| Centre Number | Candidate Number |
|---|---|
| | |

Candidate Name _____

**International General Certificate of Secondary Education**
**UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE**

# COMBINED SCIENCE 0653/6
# CO-ORDINATED SCIENCES 0654/6

PAPER 6 Alternative to Practical

**MAY/JUNE SESSION 2000** 1 hour

Candidates answer on the question paper.
No additional materials are required.

**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in 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.

| FOR EXAMINER'S USE | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| TOTAL | |

**This question paper consists of 13 printed pages and 3 blank pages.**



**[Turn over**

**1** The X-ray photograph in Fig. 1.1 shows the right side of a person's jaw. The photograph shows the actual size of the jaw and teeth. The white areas are fillings.

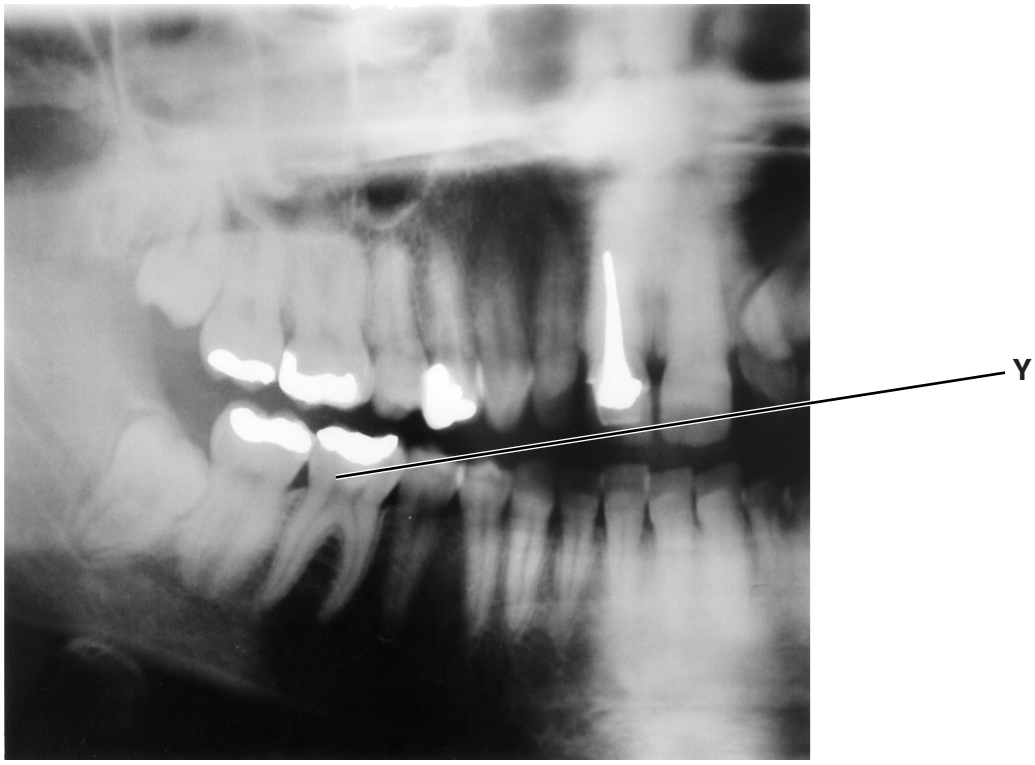



**Fig. 1.1**

**(a) (i)** Make a large diagram of tooth **Y**.

[4]

**(ii)** On your diagram, label the

pulp cavity,

filling.

[2]

**(b) (i)** Measure the length of tooth **Y** on the photograph. Mark clearly on the photograph the length you have measured.

*length on photograph* = .....[1]

**(ii)** Measure the length of tooth **Y** on your diagram.

*length on diagram* = .....[1]

**(iii)** Calculate the magnification of your diagram. Show your working.

.....[2]

**(c) (i)** What type of tooth is tooth **Y**?

.....[1]

**(ii)** Explain the function of this type of tooth.

.....

.....

