Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/22**

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 Certifi

This document consists of **16** printed pages.

CAMBRIDGE International Examinations

1 Fig. 1.1 is the speed-time graph for the motion of a bus along a road.

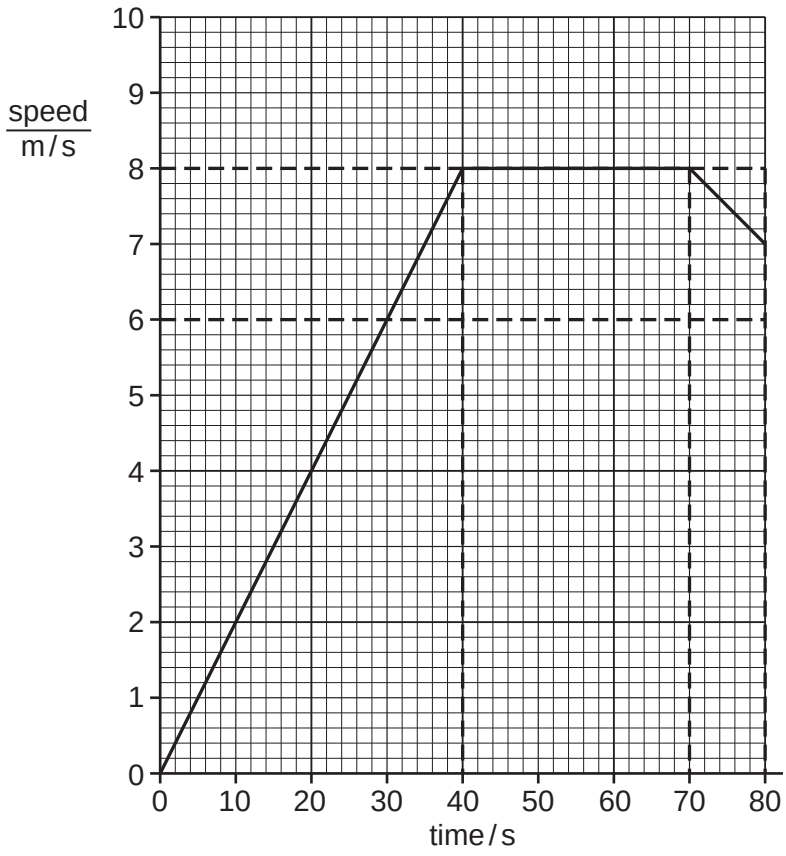

Fig. 1.1

(a) Calculate the distance travelled by the bus in the first 40 s.

distance = ... m [3]

(b) The distance travelled between 40 s and 80 s is 315 m.

Calculate the average speed of the bus during the whole 80 s.

average speed = ... m/s [4]

(c) Describe the motion of the bus

(i) between 40 s and 70 s,

.....

(ii) between 70 s and 80 s.

.....
[2]

[Total: 9]

2 A student has been told to find the density of some liquid paraffin by measuring its mass and its volume.

(a) Which piece of laboratory equipment should she use to measure the volume of the liquid paraffin?

.....[1]

(b) Which piece of laboratory equipment should she use to find the mass of the liquid paraffin?

.....[1]

(c) Describe the procedure she would follow in order to find the mass.

.....

.....

.....

.....

.....[3]

(d) These are the student's results.

mass of liquid = 62.4 g
volume of liquid = 80 cm^3

Calculate the density of the liquid paraffin.

density = ...[4]

[Total: 9]

