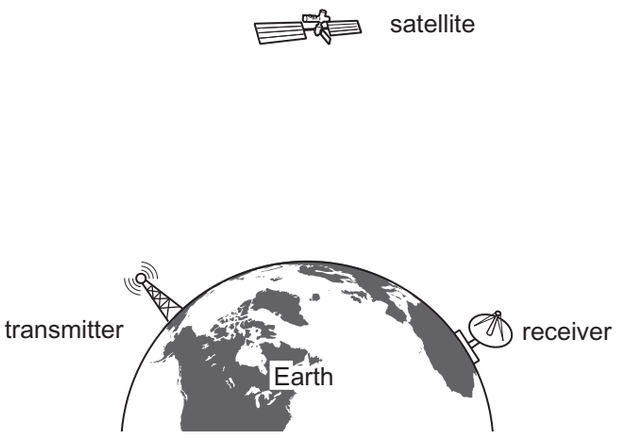
Gradient = _____

Unit = _____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

9 A satellite, situated in space, may be used to pass a microwave signal from one part of the Earth to the other as shown in the diagram.



(a) What two properties of microwaves allow the signal to travel from the transmitter to the satellite?

_____

_____ [2]

(b) Give two uses of artificial satellites, other than communications.

1. _____

2. _____ [2]

THIS IS THE END OF THE QUESTION PAPER

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