.....[2]

**2** A student found the diagram in Fig. 2.1. in a textbook and she set up the experiment.

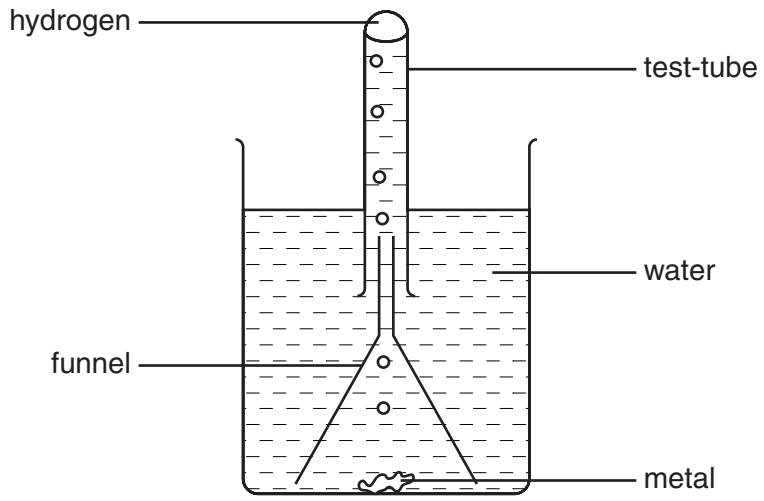



**Fig. 2.1**

**(a)** Explain how to set up the apparatus and get the test-tube, full of water, over the top of the funnel.

.....

.....

.....

.....[3]

**(b)** The student carried out the experiment with each of the five following metals.

**calcium copper iron magnesium zinc**

**(i)** Which **two** of these metals gave off bubbles of hydrogen?

..... *and* .....[2]

**(ii)** Suggest how the student tested the gas to confirm that it was hydrogen.

.....

.....[2]

**(c)** The student added Universal Indicator to the solution left in the beaker after each experiment.

What colour did she see when she used

**(i)** calcium, .....[1]

**(ii)** copper? .....[1]

**3** A student was given the apparatus shown in Fig. 3.1. Two pendulums, $\mathbf{P_1}$ and $\mathbf{P_2}$, were suspended from a horizontal length of thread.

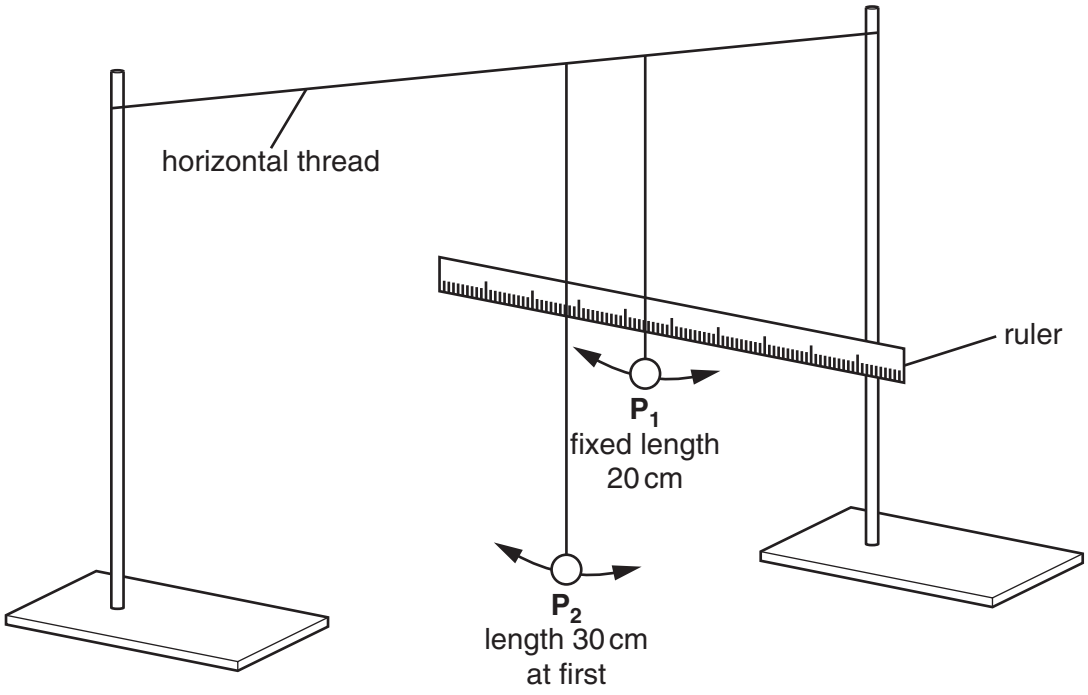



**Fig. 3.1**

The task set was to find out how pendulum $\mathbf{P_1}$ is affected by swinging pendulum $\mathbf{P_2}$.

