Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5862445146

PHYSICS **0625/32**

Paper 3 Extended **October/November 2015**

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 **18** printed pages and **2** blank pages.

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1 A comet, travelling in space, enters the atmosphere of a planet.

Fig. 1.1 is the speed-time graph for the comet from time $t = 0$ s.

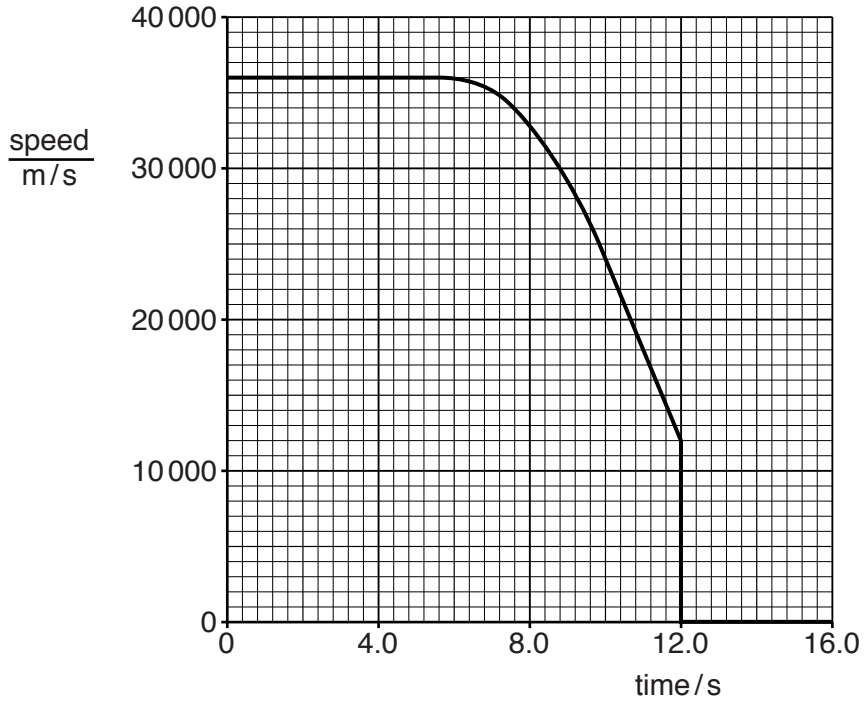

Fig. 1.1

(a) (i) During the period $t = 0$ s to $t = 6.0$ s, both the speed of the comet and the velocity of the comet remain constant.

State what this suggests about the motion of the comet.

.....

.....[1]

(ii) Determine the distance travelled during the period $t = 0$ s to $t = 6.0$ s.

distance = ...[2]

(b) Explain what the graph shows about the motion of the comet during the period $t = 6.0$ s to $t = 10.0$ s.

.....

.....

.....[2]

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(c) Determine the acceleration of the comet at $t = 11.0\,s$.

acceleration = ...[2]

(d) Suggest what happens to the comet at $t = 12.0\,s$.

.....

.....[1]

[Total: 8]

2 A student wishes to find the volume of a piece of wood of irregular shape. Her experiment requires the use of a small brass object of mass 200 g.

(a) Calculate the volume of the brass object. The density of brass is 8.4 g / cm^3.

volume = ...[2]

(b) To find the volume of the piece of wood, the student has a measuring cylinder, a supply of water and the brass object in **(a)**. The piece of wood and the brass object are small enough to be placed in the measuring cylinder.

(i) The piece of wood does not sink in water.

Suggest why.

.....[1]

(ii) Describe what the student does to find the volume of the piece of wood, stating the measurements that she makes and any calculations required.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 7]

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3 (a) (i) Define *power*.

.....[1]

(ii) In the following list, tick the **two** boxes next to the two quantities needed to calculate the work done on an object.

- ☐ mass of the object
- ☐ force acting on the object
- ☐ speed of the object
- ☐ acceleration of the object
- ☐ distance moved by the object [1]

(b) A lift (elevator) in a high building transports 12 passengers, each of mass 65 kg, through a vertical height of 150 m in a time of 64 s.

(i) Calculate the power needed to transport the passengers through this height.

power = ...[4]

(ii) The lift (elevator) is driven by an electric motor.

State a reason, other than friction, why the power supplied by the motor is greater than the power needed to transport the passengers.

