Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME				
CENTRE NUMBER			CANDIDATE NUMBER	

9619798250

PHYSICS **0625/32**

Paper 3 Theory (Core) **February/March 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 in the spaces at the top of the page.
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 **16** printed pages.

DC (NH/SW) 127036/8

CAMBRIDGE
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1 Fig. 1.1 shows how the speed of a car varies over a short time.

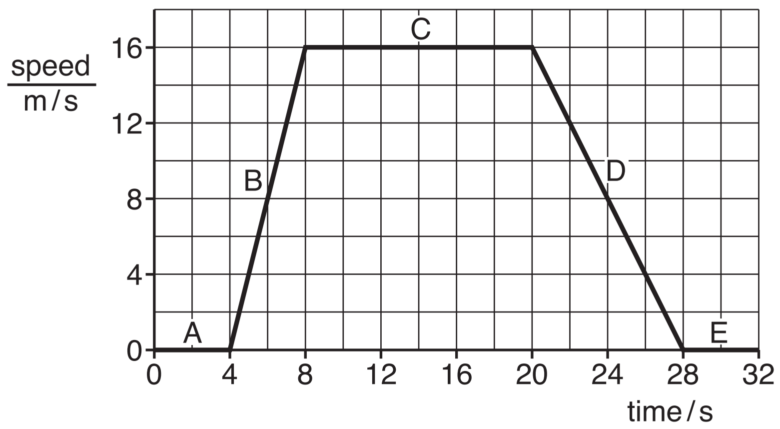


Fig. 1.1

(a) Different parts of the journey are labelled A, B, C, D and E.

(i) State a part of the graph that shows the car at rest.

....[1]

(ii) State a part of the graph that shows the car moving with constant speed.

....[1]

(iii) During part of the journey the car decelerates.

Calculate the distance travelled by the car when it is decelerating.

distance travelled = ...m [3]

(b) Another car accelerates, from rest, starting at time 0 s. This car has a constant acceleration. Its speed at 20 s is 10 m / s.

On Fig. 1.1, draw a line to show this motion. [2]

(c) Describe, using Fig. 1.1, how you can decide which car has the greater acceleration.

....

....[1]

[Total: 8]

2 A student wants to find the density of a small stone. Fig. 2.1 shows a measuring cylinder, containing water, placed on a balance.

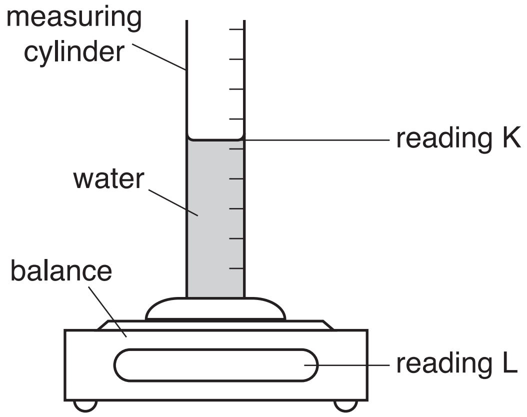


Fig. 2.1

The stone is placed in the water as shown in Fig. 2.2.

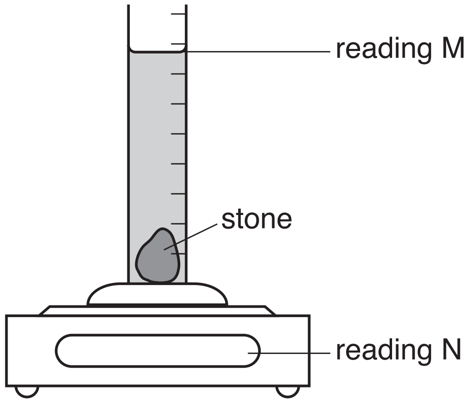


Fig. 2.2

(a) The student determines the mass of the stone and its volume.

Use the labels K, L, M and N from Fig. 2.1 and Fig. 2.2 to show how to calculate the mass and the volume of the stone.

mass of stone = reading .... minus reading ....

volume of stone = reading .... minus reading ....

[2]

(b) The student obtained the following values.

mass of stone = ...78.0 g..........

volume of stone = ...30.0 cm^3..........