The student swung $\mathbf{P_2}$ at right angles to the horizontal length of thread, as in Fig. 3.1. After a few moments, $\mathbf{P_1}$ began to swing in the same direction.

**(a)** What was transferred along the thread from $\mathbf{P_2}$, causing $\mathbf{P_1}$ to swing?

.....[1]

The student measured the maximum amplitude of $\mathbf{P_1}$ and recorded it in the table in Fig. 3.3. He decreased the length of $\mathbf{P_2}$ to 25 cm. He swung $\mathbf{P_2}$ again and found the maximum amplitude of $\mathbf{P_1}$, as before. He repeated this for lengths of $\mathbf{P_2}$ of 22, 18, 15 and 10 cm.

**(b)** Fig. 3.2 shows the positions of $\mathbf{P_1}$ at the end of its swing for each of these lengths. Measure the maximum amplitudes of $\mathbf{P_1}$ and record them in the table in Fig. 3.3.

The maximum amplitude is the distance from the vertical line to the centre of the bob.

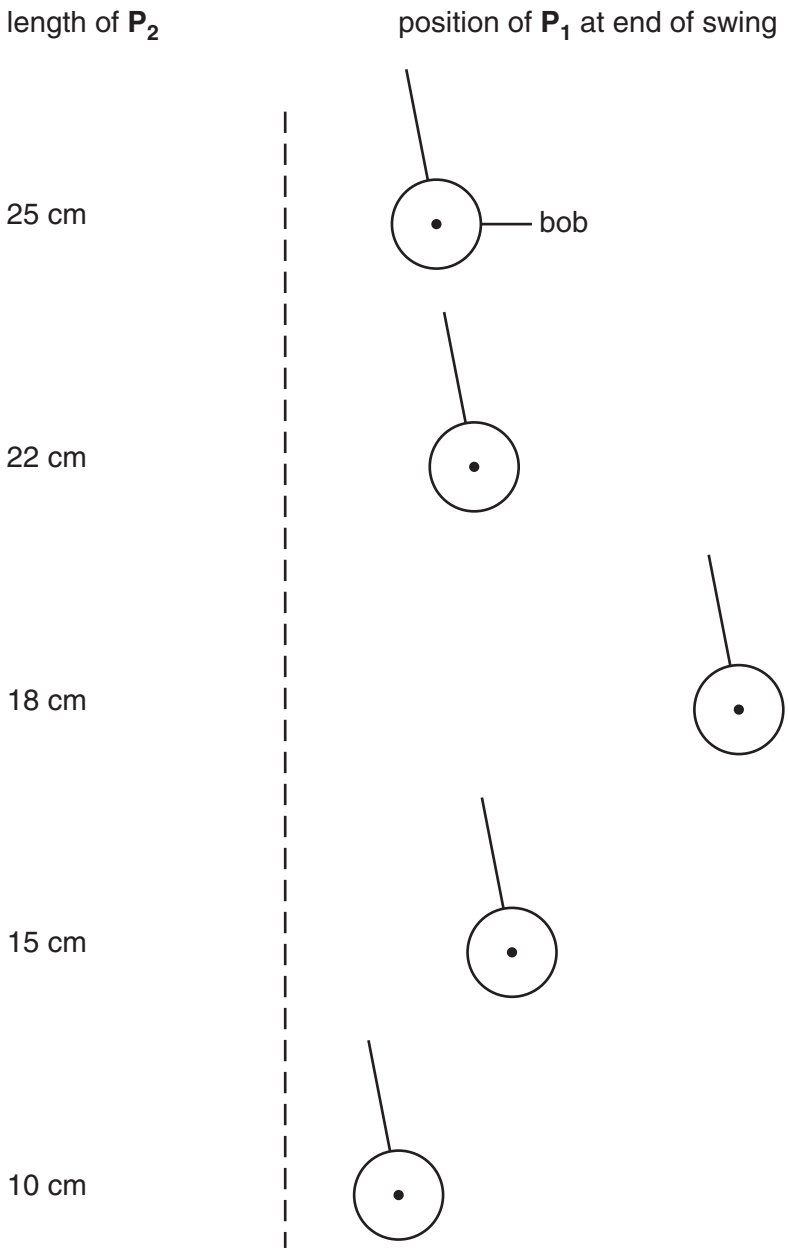
