

Centre Number	Candidate Number	Name
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CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE

0652/02

Paper 2

May/June 2003

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

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

A copy of the Periodic Table is printed on page 12.

For Examiner's Use	
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Total	

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of 12 printed pages.



- 1 An isotope of silicon has the atomic notation ${}_{14}^{29}\text{Si}$.

Use this information to complete the table in Fig. 1.1.

number of protons in nucleus of atom	14
number of neutrons in nucleus of atom	
total number of electrons around nucleus	
arrangement of these electrons in shells	

Fig. 1.1

[3]

2 Fig. 2.1 shows an electromagnetic relay switch.

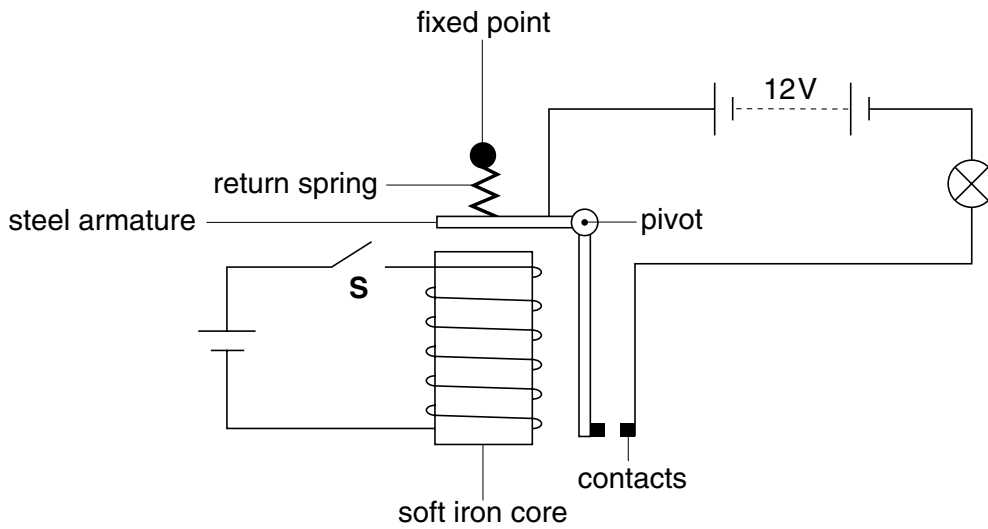


Fig. 2.1

(a) (i) Explain why the contacts close when switch S is closed.

.....

 [3]

(ii) Explain why soft iron, not steel, is used for the core.

.....
 [2]

(b) The lamp in the circuit has a current of 4 A through it when there is a potential difference of 12 V across it.

Calculate the resistance of the lamp. Show your working and state the unit of resistance.

resistance = [3]

- 3 (a) (i) Draw a 'dot-cross' diagram to describe the bonding in a molecule of methane, CH₄. You need show only the outer electrons of each atom.

[2]

- (ii) Name the type of bonding between the atoms in the methane molecule.

.....[1]

- (b) One molecule of an alcohol consists of one carbon atom, four hydrogen atoms and one oxygen atom.

- (i) Write the structural formula of this compound.

.....[2]

- (ii) Calculate the relative molecular mass, M_r , of this compound.

[1]

- 4 (a) Fig. 4.1 shows parallel light entering a converging lens.

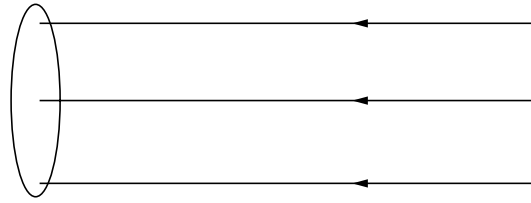


Fig. 4.1

- (i) Complete the diagram to show the paths of the rays of light after passing through the lens.
- (ii) Mark the focal length of the lens on the diagram. [3]
- (b) Fig. 4.2 shows a ray of light striking a mirror.

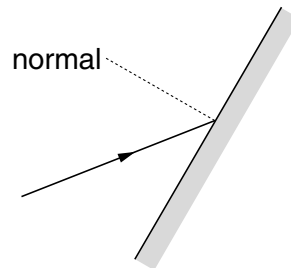


Fig. 4.2

- (i) Mark the angle of incidence at the mirror and label it i .
- (ii) Complete the path of the ray of light after it strikes the mirror. [2]

- 5 (a) In an experiment using Group VII elements, a student adds bromine water to a colourless solution of potassium iodide. The solution changes to an orange–brown colour.

In terms of the bromine reacting with the iodide ion, state the reason for this change of colour.

.....

.....

.....[2]

- (b) Complete the table in Fig. 5.1 about ethane and ethene.

	ethane	ethene
diagram for structure of molecule		
effect of hydrocarbon on bromine water		

Fig. 5.1

[4]

6 (a) Fig. 6.1 shows a liquid-in-glass thermometer.

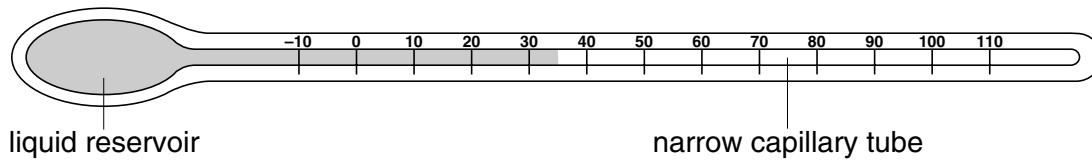


Fig. 6.1

(i) Name a suitable liquid to use in the thermometer.

