Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/21**

Paper 2 Core **May/June 2014**

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 kg to be 10 N (i.e. 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 **16** printed pages.

CAMBRIDGE International Examinations

1 A gardener studies the growth of one of his plants. At the same time each day, he measures the height *h* of the top of the plant from the ground, as shown in Fig. 1.1.

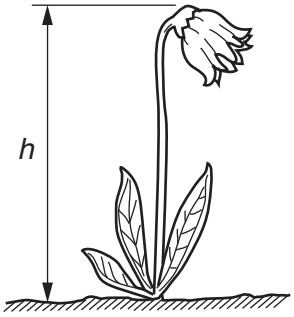


Fig. 1.1

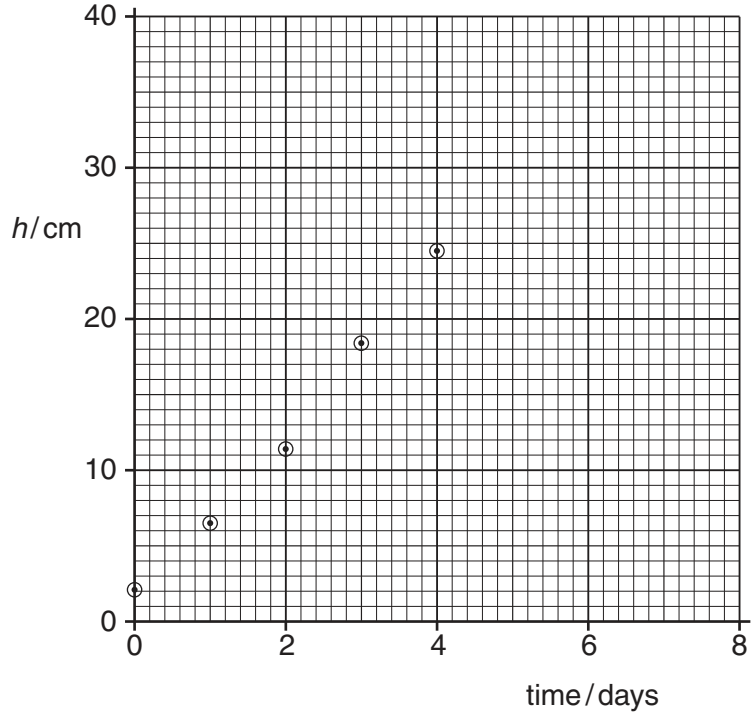
The table of his results is shown below.

time since first measurement/days	0	1	2	3	4	5	6	7
height *h*/cm	2.1	6.5	11.4	18.4	24.5	26.7	30.7	37.1

(a) From the values in the table, deduce the average speed of growth of the plant during the 7 days. Work in days and cm.

average speed = ... cm/day [4]

(b) (i) Complete Fig. 1.2 by plotting the last three values of height *h* against time. Do **not** draw a line through the points.



[2]

Fig. 1.2

(ii) Describe how the graph shows that the speed of growth of the plant is not constant.

.....

.....[1]

[Total: 7]

2 Fig. 2.1 shows a spring before and after a load is added.

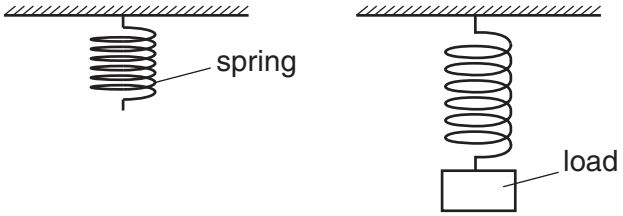


Fig. 2.1

(a) What is meant by the *extension* of the spring?

.....

.....[1]

(b) When the graph of extension against load is drawn for the spring, the result is the line shown in Fig. 2.2.

