Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

4400796608

PHYSICS **0625/32**

Paper 3 Extended **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 **17** printed pages and **3** blank pages.

DC (NF/SW) 81295/4

1 Fig. 1.1 shows a distance-time graph for a moving object.

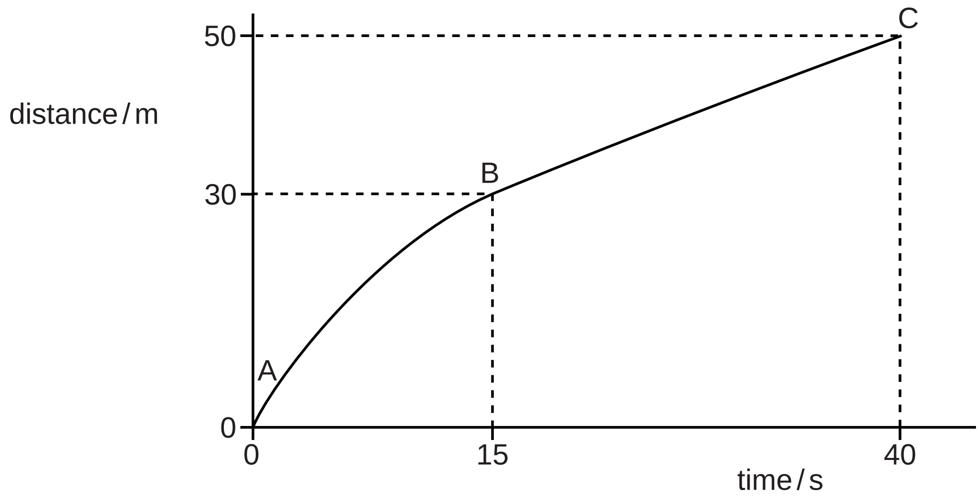

Fig. 1.1

(a) Describe the speed of the object between points

(i) A and B,

....

(ii) B and C.

....
[2]

(b) State whether the acceleration of the object is zero, negative or positive, as shown on the graph between points

(i) A and B,

....

(ii) B and C.

....
[2]

(c) Calculate the average speed of the object during the 40 seconds.

speed = ... [2]

[Total: 6]

2 A surveyor measures the dimensions of a room of constant height. Fig. 2.1 is a top view of the room and shows the measurements taken.

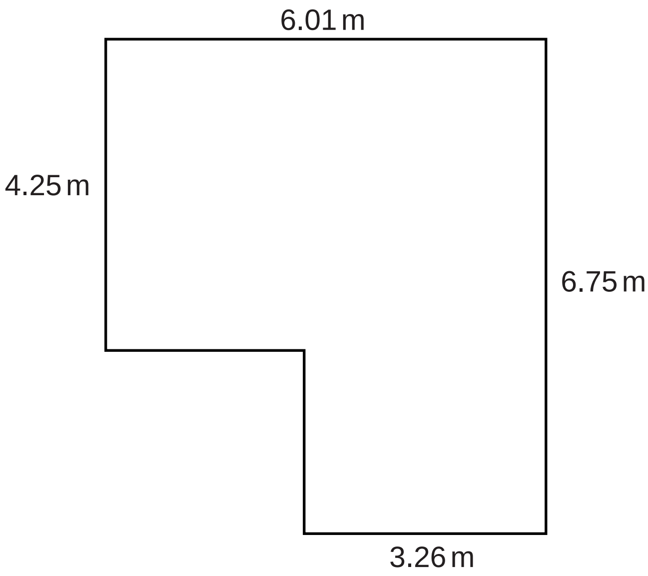

Fig. 2.1

(a) State an instrument that would be suitable to take these measurements.

.... [1]

(b) The volume of air in the room is $76.4\,m^3$. The density of the air is $1.2\,kg/m^3$.

Calculate the mass of air in the room.

mass = ... [2]

(c) A window in the room is open. The next day, the temperature of the room has increased, but the pressure of the air has stayed the same.

State and explain what has happened to the mass of air in the room.