Calculate the density of the stone. Include the unit.

density = ... unit .... [3]

[Total: 5]

3 Fig. 3.1 shows a beam on a pivot. The beam is balanced at its centre of mass.

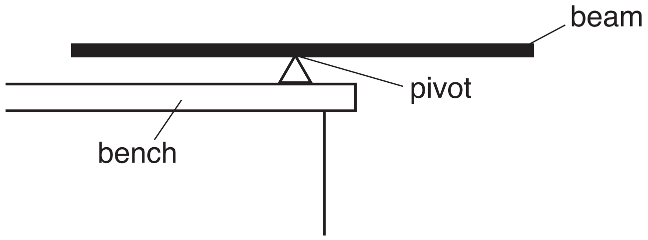


Fig. 3.1

(a) Explain the meaning of *centre of mass*.

....

....[1]

(b) Fig. 3.2 shows a load of 2.5 N on one side of the beam. The beam is balanced by a load of 1.5 N suspended by a thin string.

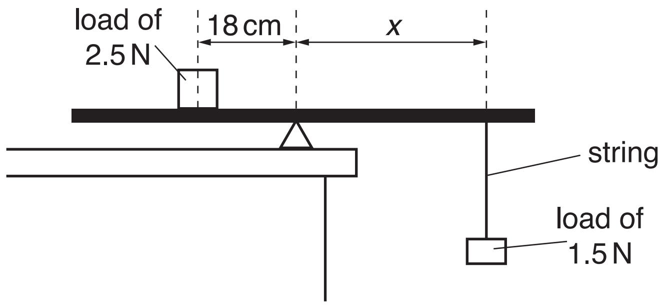


Fig. 3.2 (not to scale)

(i) Calculate the distance x from the pivot to the string.

distance from pivot = ... cm [3]

(ii) Calculate the mass of the 2.5 N load.

mass = ... kg [3]

[Total: 7]

4 Nuclear power stations produce a useful form of energy. Fig. 4.1 shows part of a nuclear reactor.

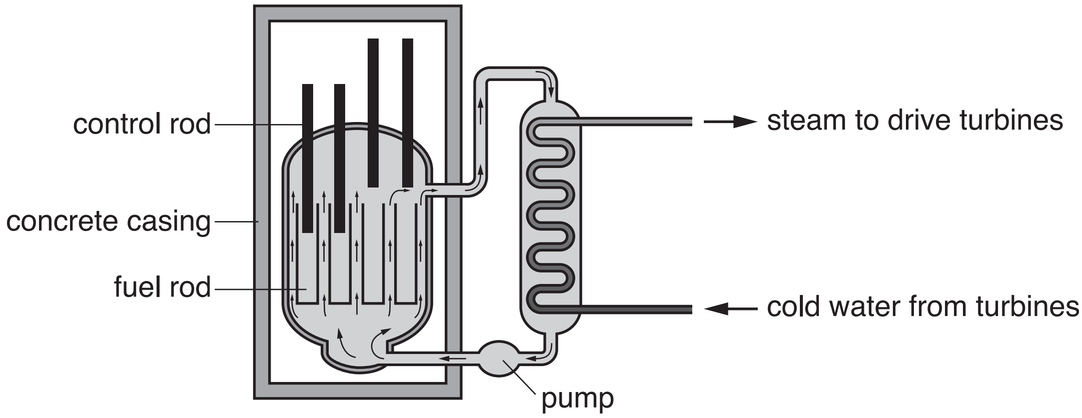


Fig. 4.1

(a) State the name of the process that releases energy in the nuclear reactor.

....[1]

(b) Suggest a suitable radioactive material used for the fuel rods.

....[1]

(c) Below are four statements that describe the operation of a nuclear power station.
They are **not** in the correct order.

J The generator produces electricity.

K The energy is used to boil water.

L The nuclei split, releasing energy.

M The steam drives a turbine.

Place the statements in the correct order.

[3]

(d) The nuclear reactor is contained in a very thick concrete casing. Suggest why.

....

....[2]

(e) Suggest one **advantage** and one **disadvantage** of a nuclear power station compared with a wind turbine.

advantage ....

....

disadvantage ....

....
[2]

(f) Wind turbines use a renewable source of energy.

State the name of another renewable source of energy.