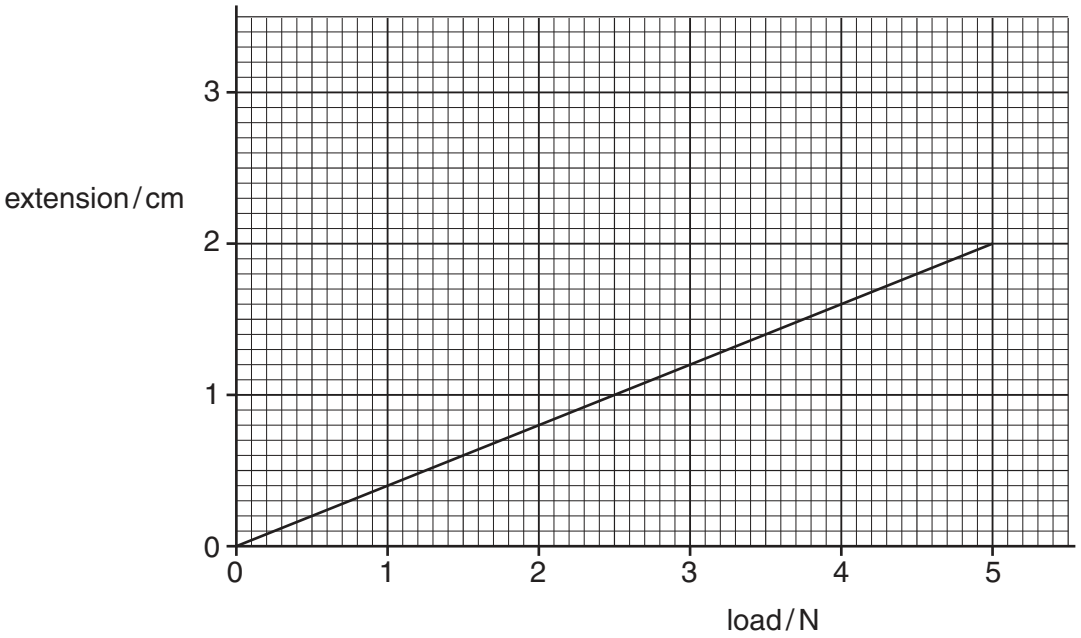


Fig. 2.2

(i) The unstretched length of the spring is 9.0 cm.

1. Calculate the total length of the spring when a 5.0 N load is hanging from the spring.

length = ... cm [2]

2. Find the extension that will be caused by a load of 2.0 N.

extension = ... cm [1]

(ii) Calculate the mass of a load of weight 2.0 N.

mass = ...[2]

[Total: 6]

3 The apparatus in Fig. 3.1 is being used to view the movement of some smoke particles trapped in a box.

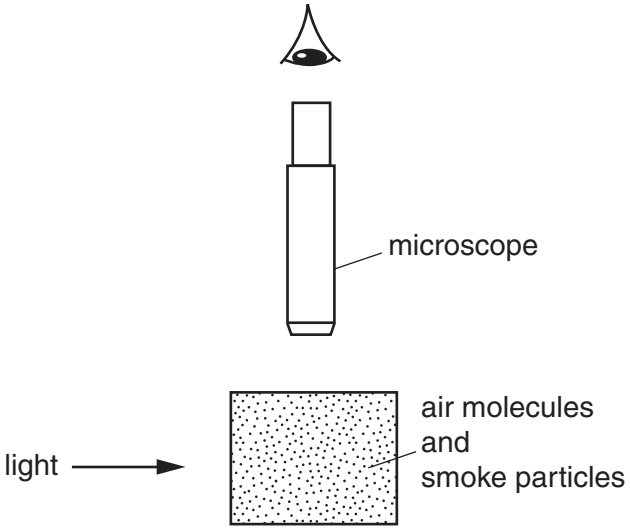


Fig. 3.1

(a) Describe what is seen when the smoke is viewed through the microscope.

.....

.....

.....[2]

(b) In the space below, sketch how one smoke particle might move during a short interval of time.

