Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

PHYSICS **0625/31**

Paper 3 Theory (Core) **May/June 2017**

1 hour 15 minutes

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.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

1 A pipe drips water into an empty glass jar. A student takes measurements to find how fast the water is rising up the jar. Fig. 1.1 shows the arrangement.

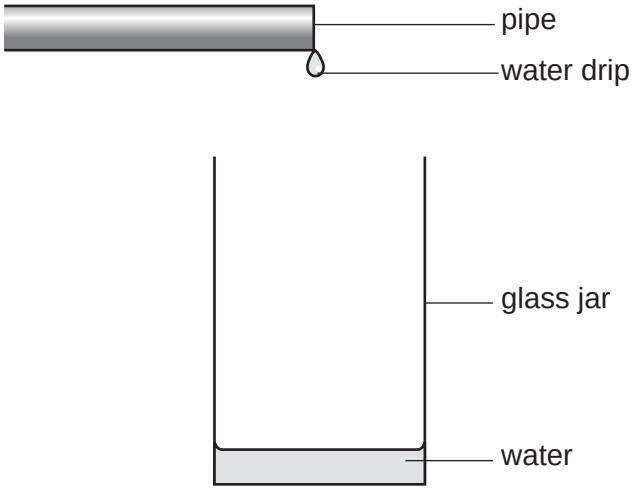

Fig. 1.1

(a) The student measures the depth of the water every minute.

State the **two** pieces of equipment that she uses.

1. .....

2. .....

[2]

(b) The student records her observations in a table. She then plots a graph using the axes shown in Fig. 1.2.

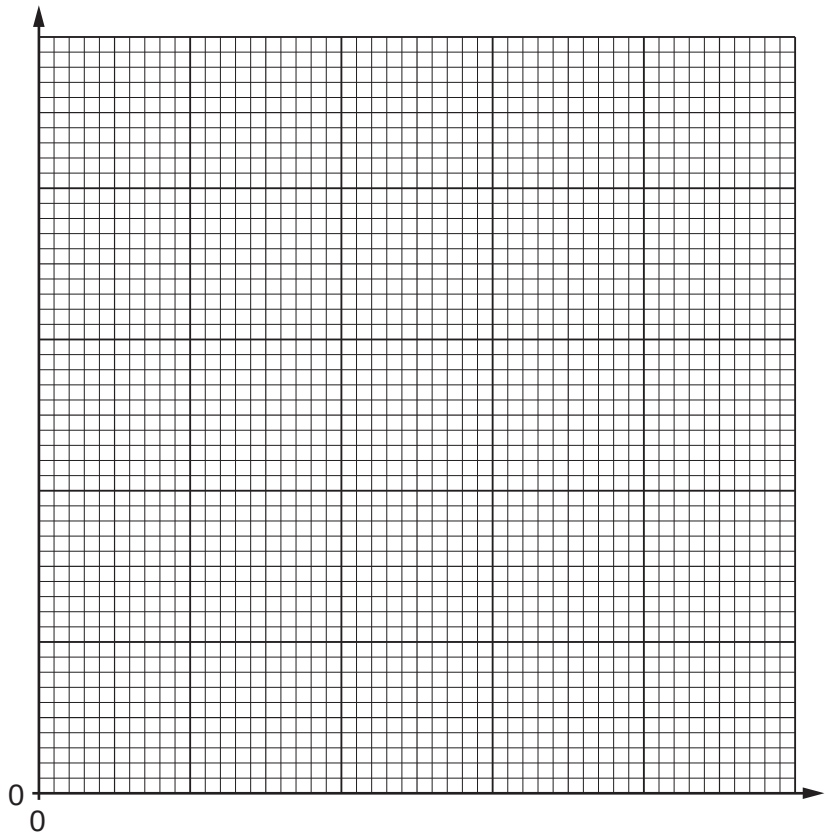

Fig. 1.2

(i) On Fig. 1.2, label both axes with title and unit. [2]

(ii) The water rises up the jar at a constant rate.

Draw a line on Fig. 1.2 to show the student's graph. Start the line from the time when the jar is empty. [2]

(c) A puddle of water forms on the ground. The average depth of the water is 2.5 mm.