....[1]

[Total: 10]

5 The bucket at the front of a tractor is used to push fence posts down into the ground, as shown in Fig. 5.1.

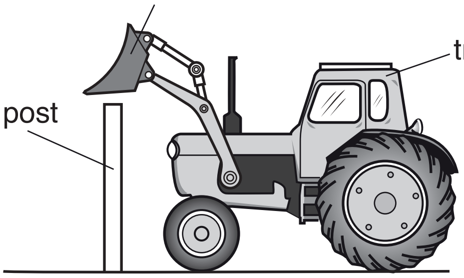


Fig. 5.1

The area of each post in contact with the ground is 100 cm^2. When the bucket pushes a post, the downward force from the post on the ground is 6500 N.

(a) Calculate the pressure that the post exerts on the ground.

pressure = ... N/cm^2 [3]

(b) A farmer cuts the bottom of one of the posts to make it more pointed. The bucket applies the same force as before.

Explain the effect this has on the pressure exerted by the post on the ground.

....

....

....

....

....[2]

[Total: 5]

6 Water can exist as ice, liquid water and steam. Fig. 6.1 represents the arrangement of the molecules in the three forms of water.

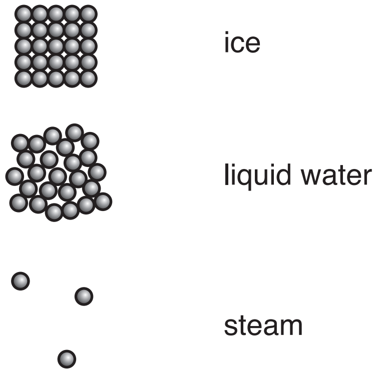
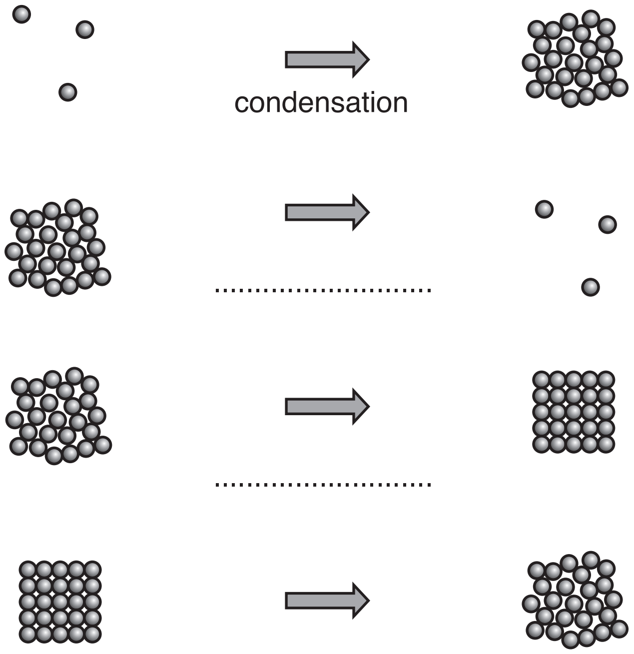


Fig. 6.1

(a) Each diagram in Fig. 6.2 shows a change of state.

Add the correct label for each change. The first has been done for you.



[3]

Fig. 6.2

(b) Some gas is heated at constant pressure.

Describe what happens to the molecules of gas as the temperature increases.

....

....[2]

(c) Fig. 6.3 shows a metal bar.

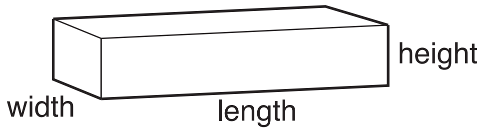


Fig. 6.3

When the metal bar is heated, the bar expands.

Identify the dimensions that increase in size when the bar is heated.
Tick (✓) all boxes that apply.

☐ length

☐ width

☐ height

[1]

(d) State one **use** and one **disadvantage** of the expansion of materials when they are heated.

use ....

disadvantage ....