....

....

....

.... [3]

[Total: 6]

3 When a salmon swims up a river to breed, it often has to jump up waterfalls. Fig. 3.1 shows a salmon jumping above the surface of the water. On this occasion the salmon falls back down into the river.

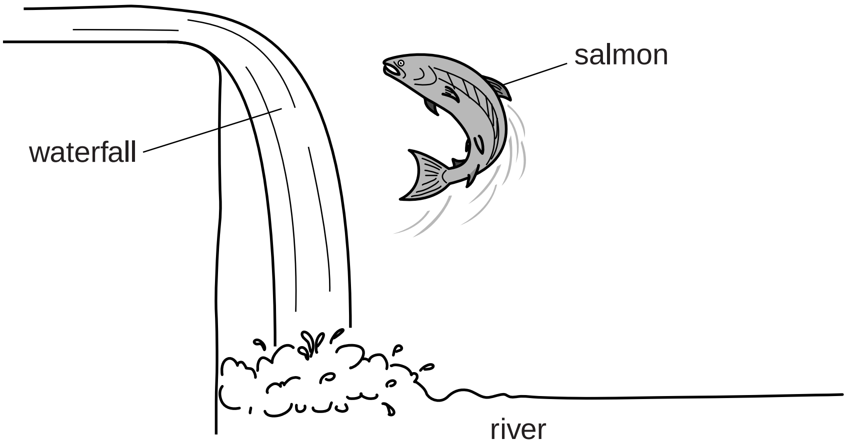

Fig. 3.1

The salmon has a mass of 2.0 kg.

(a) The salmon leaves the water vertically with a kinetic energy of 16.2 J.

(i) Calculate the speed of the salmon as it leaves the water.

speed = ... [2]

(ii) Calculate the maximum height gained by the salmon. Ignore air resistance.

gain in height = ... [3]

(iii) After the salmon has re-entered the river, it has lost nearly all its original kinetic energy.

State what has happened to the lost energy.

....

....

....

.... [2]

(b) Another salmon, of much greater mass, leaves the water vertically with the same speed.

State and explain how the height of this salmon's jump compares to the height reached by the first salmon.

....

....

.... [2]

[Total: 9]

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4 **(a)** Define the *specific heat capacity* of a substance.

....

.... [2]

(b) Fig. 4.1 shows a cylinder of aluminium heated by an electric heater.

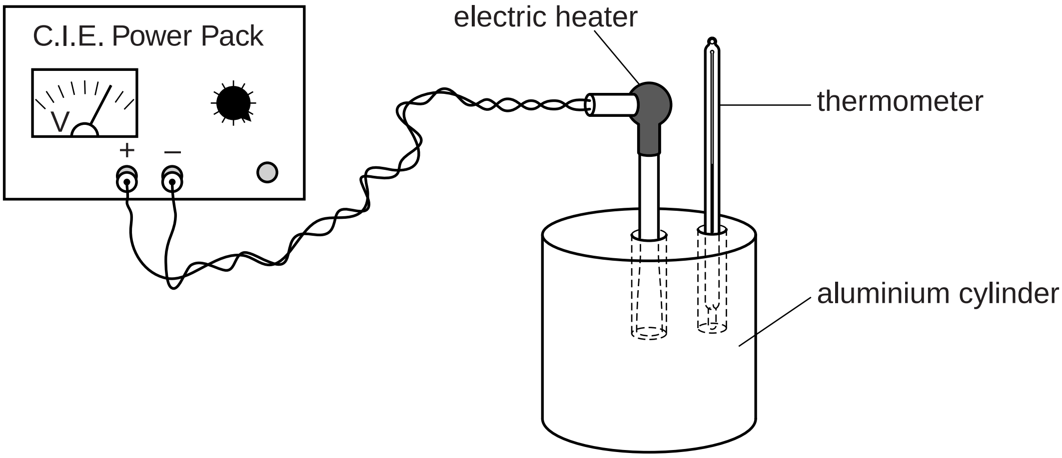

Fig. 4.1

The mass of the cylinder is 800 g. The heater delivers 8700 J of thermal energy to the cylinder and the temperature of the cylinder increases by 12 °C.