Determine the average depth of the water in m.

depth = ... m [2]

[Total: 8]

2 Three racing cars, A, B and C, all accelerate steadily and then continue at a constant speed. Fig. 2.1 gives information about the movement of car A and car B at the start of the race.

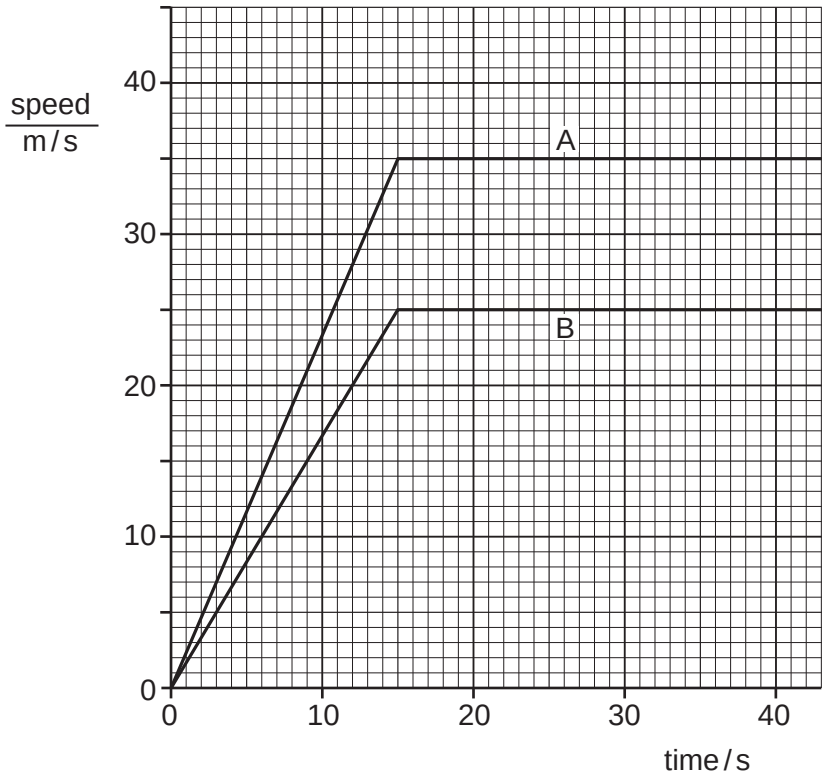

Fig. 2.1

(a) State the maximum speed of car A.

..... [1]

(b) Calculate the distance travelled by car B when accelerating.

distance = ... m [3]

(c) Car C has a greater acceleration than car A, but it reaches a lower constant speed than car B.

On Fig. 2.1, draw a line to show the movement of car C. [2]

[Total: 6]

3 Fig. 3.1 shows a tyre hanging from the branch of a tree.

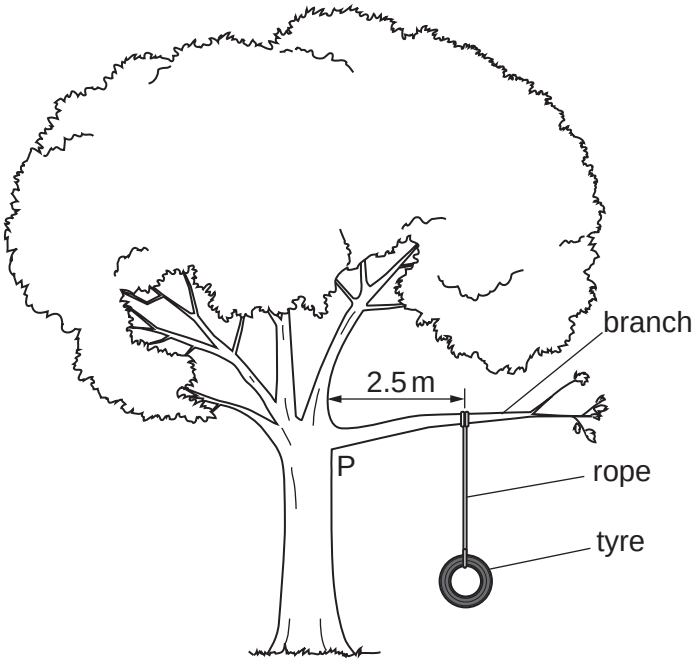

Fig. 3.1

(a) The mass of the tyre is 15 kg.