.....

.....[1]

[Total: 7]

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[Turn over

4 **(a)** Fig. 4.1 shows a top view of a tourist vehicle in a game park and two elephants pushing against the vehicle. The two forces indicated are at right angles to each other.

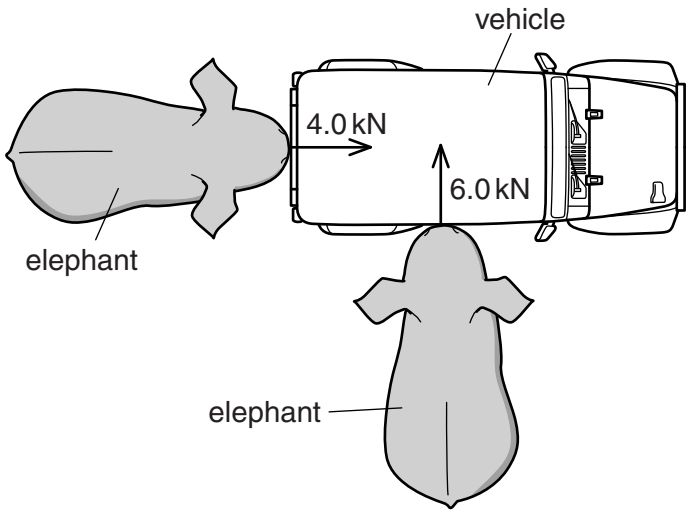

Fig. 4.1

In the space below, draw a scale vector diagram to determine the magnitude of the resultant force. Label the two forces applied and the resultant, and clearly state the scale you use.

magnitude of resultant force = ...[3]

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(b) Fig. 4.2 shows another elephant pushing horizontally against a vehicle with a force of 11 kN at a distance 1.8 m above the ground. Point M is the centre of mass of the vehicle.

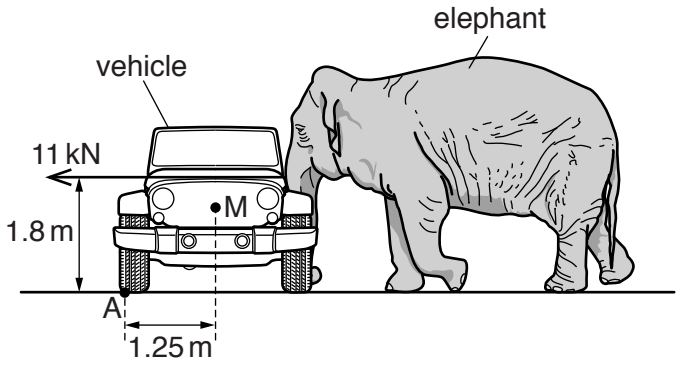

Fig. 4.2

(i) Calculate the moment about point A of the force exerted by the elephant.

moment = ...[2]

(ii) The mass of the vehicle is 1900 kg, and it does not slide when pushed by the elephant.

Determine whether the elephant tips the vehicle over. Show your working.

calculation

conclusion .....[2]

[Total: 7]

5 **(a)** X and Y are liquid-in-glass thermometers. The scale of each thermometer starts at 0 °C.

X has a large range, good linearity and high sensitivity.
Y has a small range, poor linearity and low sensitivity.

Explain what is meant by

(i) the difference in their *ranges*,

.....

.....

(ii) the difference in their *linearities*,

.....

.....

(iii) the difference in their *sensitivities*.

.....

.....

[3]

(b) A thermocouple is used to measure the temperature of a small volume of liquid.

(i) Draw and label a sketch of the arrangement.

[3]

(ii) The temperature of the liquid is changing rapidly.

Explain why the thermocouple is able to respond quickly to this rapid change.

.....

.....

.....[2]

[Total: 8]

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6 **(a)** In the space below, draw a simple labelled diagram of the apparatus used to demonstrate Brownian motion.

[2]

(b) State what is observed.

.....

.....

.....[2]

(c) Explain what is observed in terms of molecules.

.....

.....

.....

.....[2]

[Total: 6]

7 Sound from a loudspeaker is travelling in air towards a solid wall.

Fig. 7.1 shows compressions of the incident sound wave and the direction of travel of the wave.