(i) Calculate a value for the specific heat capacity of aluminium.

specific heat capacity = ... [2]

(ii) Calculate the thermal capacity (heat capacity) of the aluminium cylinder.

thermal capacity = ... [2]

(c) State and explain a method of improving the accuracy of the experiment.

....

....

.... [2]

[Total: 8]

5 **(a)** Puddles of water form on a path after rainfall on a windy day.

In terms of molecules, state and explain how the rate of evaporation of the puddles is affected by

(i) a reduction of wind speed,

....

....

....

.... [2]

(ii) an increase of water temperature.

....

....

....

.... [2]

(b) Fig. 5.1 shows two puddles.

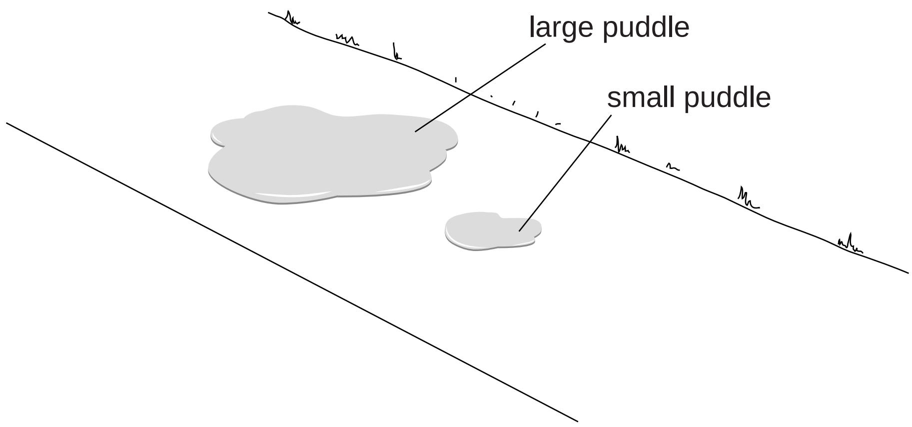

Fig. 5.1

State and explain how the rate of evaporation from the large puddle compares to that from the small puddle under the same conditions.

....

....

....

.... [2]

(c) Describe an experiment to demonstrate the difference between good and bad emitters of infra-red radiation. You may include a diagram to help your description. State what readings should be taken.

....

....

....

....

....

....[3]

[Total: 9]

6 **(a)** Fig. 6.1 shows a ray of light incident on the surface of a glass block.

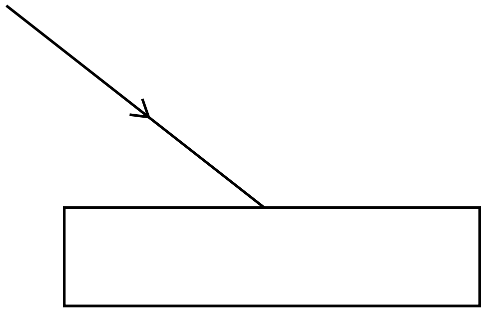

Fig. 6.1

On Fig. 6.1, accurately draw the reflected ray. [2]

(b) Fig. 6.2 shows a ray of light incident on a glass prism.

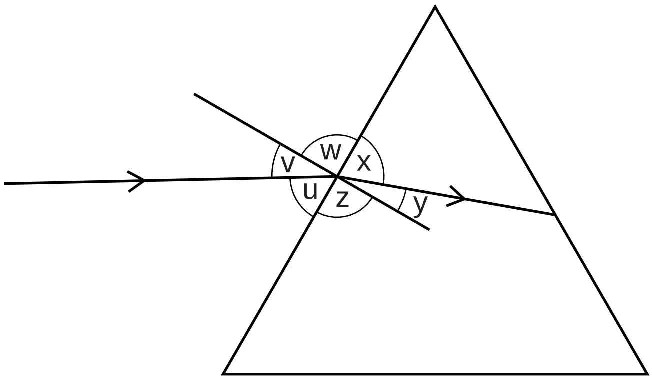

Fig. 6.2

Put **one tick only** in each line of the table to indicate which of the angles labelled in Fig. 6.2 are the angle of incidence and the angle of refraction.

	u	v	w	x	y	z
angle of incidence						
angle of refraction						

[2]

(c) The refractive index of water is 1.33. A ray of light passes from water into air. The angle of incidence at the water-air interface is 30°.