3 A rowing boat is moving through water, in the direction shown in Fig. 3.1.

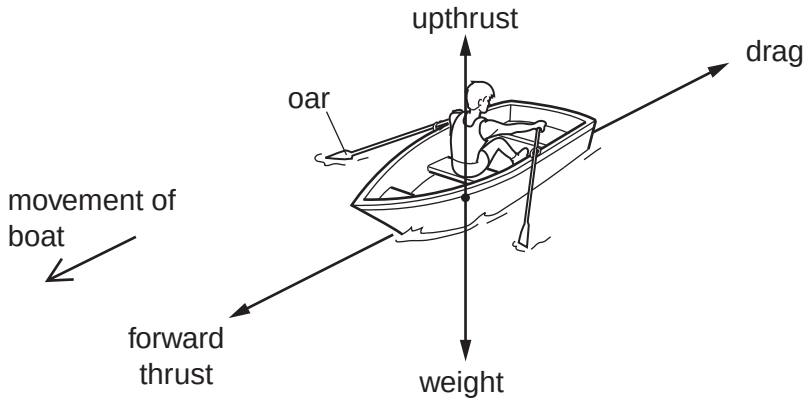

Fig. 3.1

There are four forces acting on the boat.

The weight is the force of gravity on the boat.

The upthrust is the upwards force of the water on the boat.

The forward thrust is the force that drives the boat through the water, and is caused by the action of the oars.

The drag is the resistance to the motion due to friction.

(a) The boat is floating. What can be said about the upthrust and the weight?

.....[1]

(b) Explain why it is important that the weight is not greater than the upthrust.

.....

.....[1]

(c) Describe what happens to the boat when the forward thrust is greater than the drag.

.....[2]

(d) Describe what happens to the moving boat when the oars are out of the water and the forward thrust is zero.

.....[1]

[Total: 5]

4 A metal tyre for a wooden wheel is made from an iron ring. This is shown in Fig. 4.1.

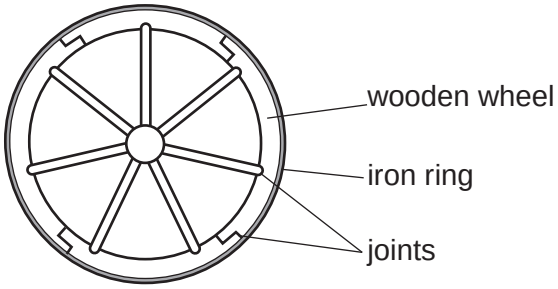

Fig. 4.1

The iron ring is made slightly too small to fit on the wheel.

(a) Explain why heating the iron ring will help it fit on the wheel.

.....

.....[1]

(b) Explain your answer to **(a)** in terms of the particles in the iron ring.

.....

.....[2]

(c) Explain what will happen to the iron ring after it has been fitted on the wheel and left to cool.

.....

.....[1]

(d) Suggest what happens to the joints in the wooden wheel after fitting the iron ring.

.....

.....[1]

[Total: 5]

5 **(a)** A copper rod and a plastic rod each pass through holes in rubber bungs, so that their ends are inside a tank, as shown in Fig. 5.1.

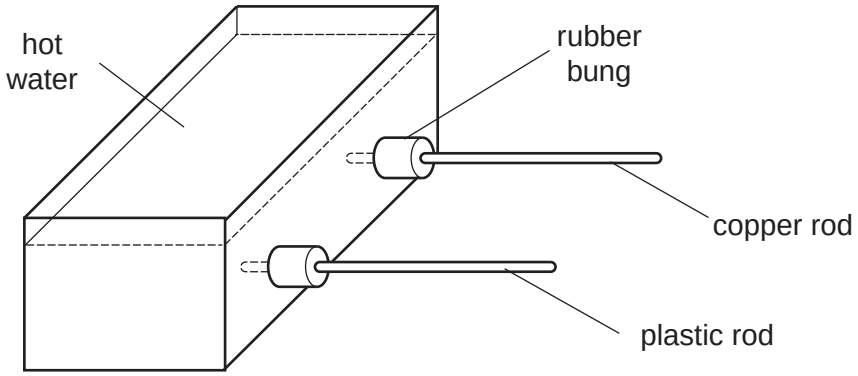

Fig. 5.1

Both rods are covered with wax.

Very hot water is poured into the tank, covering the end of each rod.

(i) What, if anything, is **seen** happening on the rods during the next few minutes?

copper rod .....

plastic rod .....
[2]

(ii) Explain your answers to **(a)(i)**.

.....

.....

.....[2]

(b) Explain, in terms of particles, how evaporation causes the hot water to cool.

.....

.....

.....