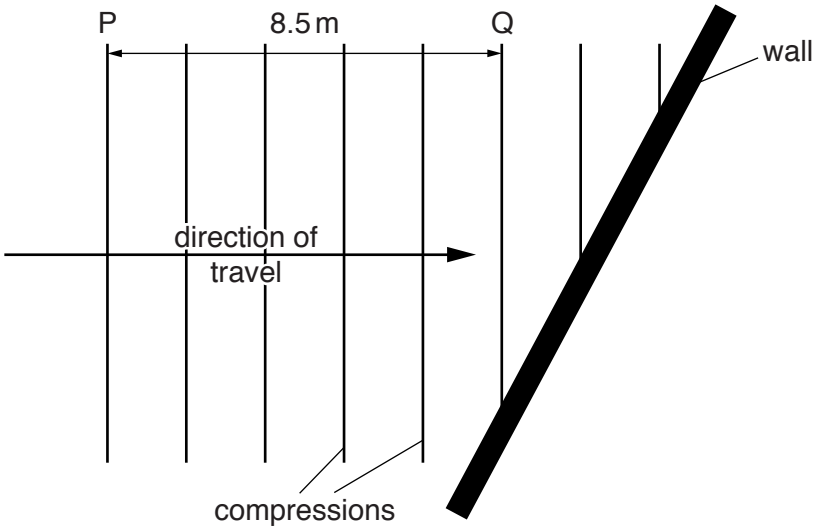

Fig. 7.1

(a) State what is meant by a *compression*.

.....

.....[1]

(b) The distance from point P to point Q is 8.5 m. It takes 25 ms for the compression at P to reach Q.

For this sound wave, determine

(i) the wavelength,

wavelength = ...[1]

(ii) the frequency.

frequency = ...[2]

(c) As it strikes the wall, the sound reflects.

Complete Fig. 7.1 to show the positions of three compressions of the reflected sound wave. [2]

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(d) The loudspeaker is immersed in water, where it continues to produce sound of the same frequency.

State and explain how the wavelength of the sound wave in water compares with the wavelength determined in **(b)(i)**.

.....

.....

.....[2]

[Total: 8]

8 **(a)** Fig. 8.1 is a ray diagram of a convex lens being used as a magnifying glass to produce a virtual image.

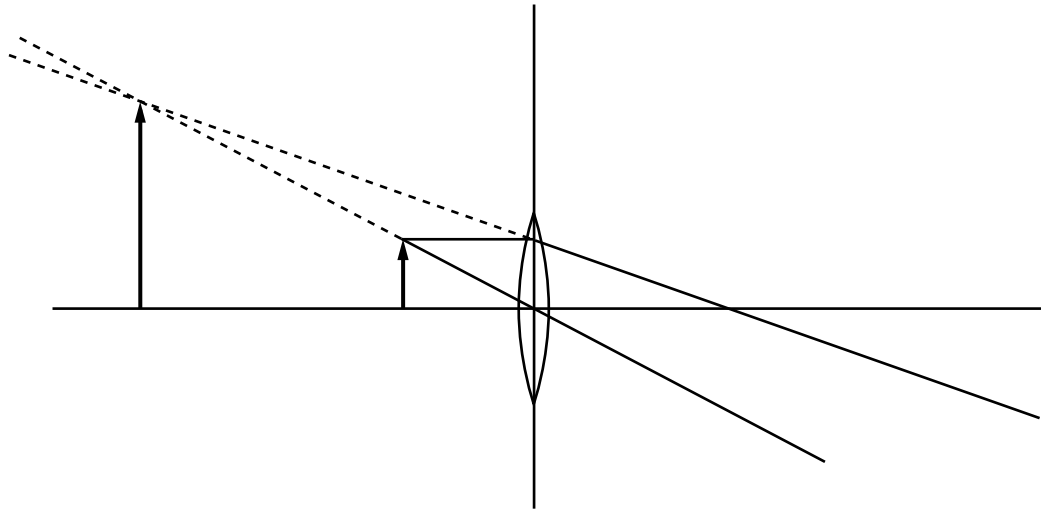

Fig. 8.1

On Fig. 8.1,

(i) label the object O,

(ii) label the image I,

(iii) label a principal focus F,

(iv) put arrows on the two rays to indicate their directions.

[4]

(b) Fig. 8.2 shows a ray of light in air incident on an interface with glass. The refractive index of glass is 1.5.