Calculate its weight.

weight of tyre = ... N [2]

(b) The weight of the tyre exerts a moment on the branch, about point P where the branch joins the tree.

(i) Explain what is meant by the term *moment*.

..... [1]

(ii) A child sits on the tyre. The weight of the child and tyre together is 425 N. Calculate the moment of this force about point P. Use information given in Fig. 3.1. Include the unit.

moment = ... [4]

(iii) A heavier child wants to sit on the tyre. Describe how the tyre position should be adjusted so that the moment is the same as in **(b)(ii)**.

..... [1]

[Total: 8]

4 Fig. 4.1 shows a hydroelectric power system located in the mountains.

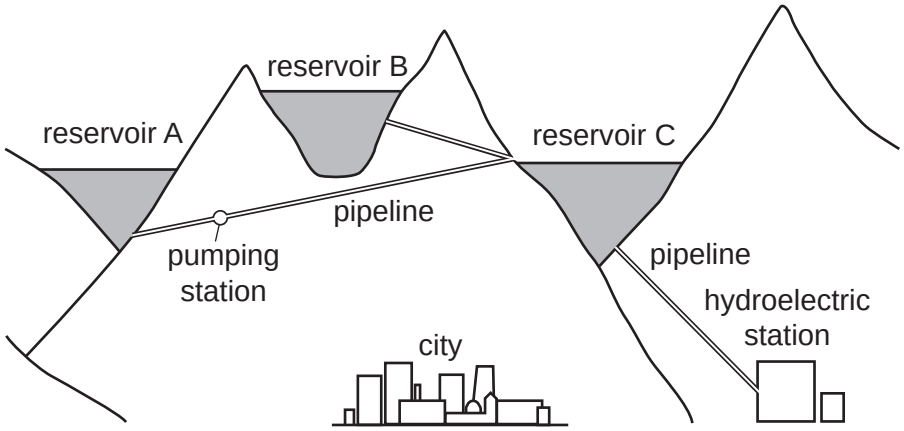

Fig. 4.1

(a) The reservoirs store energy.

State the terms used to describe the energy stored in the reservoirs.

..... [1]

(b) Describe how the energy stored in reservoir C becomes useful energy for the city at the hydroelectric station.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Some of the stored energy is wasted. Explain what happens to this energy.

.....

..... [2]

(d) Water from reservoirs A and B may flow into reservoir C. It is more efficient to fill reservoir C using water from reservoir B only.

Suggest a reason for this.

.....

..... [1]

[Total: 7]

5 A laboratory floor has a surface that prevents people from slipping when the floor is wet.

(a) Name the force that prevents a person from slipping.

..... [1]

(b) A stool has a round non-slip pad fitted to the bottom of each leg.

(i) The stool has four legs. The area of each pad is 3 cm^2. The weight of the stool is 75 N. A student sits on the stool. The weight of the student is 525 N.

Calculate the pressure acting on the floor due to the student and the stool.

pressure = ... N/cm^2 [5]

(ii) The legs of the stool are made of hollow metal tubes. Fig. 5.1 shows the bottom of a stool leg with and without a pad.

Fig. 5.1

Explain why a stool leg without a pad does more damage to the floor.

.....

..... [2]

[Total: 8]

6 Fig. 6.1 shows workers pouring liquid metal.

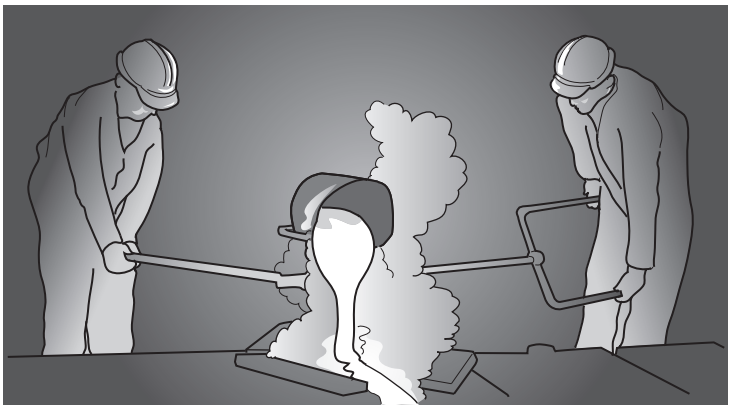

Fig. 6.1

(a) The metal changes from hot liquid to cool solid.