.....[3]

[Total: 7]

6 A metal rail is 330 m long. Sound travels at 5000 m / s in the metal.

(a) Calculate the time taken for a sound to travel the length of the rail.

time taken = ... s [3]

(b) Sound in air takes 1.0 s to travel 330 m.

As shown in Fig. 6.1, a man puts his right ear against one end of the rail. Another man strikes the other end of the rail with a hammer.

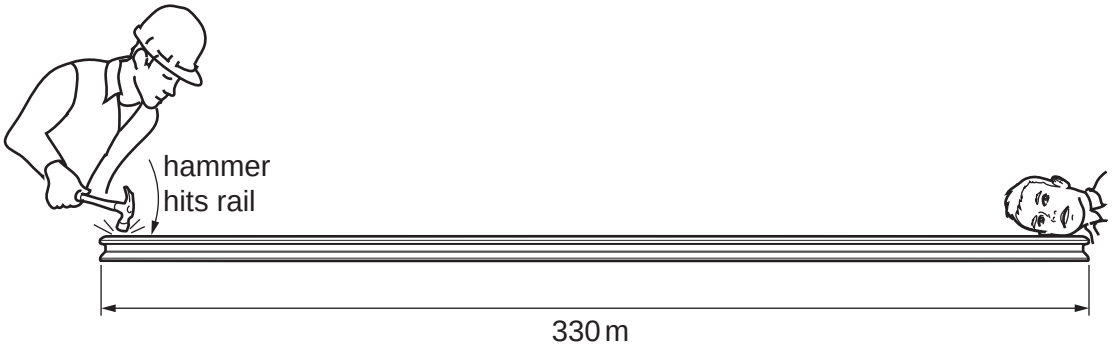

Fig. 6.1 (not to scale)

Describe and explain what each man hears.

man with hammer .....

.....

man with one ear against rail .....

.....

.....

[3]

[Total: 6]

7 **(a)** Fig. 7.1 represents a longitudinal wave.

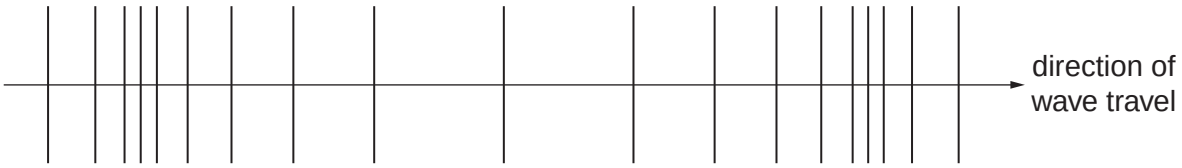

Fig. 7.1

(i) On Fig. 7.1, mark carefully a distance that represents the wavelength of the wave. [2]

(ii) A long spring (slinky) is used to demonstrate a longitudinal wave motion.

Describe how a longitudinal wave could be set up in the spring.

.....

.....

.....[1]

(b) Fig. 7.2 represents a cross-section through a water wave.

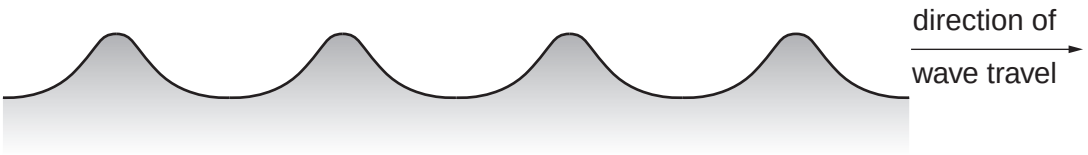

Fig. 7.2

(i) On Fig. 7.2, mark carefully a distance that represents the wavelength of the wave. [1]

(ii) Describe the change that would need to be made to Fig. 7.2 in order to show a wave of bigger amplitude.

.....

.....[1]

(c) Fig. 7.3 shows a cross-section through the water wave as it moves into a shallow region and then out of the shallow region.