[2]

(c) What causes the smoke particles to move?

.....

.....

.....[2]

(d) What name is used for this motion of the smoke particles? Complete the sentence.

The motion of the smoke particles is known as ..... motion. [1]

[Total: 7]

4 A young boy, skating on a frozen pond, has fallen through some thin ice about 10 m from the shore of the pond. Fig. 4.1 shows the situation.

Fig. 4.1

A man, standing near the pond, hears the boy's shouts for help.

The man weighs more than the boy.

(a) Why would it be unsafe for the man to walk on the ice to rescue the boy?

.....

.....[1]

(b) Suggest and explain what the man could do to cross the ice to reach the boy safely.

.....

.....

.....

.....

.....[4]

[Total: 5]

5 The thermometer in Fig. 5.1 is recording the temperature of the laboratory.

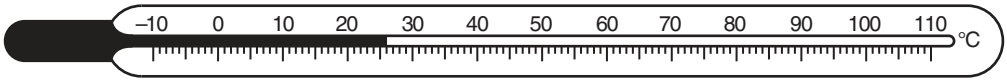


Fig. 5.1

(a) The bulb of the thermometer is placed in pure, boiling water at standard atmospheric pressure.

State the temperature **increase**.

temperature increase = ... °C [1]

(b) During the day, the temperature in the laboratory rises. In the late afternoon a thermometer attached to the ceiling records a higher temperature than a thermometer placed close to the ground.

Explain why this happens.

.....

.....

.....

.....[3]

(c) At night, the temperature in the laboratory falls.

Describe what can be seen happening to the liquid in a thermometer as the temperature falls, and explain why this happens.

.....

.....

.....[2]

(d) On Fig. 5.1, draw an arrow to show where the end of the liquid thread might be seen when the temperature being measured is –15°C. [1]

[Total: 7]

6 **(a)** A periscope is an optical instrument containing two mirrors in a long tube.

Fig. 6.1 shows the path of a ray of light through a periscope, without the tube.

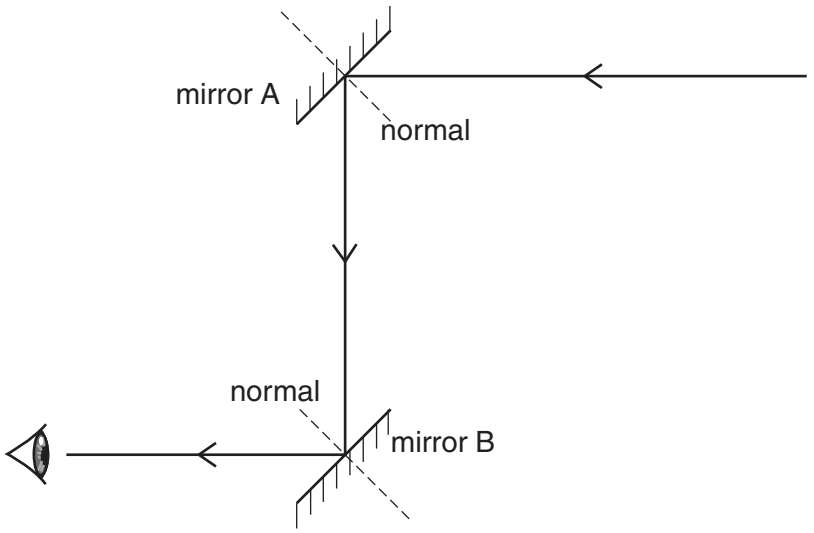


Fig. 6.1

(i) On Fig. 6.1,

1. use the letter i to indicate clearly the angle of incidence of the ray striking mirror A,

2. use the letter r to indicate clearly the angle of reflection of the ray leaving mirror A. [1]

(ii) Write down the equation that links i and r.

.....[1]

(iii) Suggest a use for the periscope.

.....[1]

(iv) State what happens if mirror B is rotated through a small angle.