Describe what happens to the arrangement, separation and motion of the atoms as the metal changes from hot liquid to cool solid.

.....

.....

.....

.....

.....

.....

..... [3]

(b) The workers cool their tools in water. They spill some water onto the floor but later the floor is dry.

Explain what happens to the water. State the name of the process.

explanation .....

.....

.....

.....

.....

process .....

[3]

[Total: 6]

7 This question is about the electromagnetic spectrum.

(a) Fig. 7.1 shows labels for parts of the electromagnetic spectrum, in order.

radio waves	microwaves	infra-red radiation	visible light	.....	.....	gamma rays

Fig. 7.1

Complete Fig. 7.1 by adding the two missing labels. [2]

(b) State a use of infra-red radiation.

..... [1]

(c) Describe the harmful effect of microwaves on people.

.....

..... [1]

[Total: 4]

8 Iodine-131 is a radioactive isotope of iodine. Iodine-131 decays by the emission of a β-particle and a γ-ray.

(a) A nucleus of iodine-131 can be represented as

$$^{131}_{53}\mathrm{I}$$

Determine the number of neutrons in a nucleus of iodine-131.

number of neutrons ..... [1]

(b) β-particles and γ-rays are ionising radiations.

Explain the meaning of *ionising* radiations.

.....

..... [1]

(c) Fig. 8.1 shows a decay curve for iodine-131.

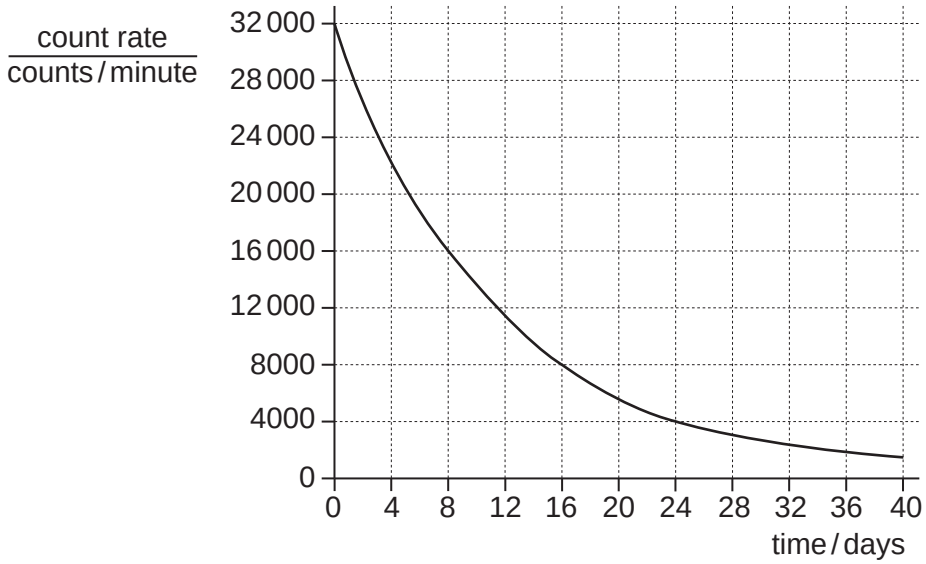

Fig. 8.1

Use information from Fig. 8.1 to determine the half-life of iodine-131. Show clearly how you used the graph.

half-life = ... days [3]

(d) A different radioactive substance has a half-life of 120 hours.

Calculate the time for it to decay to 25% of its original amount.

time = ... hours [2]

[Total: 7]

9 Fig. 9.1 shows the position of a man working in a rock quarry. A single explosion is used to break part of one rock face.