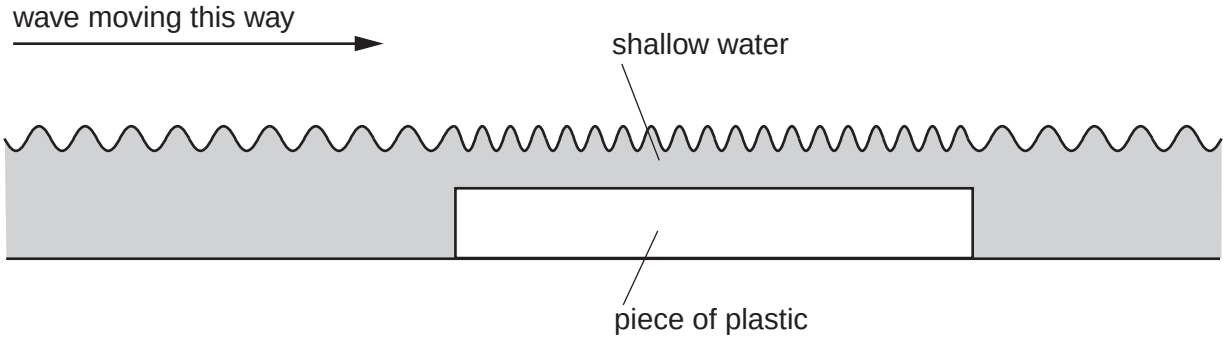

Fig. 7.3

State what, if anything, Fig. 7.3 shows happening to

(i) the amplitude of the wave as it moves into the shallow region,

.....

(ii) the wavelength of the wave as it moves into the shallow region.

.....
[2]

[Total: 7]

8 Here is a list of eight substances that may be found in a Physics laboratory.

aluminium
copper
ebonite
glass
gold
iron
plastic
silk

(a) State one substance in the list above that

(i) is a conductor, ...

(ii) is an insulator, ...

(iii) can be magnetised, ...

(iv) can be charged by rubbing with a cloth. ..... [4]

(b) Describe briefly a method for magnetising a sample of the substance named in **(a)(iii)**.

.....

.....

..... [2]

[Total: 6]

9 The electric circuit shown in Fig. 9.1 contains a battery, two resistors, a switch and another component.

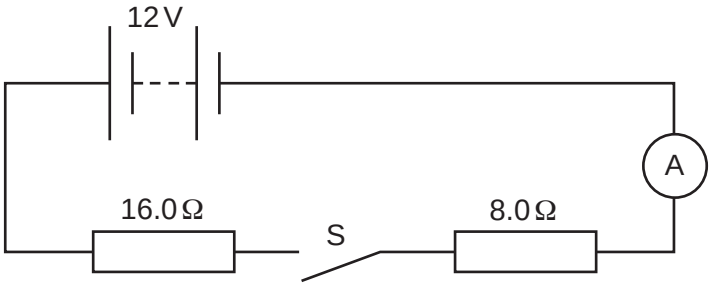

Fig. 9.1

(a) (i) Which instrument does the symbol (A) represent?

.....[1]

(ii) Which quantity does this instrument measure? Tick one box.

charge ☐

current ☐

potential difference ☐

power ☐

[1]

(b) The switch is closed so that there is a current in the circuit.

(i) What flows in the circuit in order to create the current? Tick one box.

charge	☐
potential difference	☐
power	☐
resistance	☐

[1]

(ii) Using values from Fig. 9.1, calculate

1. the combined resistance of the two resistors,

combined resistance = ... Ω [2]

2. the current in the circuit, stating the unit of your answer.

current = ...[4]

(c) When the switch is open, what is the potential difference across the 16 Ω resistor? Tick one box.

12V	☐
8.0V	☐
6.0V	☐
0V	☐

[1]

[Total: 10]

10 A laboratory technician has a 12V a.c. power supply. He wishes to use it to light a 6.0V, 1.5Ω lamp, using either a transformer or a resistor.

(a) State what will happen if he connects the lamp directly to the 12V power supply.

.....[1]

(b) **(i)** Using a standard transformer symbol, complete the circuit in Fig. 10.1 to show how the transformer could be used to light the lamp at normal brightness.