.....[1]

(b) Fig. 6.2 shows a converging lens. The lens has one principal focus at F_1 and the other principal focus at F_2.

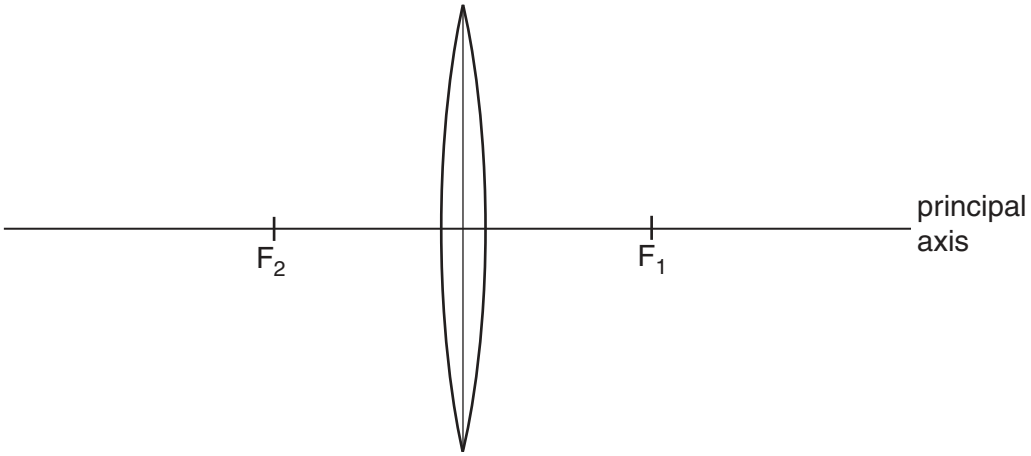


Fig. 6.2

Use your ruler to help you answer this question.

(i) On Fig. 6.2, clearly mark **two** distances that are each the focal length of the lens. [1]

(ii) On Fig. 6.2, draw a ray on the left side of the lens, which strikes the lens, above and parallel to the principal axis. Label this ray: **ray 1**.

Continue this ray to show its path through the lens and at least 6 cm to the right of the lens. [2]

(iii) On Fig. 6.2, draw a ray that emerges from the lens, below and parallel to the principal axis. Label this ray: **ray 2**.

Show clearly the path of this ray before it reached the lens. [1]

[Total: 8]

7 In Fig. 7.1, XY is a copper rod placed between the N and S poles of a magnet.

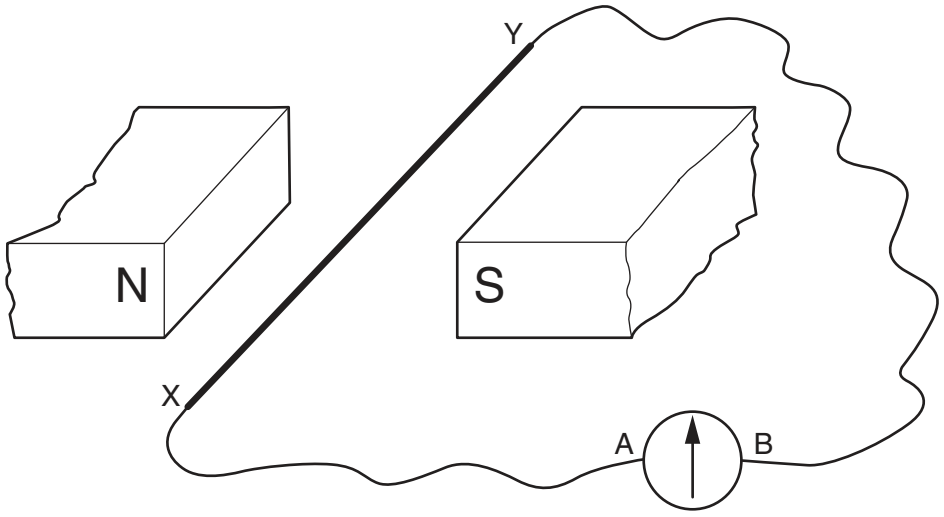


Fig. 7.1

XY is connected to the terminals A and B of a sensitive, centre-zero instrument that measures current.