[2]

[Total: 8]

7 Fig. 7.1 represents a wave on a string.

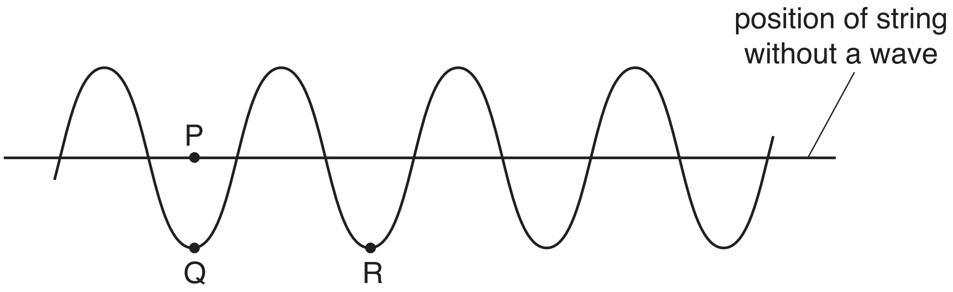


Fig. 7.1

(a) Complete the sentences about the wave. Use words from the box.

amplitude	energy	frequency	matter	oscillation	wavelength

The wave transfers ....

The number of waves per second passing point P is the ....

The distance between P and Q is the ....

The distance between points Q and R is the ....

[4]

(b) The wave on the string is an example of a transverse wave.

Explain how a transverse wave differs from a longitudinal wave.

....

....[1]

[Total: 5]

8 A cruise ship has a firework display near a cliff as shown in Fig. 8.1.

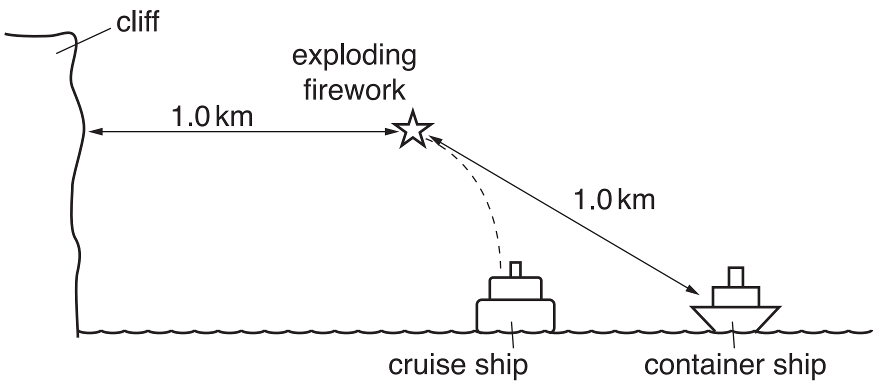


Fig. 8.1 (not to scale)

A firework is sent into the air from the cruise ship. The firework explodes with a bright flash of light and a loud bang.

(a) People on a container ship see the flash before they hear the bang.

Explain why.

....

....[2]

(b) The people on the container ship hear two bangs. They hear the second bang shortly after the first bang.

(i) Explain why they hear two bangs.

....

....[2]

(ii) The speed of sound in air is 330 m/s. The firework explodes at a distance of 1.0 km from the container ship.

1. Calculate the time for the first bang to reach the people on the container ship.

time = ... s [3]

2. Estimate the time delay between hearing the first bang and second bang.

time = ... s [1]

[Total: 8]

9 Fig. 9.1 shows an electric heating element in a beaker containing water. The heating element is switched on.

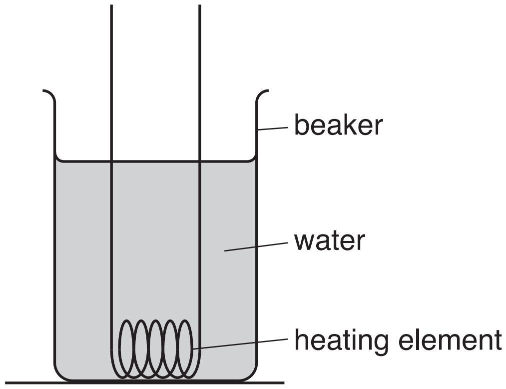


Fig. 9.1

Explain how thermal energy is transferred throughout the water in the beaker. Use ideas about density and expansion in your answer.

....

....

....

....

....

....[5]

[Total: 5]

10 Fig. 10.1 shows two mirrors placed at right angles to each other. A ray of light is incident on mirror A, which is then reflected towards mirror B.

