

Candidate Name _____

Centre Number	Candidate Number

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

**Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level**

SCIENCE

5124/2, 5125/2

PAPER 2 Physics

OCTOBER/NOVEMBER SESSION 2001

1 hour 15 minutes

Additional materials:

Answer paper

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and on all separate answer paper used.

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 separate answer paper provided.

At the end of the examination,

1. fasten all separate answer paper securely to the question paper;
2. enter the numbers of the **Section B** questions you have answered in the left-hand column of the grid below.

INFORMATION FOR CANDIDATES

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

FOR EXAMINER'S USE	
Section A	
Section B	
TOTAL	

This question paper consists of 8 printed pages.

Section A

Answer **all** the questions.

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

- 1 The water level in a measuring cylinder rises from the 40 cm^3 mark to the 65 cm^3 mark when a stone of mass 125 g is totally immersed in the water.

Calculate the density of the stone.

[4]

- 2 An object of mass 0.4 kg is set into motion so that it slides up a friction-free slope with an initial speed of 6 m/s . The object comes to rest after 2 s .

Calculate, for this object,

- (a) its initial kinetic energy,

[3]

- (b) the potential energy it gains in moving up the slope,

[1]

- (c) its acceleration.

[2]

3 A piece of copper tube is heated.

State whether the following quantities increase, decrease or remain unchanged.

- (a) mass of the tube[1]
- (b) length of the tube[1]
- (c) internal diameter of the tube[1]

4 A sound wave is emitted downwards from a ship. The sound wave is reflected from the seabed and is detected as it arrives back at the ship. See Fig. 4.1.

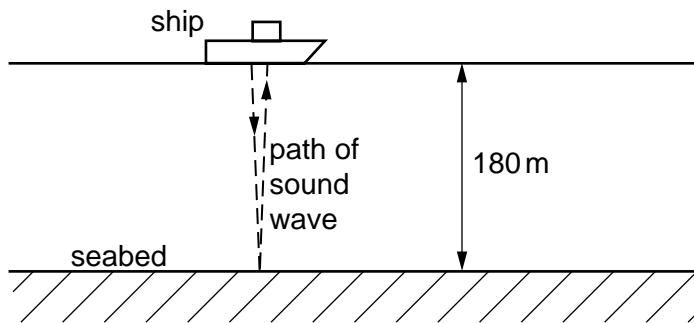


Fig. 4.1

The time between emitting the sound wave and detecting it back at the ship is 0.25 s. The seabed is 180 m below the ship.

(a) Calculate the speed of sound in seawater.

[3]

(b) Suggest why sound waves cannot move from the Earth to the Moon.

.....
[2]

- 5 Fig. 5.1 shows a $2\ \Omega$ resistor and a $6\ \Omega$ resistor connected in series with a $4\ \text{V}$ battery.

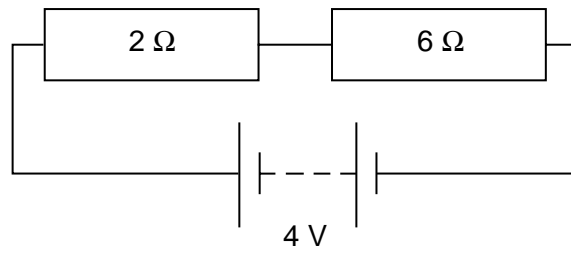


Fig. 5.1

Calculate

- (a) the combined resistance of the resistors,

[2]

- (b) the current in the battery,

[2]

- (c) the current in the $2\ \Omega$ resistor,

[1]

- (d) the amount of charge passing through the battery in $10\ \text{s}$.

[2]

6 The current in the heater of an electric kettle operating on a 240 V mains supply is 8.0 A.

(a) Calculate the power of the kettle.

[2]

(b) For the kettle operating normally, state the value of the current in

(i) the live wire,[1]

(ii) the neutral wire,[1]

(iii) the earth wire.[1]

7 Fig. 7.1 shows that a wire of length l and cross-sectional area A has a resistance of $18\ \Omega$.

length	cross-sectional area	resistance / Ω
l	A	18
$2l$	A	
l	$3A$	
$2l$	$2A$	

Fig. 7.1

Complete Fig. 7.1 for the other wires of the same material.

[3]

- 8 Fig. 8.1 shows a simple transformer.

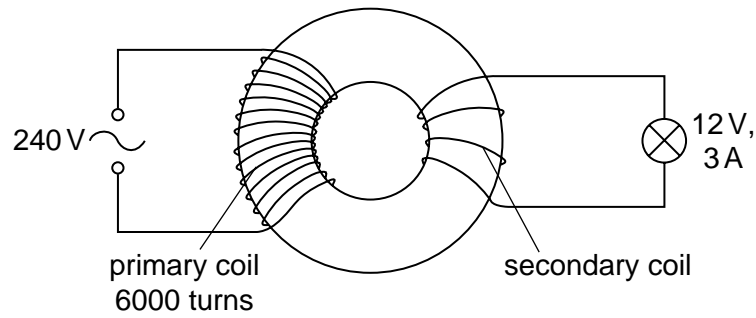


Fig. 8.1

The transformer is used to operate a 12 V, 3 A lamp from a 240 V mains supply. There are 6000 turns on the primary coil of the transformer.

- (a) Calculate the number of turns on the secondary coil.

[2]

- (b) Assuming the transformer is 100% efficient, calculate the current in the primary coil.

[2]

- (c) Suggest why the wire used for the secondary coil is thicker than that used for the primary coil.

.....

[2]

- 9 (a) Explain what is meant by the *half-life* of a radioactive substance.

.....
[2]

- (b) Fig. 9.1 shows the half-lives of three emitters of beta-particles.

nuclide	half-life
$^{210}_{81}\text{Tl}$	1.3 minutes
$^{214}_{82}\text{Pb}$	27 minutes
$^{90}_{38}\text{Sr}$	28 years

Fig. 9.1

- (i) Samples of the three nuclides have the same number of atoms.

Which sample has the highest activity? Explain your answer.

.....
[2]

- (ii) What fraction of the sample of $^{90}_{38}\text{Sr}$ is undecayed after 84 years?

[2]

Section B

Answer any **two** questions.

Write your answers on the separate answer paper provided.

- 10 (a) (i)** Describe an experiment to investigate how the extension of a spring varies with the load applied. Sketch a graph of the result you would expect. [6]
- (ii)** Explain how you would know if the limit of proportionality had been exceeded. [1]
- (b)** A certain spring is extended by 2 cm by an object hanging from it. The spring is then moved to the Moon, where the value of g is lower than on the Earth.
- State and explain what difference, if any, there is in
- (i)** the extension of the spring with the same object hanging from it, [2]
- (ii)** the extension – load graph for the spring. [1]
- 11 (a)** Describe an experiment to determine the refractive index of the glass of a rectangular block. Include a ray diagram in your answer. [8]
- (b)** State **two** differences between an electromagnetic wave and a sound wave of the same wavelength. [2]
- 12 (a)** With the aid of a diagram, explain how an electric current may be used
- (i)** to magnetise a steel bar, [3]
- (ii)** to demagnetise a magnet. [3]
- (b)** State, explaining your answers, whether you would choose iron or steel for each of the following.
- (i)** a bar magnet [1]
- (ii)** the core of an electromagnet [1]
- (iii)** the needle of a plotting compass [2]