(a) State the name of this instrument. .....[1]

(b) When there is no current, the pointer on the instrument points half-way between A and B.

State what, if anything, is **seen** happening to the pointer when XY is

(i) held stationary,

.....[1]

(ii) moved horizontally at a steady speed towards the N pole,

.....[1]

(iii) moved horizontally at a steady speed towards the S pole,

.....[1]

(iv) moved repeatedly up and down at right angles to the magnetic field.

.....[2]

(c) Suggest one electrical device that makes use of the effect demonstrated in **(b)**.

.....[1]

[Total: 7]

[Turn over

8 A student connects the circuit shown in Fig. 8.1.

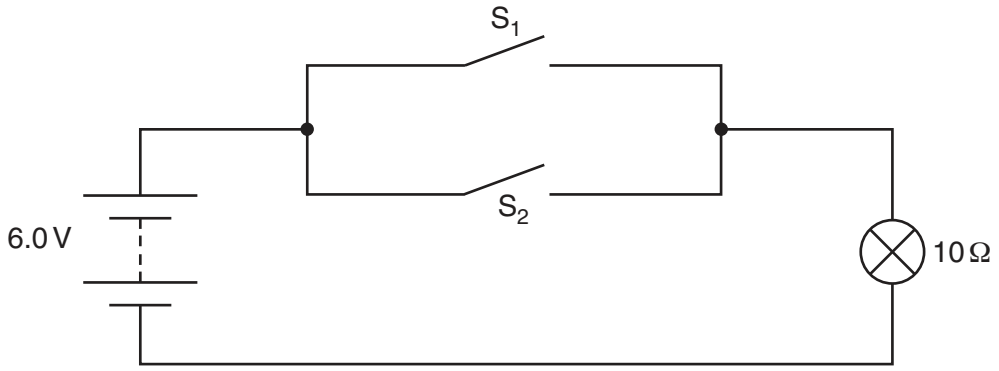


Fig. 8.1

When operating normally, the lamp has a resistance of 10 Ω.

(a) (i) State the current in the lamp when both S_1 and S_2 are open.

.....[1]

(ii) The student closes switch S_1.

Calculate the current in the lamp, stating the unit of your answer.

current = ... [4]

(iii) The student now closes S_2 as well as S_1.

State the current in the lamp with both switches closed.

.....[1]

(b) The student decides that she would like to be able to vary the brightness of the lamp.

(i) Name an electrical component that she could add to the circuit to do this.

.....[1]

(ii) In the space below, redraw the circuit of Fig. 8.1, including the component for varying the lamp brightness.

[2]

[Total: 9]

9 **(a)** Describe how the N pole of a bar magnet can be identified.

.....

.....

.....[2]

(b) Use words from the following list to answer the three questions below.

attractive force

repulsive force

no force

What force is there between

(i) two N poles, ...

(ii) two S poles, ...

(iii) a N pole and a S pole? .....
[3]

(c) Fig. 9.1 shows an iron bar placed close to the N pole of a bar magnet.

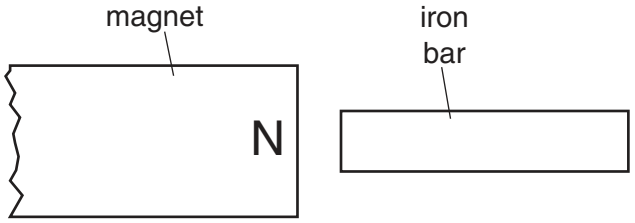


Fig. 9.1

(i) On Fig. 9.1, write N and S, to indicate the induced poles in the iron bar. [1]

(ii) Use a word from the list in **(b)** to describe the force between the magnet and the iron bar.

.....[1]

(iii) The iron bar is reversed end-to-end.