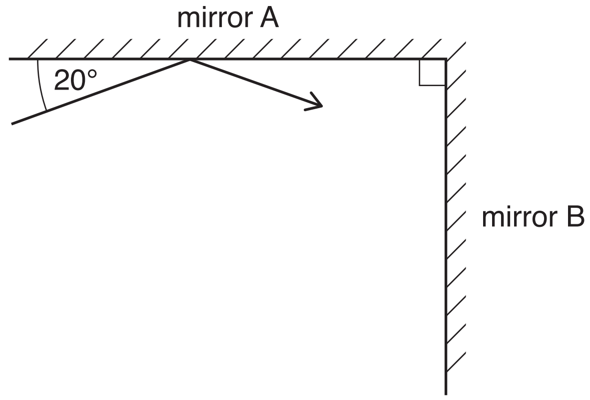


Fig. 10.1

(a) Determine the angle of incidence of the ray on mirror A.

angle of incidence = ...[1]

(b) **(i)** The ray is also reflected from mirror B.

On Fig. 10.1, continue the path of the ray of light. Show the position of the reflected ray and the normal to mirror B. [2]

(ii) On Fig. 10.1, use the letter *r* to label the angle of reflection from mirror B. [1]

(c) State the law you used to complete the ray diagram.

....[1]

[Total: 5]

11 An electrical conductor is placed between the poles of a magnet as shown in Fig. 11.1.

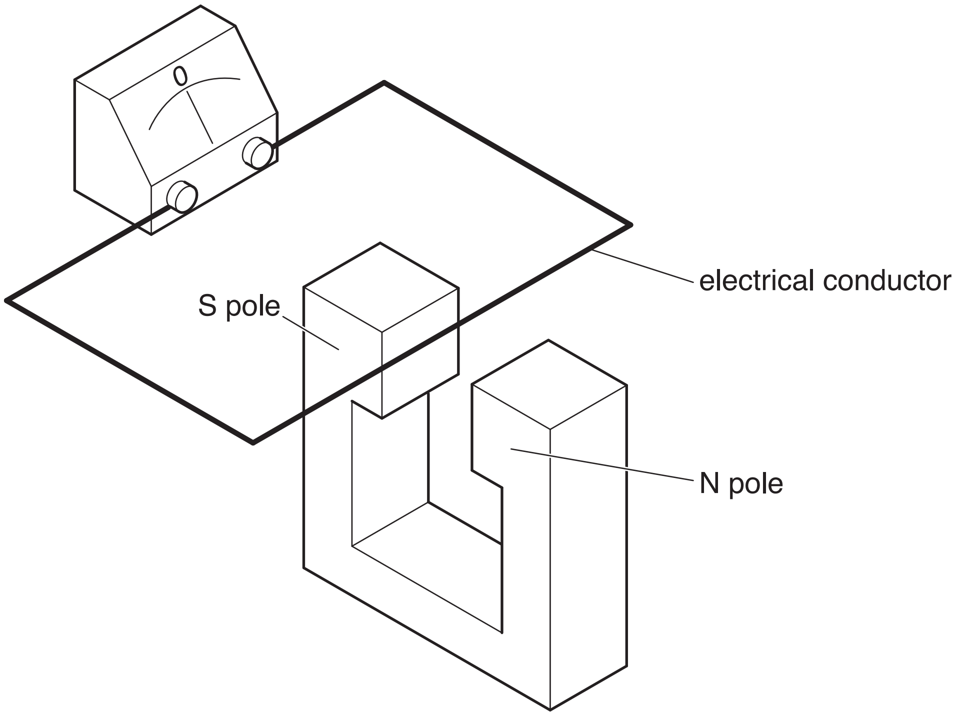


Fig. 11.1

(a) State a material from which an electrical conductor can be made.

....[1]

(b) **(i)** A centre-zero meter measures the electromotive force (e.m.f.) across the conductor.

State the unit of e.m.f.

unit = ...[1]

(ii) State what, if anything, is shown by the centre-zero meter when the conductor is moved.

- horizontally, from side-to-side, between the poles of the magnet,

....

- vertically, up-and-down, between the poles of the magnet.

....

[3]

(c) State **two** factors that affect the size of the e.m.f. across the conductor.

1 ....

2 ....

[2]

[Total: 7]

12 This question is about the structure of an atom.

(a) An atom contains three types of particle.

Complete the table with the name of each type of particle.

particle	charge
	0
	+1
	–1

[3]

(b) Draw a labelled diagram to show the structure of a lithium atom, ${}^{7}_{3}Li$.

[4]

[Total: 7]