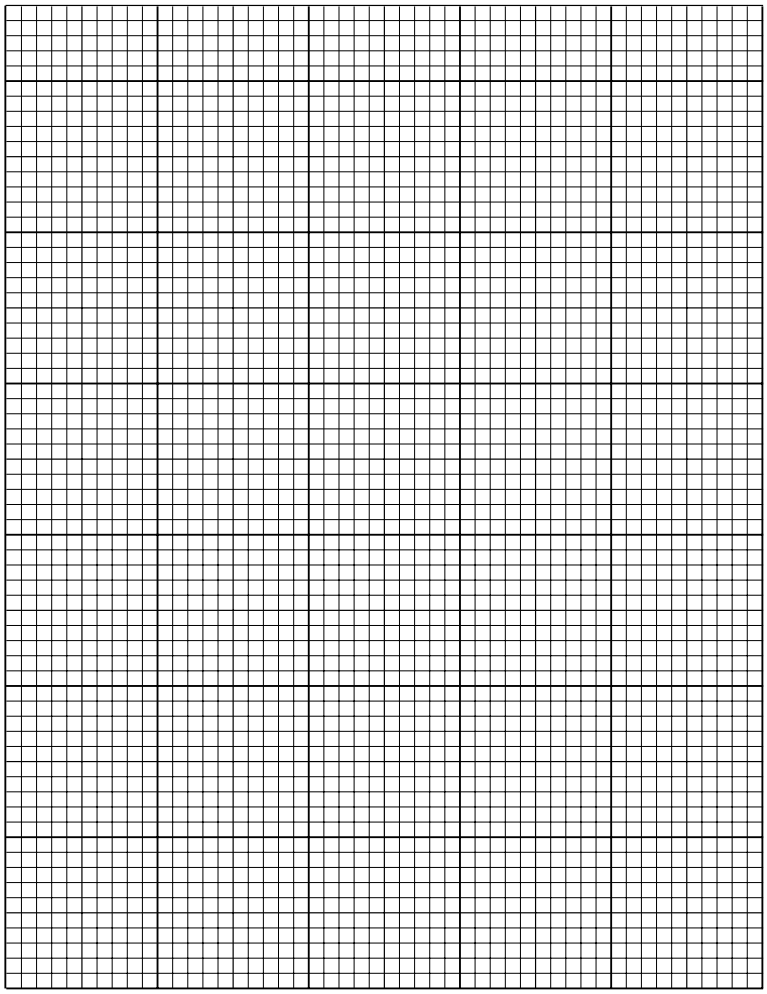



**Fig. 3.2**

| length of $\mathbf{P_2}$/cm | 30 | 25 | 22 | 18 | 15 | 10 |
|---|---|---|---|---|---|---|
| maximum amplitude of $\mathbf{P_1}$/cm | 1.0 | | | | | |

**Fig. 3.3** [4]

**(c)** Plot the amplitude of $\mathbf{P_1}$ (vertical axis) against the length of $\mathbf{P_2}$ on the grid below. Draw a smooth curve through the points.



[4]

**(d) (i)** Use your graph to suggest the maximum value of the amplitude of $\mathbf{P_1}$.

.....[1]

**(ii)** What is the length of $\mathbf{P_2}$ when the amplitude of $\mathbf{P_1}$ is at this maximum?

.....[1]

**4** All living things respire. Carbon dioxide is a waste product of respiration.

Use this information to design a simple experiment you could do to find out if pieces of an apple fruit are alive. You can use diagrams if they help you to explain how you would carry out your experiment.