Calculate the angle of refraction.

angle of refraction = ... [3]

(d) Fig. 6.3 shows rays of violet and red light incident on a prism. The dashed line shows the path taken by the ray of violet light in the prism.

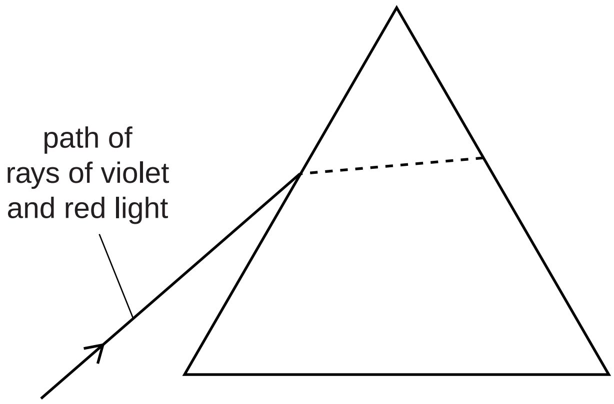

Fig. 6.3

On Fig. 6.3, draw and label the path that the ray of red light takes in the prism. A calculation is not required. [2]

[Total: 9]

7 **(a)** A solenoid connected to a battery produces a magnetic field. The wires are then connected to the battery terminals the other way round.

Tick **one** box in the table to indicate the effect on the magnetic field.

decreases but not to zero	
decreases to zero	
reverses direction	
increases	
stays the same	

[1]

(b) Fig. 7.1 shows a top view of two bar magnets and a vertical rigid conducting rod carrying a current. The direction of the current in the rod is coming **out of the paper**.

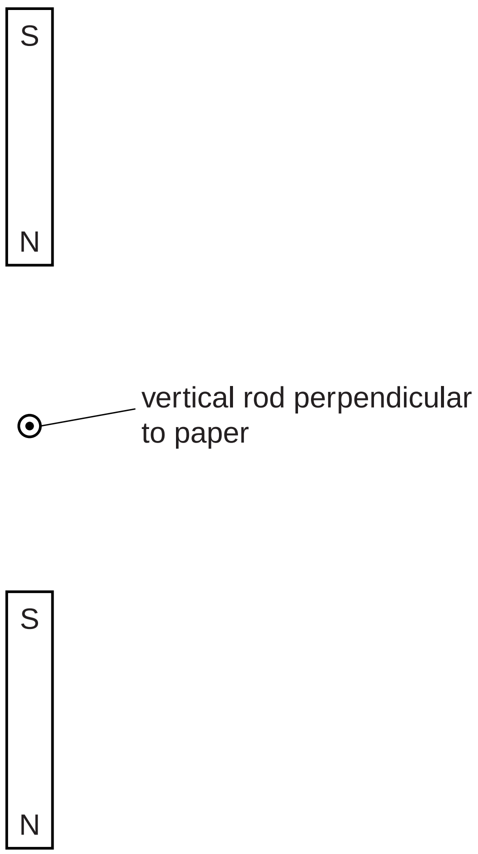

Fig. 7.1

(i) On Fig. 7.1, draw a single line with an arrow to show the direction of the magnetic field due to the bar magnets at the position of the rod. [2]

(ii) State the direction of the force exerted on the vertical rod.

.... [2]

(c) The rod has a mass of 350 g and the resultant force acting on the rod is 0.21 N. The rod is free to move.