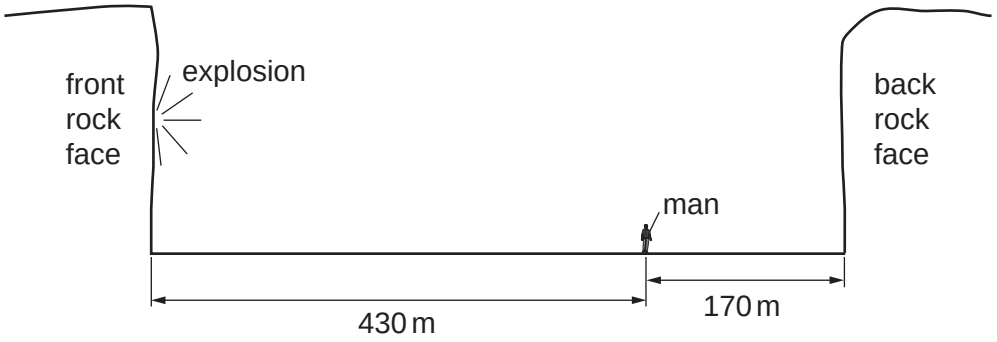

Fig. 9.1

(a) Explain why the man sees the flash of the explosion before he hears the bang.

.....

..... [1]

(b) The man hears a second bang shortly after the first bang.

(i) State the name given to this second bang.

..... [1]

(ii) State how the second bang compares with the first bang in terms of its amplitude and speed.

amplitude .....

speed .....
[2]

(c) The man stands 170 m from the back rock face. The time between hearing the first bang and hearing the second bang is 1.0 s.

Use the information in Fig. 9.1 to determine the speed of sound in the quarry.

speed of sound = ... m/s [3]

[Total: 7]

10 Fig. 10.1 shows a demonstration with magnets.

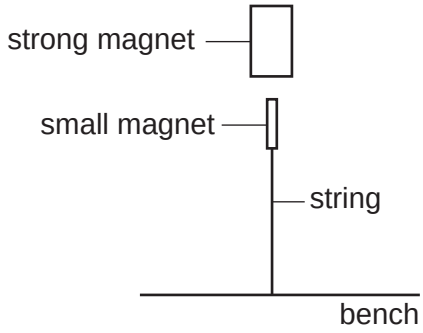

Fig. 10. 1

The strong magnet has a pole on its top surface and a pole on its bottom surface. The strong magnet is placed above a small magnet that is connected to a bench by a string.

(a) (i) Explain why the small magnet is in the position shown in Fig. 10.1.

.....

..... [2]

(ii) The strong magnet is turned so that the opposite surface is now facing the small magnet. State and explain what happens, if anything.

..... [1]

(b) (i) Describe a method for magnetising an iron pin using a permanent magnet.

.....

.....

..... [2]

(ii) Explain how you would identify the poles of the magnet made in **(b)(i)**.

.....

..... [2]

[Total: 7]

11 Fig. 11.1 shows a power supply in series with a resistance wire and a switch.

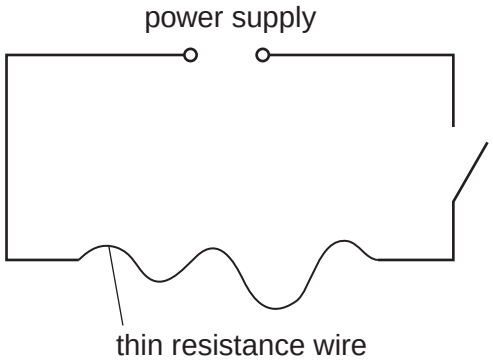

Fig. 11.1

(a) When the switch is closed, energy is transferred from the power supply. Explain what happens to this energy.

.....

..... [2]

(b) A student wants to determine the resistance of the wire. He adds components to the circuit shown in Fig. 11.1.

(i) He measures the current in the circuit. State the name of the component that he uses.

..... [1]

(ii) The student measures the potential difference (p.d.) across the resistance wire. On Fig. 11.1, draw the correct symbol for the component he uses and show how he connects it. [2]

(iii) Fig. 11.2 shows the symbol for another component that the student adds to the circuit.

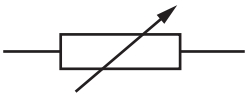

Fig. 11.2

State the name and function of this component.

name .....

function .....

.....
[2]

[Total: 7]

12 A student demonstrates electromagnetic induction.

(a) Describe how to demonstrate electromagnetic induction using a magnet, a coil of wire and a sensitive ammeter. You may include a diagram.

.....

.....

.....

..... [3]

(b) State **two** factors that affect the size of an induced electromotive force (e.m.f.)

1. .....

2. ..... [2]

[Total: 5]

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