Your experiment should include a control.

*Method*

.....

.....

.....

.....

.....[5]

*Expected results*

.....

.....

.....[2]

**5** Fig. 5.1 shows an experiment on energy conversions. A student ate a meal of rice, which contains carbohydrates. He then pedalled a bicycle which drove a generator (dynamo) producing electricity.

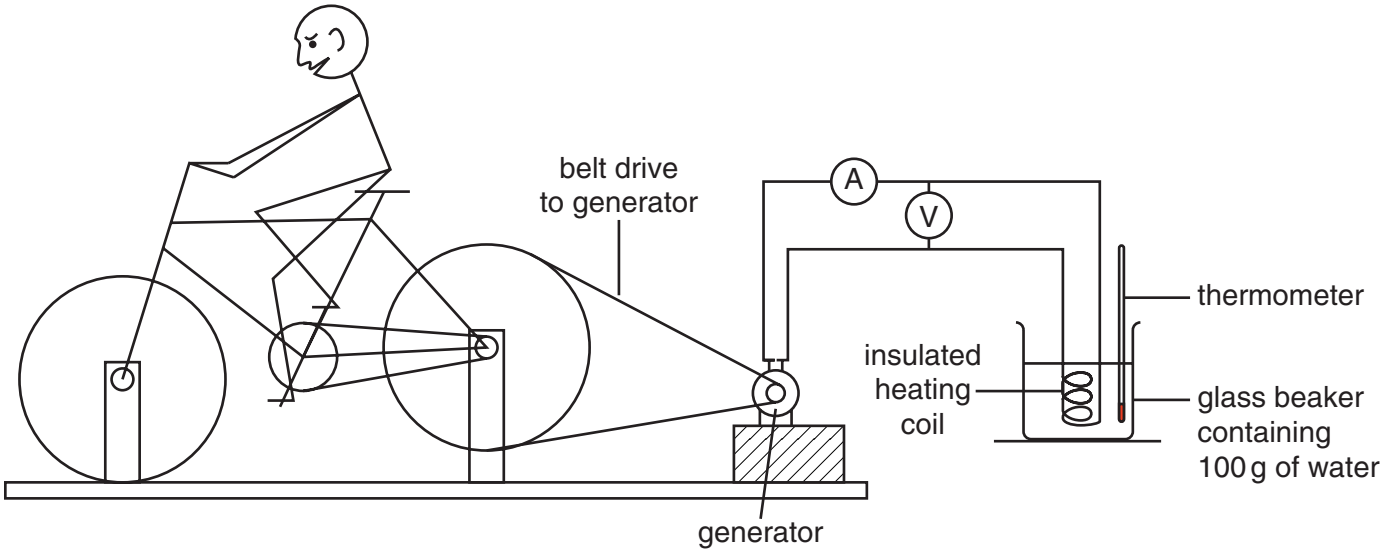



**Fig. 5.1**

The electric current from the generator passed through a heating coil in 100 g of water. The temperature of the water was read before and after the experiment.

**(a)** Complete the lines below to show the energy conversions which took place.

chemical energy

to ..... energy

to ..... energy

to ..... energy

[3]