[1]

Fig. 10.1

(ii) The transformer is to light the lamp at normal brightness.

Determine the value of the ratio: $\frac{\text{number of turns on secondary coil}}{\text{number of turns on primary coil}}$.

ratio = ...[2]

(c) **(i)** Complete the circuit in Fig. 10.2 to show how a single resistor could be connected so that the lamp lights at normal brightness.

[2]

Fig. 10.2

(ii) State the value of the resistance that is needed for the lamp to light at normal brightness.

resistance = ... Ω [1]

[Total: 7]

11 One nuclide of sodium is represented in nuclide notation as $^{23}_{11}\text{Na}$.

For one neutral atom of $^{23}_{11}\text{Na}$, state

(a) its nucleon number, ...

(b) its proton number, ...

(c) the number of neutrons, ...

(d) the number of electrons. .....

[4]

[Total: 4]

Question 12 is on the next page.

12 Fig. 12.1 shows how the count rate from a radioactive specimen changes with time.

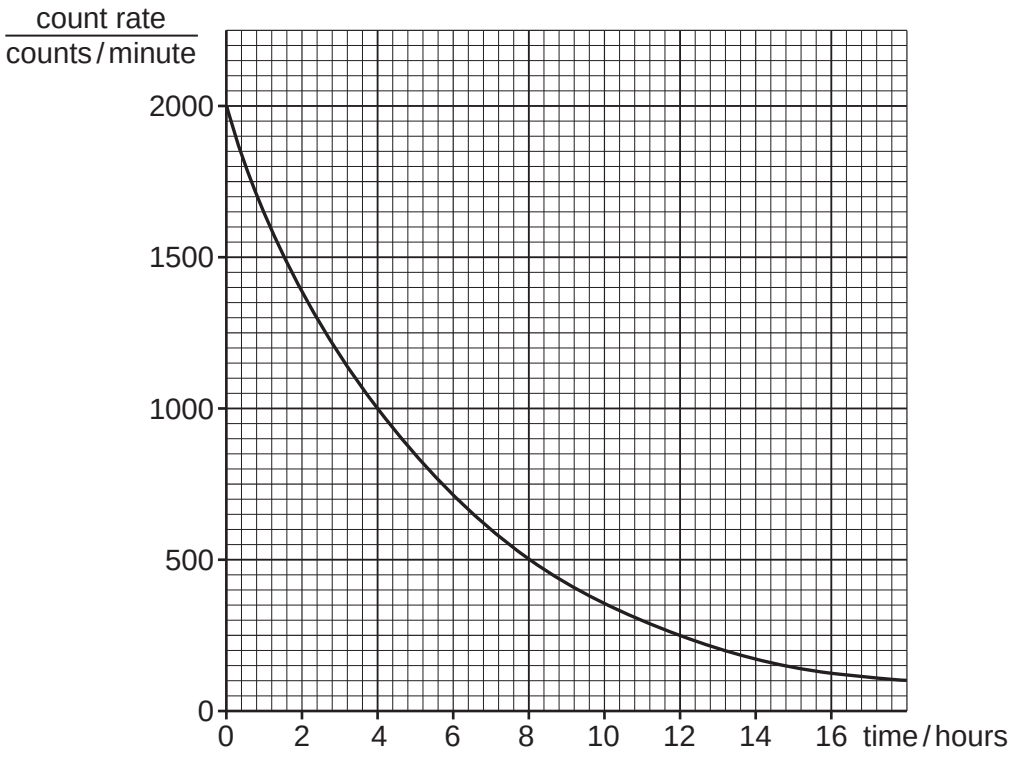

Fig. 12.1

(a) Use the graph to determine the half-life of the radioactive material. Make clear marks on the graph to show how you obtained the answer.

half-life = ... hours [2]

(b) Measurements are made over the same period of time for another specimen of the same material as the specimen in **(a)**. The second specimen has half as many radioactive atoms at time zero.

Suggest the values this second specimen gives for

(i) the count rate at time zero, ... counts / minute

(ii) the half-life, ...hours

(iii) the count rate after 16 hours. ..... counts / minute [3]

[Total: 5]