(ii) State the reading on the thermometer. °C

(iii) Explain why a narrow capillary tube is used.

.....
[3]

(b) The thermometer bulb is put in melting ice.

(i) Explain why the liquid moves in the capillary tube.

.....

(ii) Mark on the diagram the new position of the liquid. [3]

7 (a) Use the kinetic particle theory of matter to explain why energy is needed to melt a solid, at its melting point, to form a liquid.

.....

[2]

(b) A student puts a drop of coloured ink into water. The ink slowly spreads throughout the water.

Use the kinetic particle theory of matter to explain this observation.

.....

[2]

- 8 (a) Fig. 8.1 shows water waves going from deep water into shallow water. The arrows show the direction of the waves in the deep water.

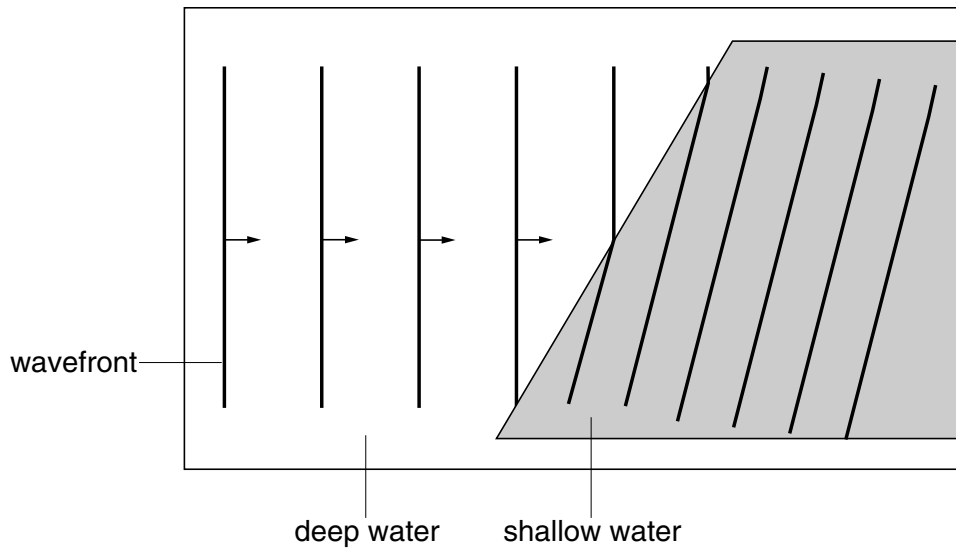


Fig. 8.1

- (a) (i) Name the process illustrated.
- (ii) Draw an arrow to show the direction of the waves in the shallow water. [2]
- (b) When the waves enter the shallow water, state what happens to
- (i) their speed,
- (ii) their frequency,
- (iii) their wavelength.[3]

9 A student is asked to prepare the salt calcium chloride from powdered limestone, calcium carbonate.

(a) Name the acid she must use.

.....[1]

(b) She adds powdered limestone gradually to the acid in a beaker, stirring frequently. A gas is produced.

(i) Name the gas produced in this reaction.

.....[1]

(ii) Describe a test to identify the gas produced in this reaction.

test

result

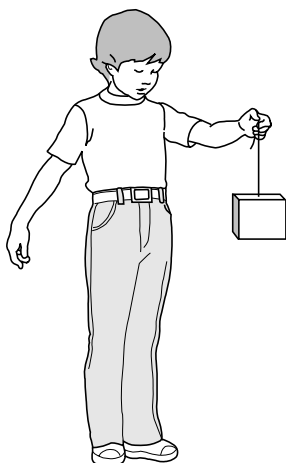
[2]

(c) She continues to add powdered limestone until no further reaction occurs.

Describe how to obtain solid calcium chloride from the mixture in the beaker.

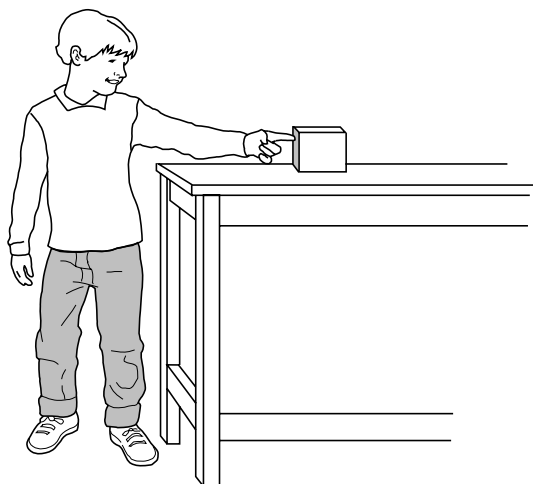
.....
.....
.....[2]

10 Fig. 10.1 shows two examples of a boy applying a force to an object.



example 1

The boy holds a box in a steady position.



example 2

The boy pushes the box along the bench.

Fig. 10.1

(a) State and explain in which example the boy is doing useful work on the box.

.....

 [2]

(b) The box has a mass of 1.8 kg.

Calculate the weight of the box. ($g = 10 \text{ N/kg}$)

weight = [2]

(c) In example 1, the boy drops the box.

Describe the motion of the box as it falls to the ground.

.....
 [2]

11 Most fuels are chemicals which burn in air.

(a) Hydrogen burns in air to form water vapour.

Use this example to explain the meaning of *oxidation*.

.....
.....
.....[2]

(b) In terms of energy, state why hydrogen is useful as a fuel.

.....
.....[1]

(c) Explain why hydrogen is described as a *clean* fuel.

.....
.....
.....[2]