**(b)** Fig. 5.2 shows the dials of the ammeter and the voltmeter used in the circuit.

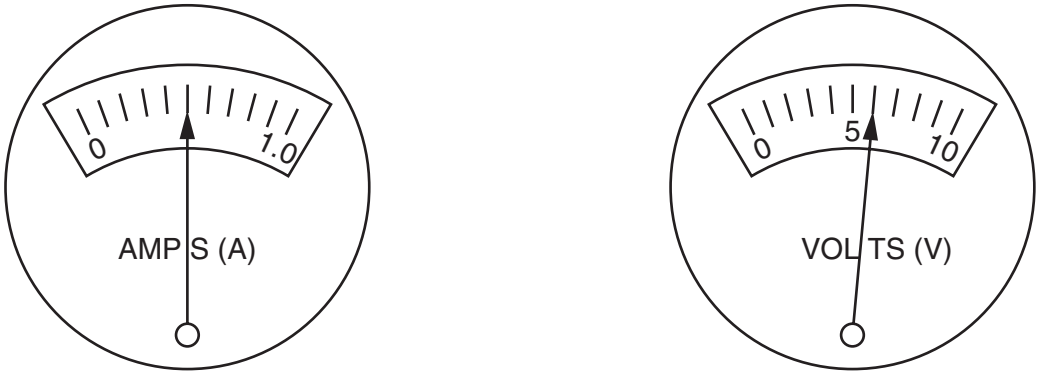



**Fig. 5.2**

**(i)** What was the ammeter reading? ..... amps [1]

**(ii)** What was the voltmeter reading? ..... volts [1]

**(iii)** The total energy carried by the electric current during the experiment can be calculated by using the following formula.

energy = amps x volts x 0.6 kJ

Calculate the total energy using your answers to **(i)** and **(ii)**.

..... kJ [1]

**(c)** Fig. 5.3 shows the thermometer reading at the beginning and at the end of the experiment.

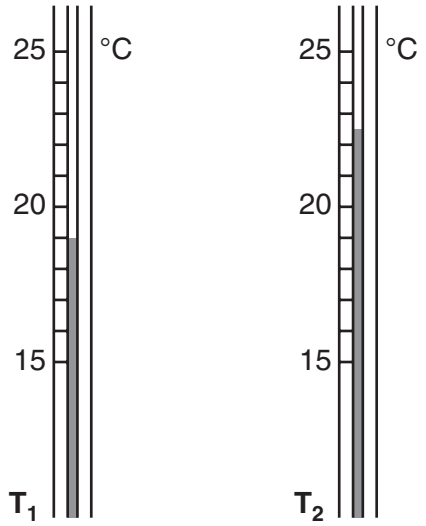



**Fig. 5.3**

**(i)** What was the first reading, $\mathbf{T_1}$, on the thermometer? ..... °C [1]

**(ii)** What was the second reading, $\mathbf{T_2}$, on the thermometer? ..... °C [1]

**(iii)** The total energy which had been gained by the water can be calculated by using the following formula.

$$\text{energy} = 0.42 \times (\mathbf{T_2} - \mathbf{T_1})\,\text{kJ}$$

Calculate this total energy using your answers to **(i)** and **(ii)**.

..... kJ [1]

**(d)** It was calculated that the student used 250 kJ of energy while he was pedalling the bicycle.

Comment on the difference between this value of 250 kJ and your answer to **(c)(iii)**.

.....

.....

.....[1]

**6** A blue powdery mixture, **M**, contained two salts. Fig. 6.1 shows the tests which were carried out using **M**, and the observations and conclusions which were drawn.

Complete the table in Fig.6.1.

| test | observations | conclusions |
|---|---|---|
| **1** **M** was added to water and the mixture was stirred. | A blue solution formed and a white powder settled to the bottom of the tube. | |
| **2** The mixture from **1** was filtered. To 2 $cm^3$ of the blue solution, dilute hydrochloric acid was added, followed by aqueous barium chloride. | A white precipitate was seen. | |
| **3** **(a)** To 2 $cm^3$ of the blue solution from **1**, a few drops of aqueous ammonia were added. | | The presence of copper ions was suspected. |
| **(b)** More aqueous ammonia was added to the mixture from **(a)** until the ammonia was in excess. | | The presence of copper ions was confirmed. |
| **4** **(a)** A little of the white residue from **1** was added to dilute hydrochloric acid. | The white residue dissolved and a gas was given off. | The presence of a carbonate was suspected. |
| **(b)** | | The gas was carbon dioxide. |

| test | observations | conclusions |
|---|---|---|
| **5 (a)** To 2 $cm^3$ of the solution from **4(a)**, a few drops of aqueous sodium hydroxide were added. | A white precipitate was seen. | The presence of zinc ions was suspected. |
| **(b)** More aqueous sodium hydroxide was added to the mixture from **(a)** until the sodium hydroxide was in excess. | | |

[8]

**Fig. 6.1**

Suggest the names of the two salts in the blue powdery mixture, **M**.

..... *and* ..... [2]

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