Calculate the initial acceleration of the rod.

acceleration = ... [2]

[Total: 7]

8 Fig. 8.1 shows three cells each with e.m.f. 1.5V connected in series.

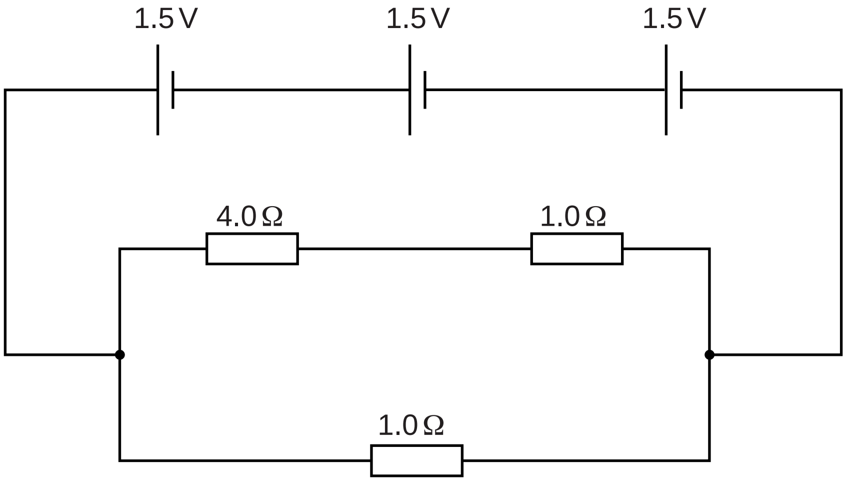

Fig. 8.1

(a) Calculate the combined e.m.f. of the cells.

e.m.f. = ... [1]

(b) Calculate the combined resistance of the three resistors shown in Fig. 8.1.

resistance = ... [2]

(c) Calculate the current in the 4.0Ω resistor in Fig. 8.1.

current = ... [3]

(d) Calculate the combined e.m.f. of the cells if one cell is reversed.

e.m.f. = ... [1]

[Total: 7]

9 Fig. 9.1 shows a positively charged plastic rod, a metal block resting on an insulator, and a wire connected to earth.

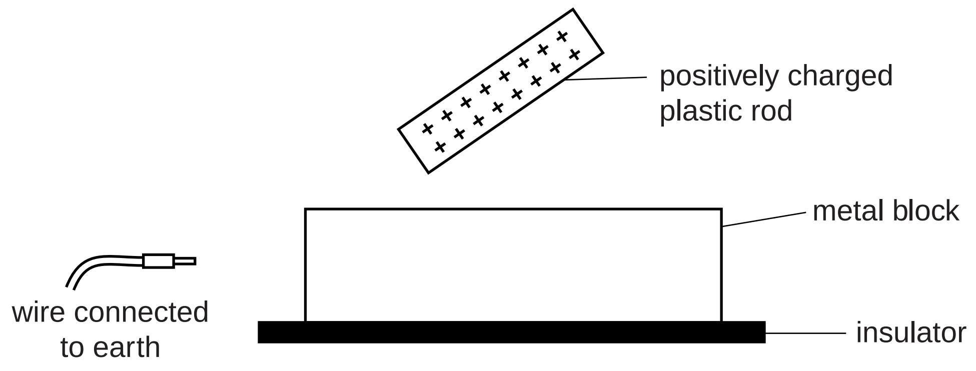

Fig. 9.1

(a) On Fig. 9.1, draw the charge distribution in the metal block. [2]

(b) The earth wire is held against the metal block, as shown in Fig. 9.2.