Describe the force that now exists between the magnet and the iron bar.

.....[1]

[Total: 8]

10 A transformer is a device for changing voltages.

Fig. 10.1 shows a transformer that has a primary coil with 1000 turns and a secondary coil with 50 turns.

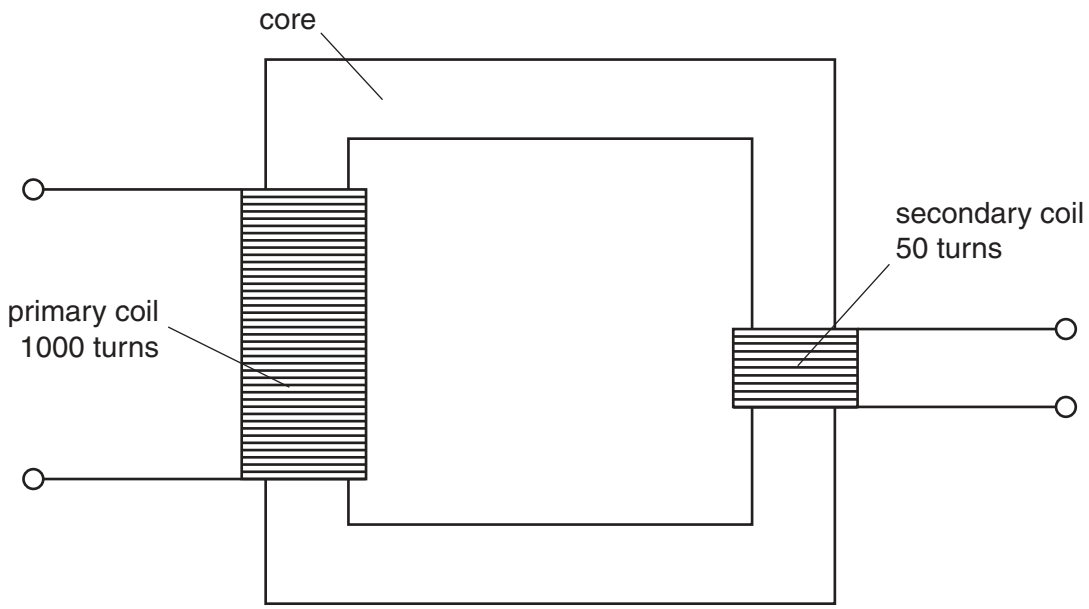


Fig. 10.1

(a) State the material from which the core of the transformer is made.

.....[1]

(b) The primary coil is connected to a 240 V alternating current supply.

Calculate the voltage across the secondary coil.

secondary coil voltage = ... V [3]

[Total: 4]

11 Polonium-210 $\left({}^{210}_{84}\text{Po}\right)$ is radioactive.

(a) Name **three** types of emission from radioactive sources.

1. .....

2. .....

3. .....

[2]

(b) State which of these radiations

(i) carries a negative charge, ...

(ii) is most easily absorbed, ...

(iii) is the emitted particle in the decay

$${}^{210}_{84}\text{Po} \longrightarrow {}^{206}_{82}\text{Pb} + \text{emitted particle.}$$ .....

[3]

(c) Polonium-210 has a half-life of 138 days.

A sample containing 8×10^{10} atoms of polonium-210 decays for 276 days.

(i) How many half-lives elapse in this time? .....

(ii) How many atoms decay in this time?

number that decay = ...

(iii) How many particles are emitted from the polonium-210 during this time?

number emitted = ...[4]

[Total: 9]

12 One nuclide of chlorine has 35 nucleons and the other nuclide of chlorine has 37 nucleons. The proton number of chlorine is 17.

(a) How many protons are there in a neutral atom of chlorine-35? .....

(b) How many neutrons are there in a neutral atom of chlorine-37? .....

(c) How many electrons are there in a neutral atom of chlorine-37? .....

[3]

[Total: 3]