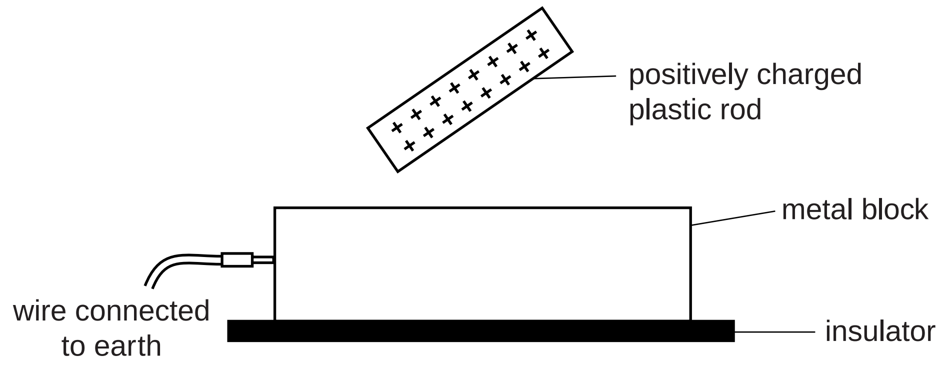

Fig. 9.2

On Fig. 9.2, draw the new charge distribution. [1]

(c) The charged rod and the earth wire are removed and the metal block is left charged.

State the order in which the rod and the wire were removed. Explain your answer.

....

....

....

.... [2]

(d) Name this charging process.

.... [1]

[Total: 6]

10 (a) Fig. 10.1 shows a digital logic circuit, not using the recognised symbols.

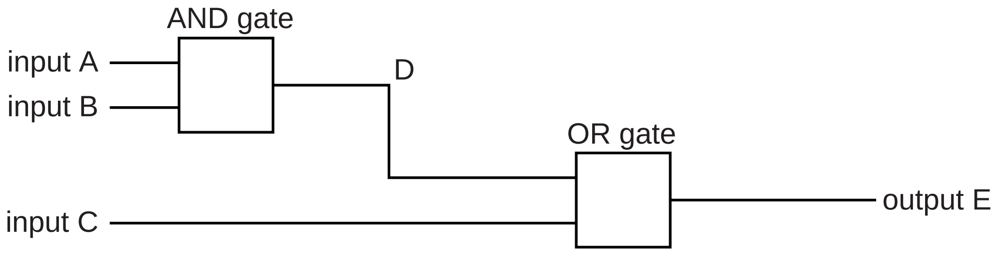

Fig. 10.1

Complete the table below to indicate the logic levels of points D and E in the circuit, when points A, B and C are at the logic levels indicated.
0 represents low or off. 1 represents high or on.

A	B	C	D	E
0	0	0		
0	0	1		
1	1	1		

[3]

(b) Draw the recognised symbol for an AND gate.

[1]

(c) A NAND gate can be replaced by an AND gate and a NOT gate.

Draw a diagram to show how the AND gate and the NOT gate should be connected. Label clearly the logic gates and any input or output.

[2]

[Total: 6]

11 Fig. 11.1 shows a beam of radiation that contains α-particles, β-particles and γ-rays. The beam enters a very strong electric field between charged plates in a vacuum.

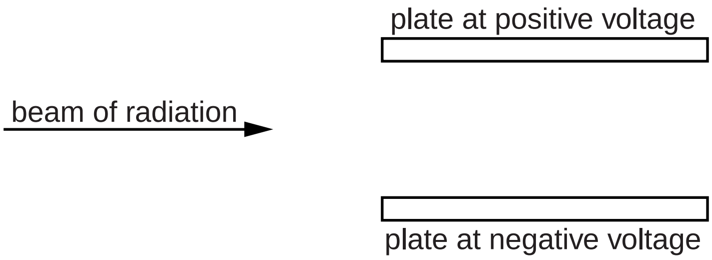

Fig. 11.1

(a) Indicate the deflection, if any, of the α-particles, β-particles and γ-rays, by placing **one** tick in **each** column of the table.

possible deflection	α-particles	β-particles	γ-rays
no deflection			
towards positive plate			
towards negative plate			
out of the paper			
into the paper			

[3]

(b) The radiation is said to be *ionising*. Explain what this means.

....

....[1]

(c) α-particles are more strongly ionising and have a shorter range in air than γ-rays.

Use your knowledge of the nature of these radiations to explain these differences.

....

....

....

.... [3]

[Total: 7]

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