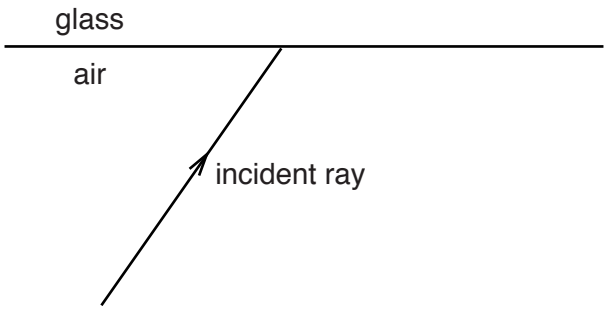

Fig. 8.2

On Fig. 8.2, accurately draw the ray as it travels in the glass. You will need to take a measurement from Fig. 8.2 and carry out an appropriate calculation. Show your working.

[3]

[Total: 7]

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[Turn over

9 **(a)** Fig. 9.1 shows the symbol for a logic gate.

Fig. 9.1

(i) State the name of this gate.

.....

(ii) On Fig. 9.1, clearly label an input and an output.

[2]

(b) In the space below, draw the symbol for a fuse.

[1]

(c) Fig. 9.2 shows a circuit.

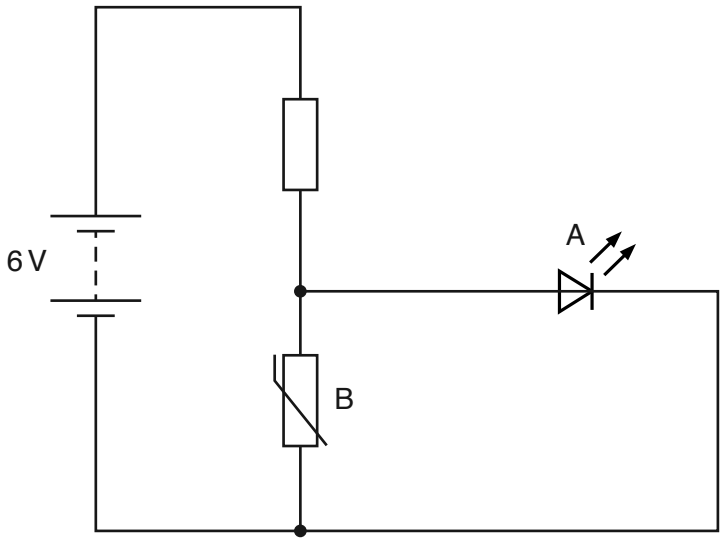

Fig. 9.2

Component A is not emitting light. It only emits light when the p.d. across it is greater than 1 V.

(i) A change to the environment around component B causes component A to emit light.

State the environmental change.

.....[1]

(ii) Explain your answer to **(i)**.

.....

.....

.....

.....[3]

(d) The combined resistance of the two resistors shown in Fig. 9.3 is 4.0 Ω.

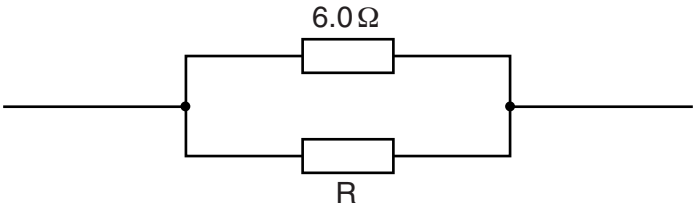

Fig. 9.3

Calculate the resistance of resistor R.

resistance of R = ...[2]

[Total: 9]

10 **(a)** Fig. 10.1 shows the gap between the N-pole and the S-pole of a magnet.

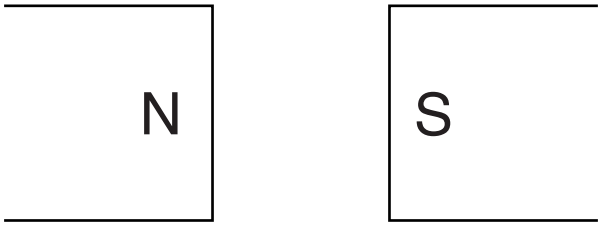

Fig. 10.1

The magnetic field in the gap is uniform.

On Fig. 10.1, draw four field lines to show the pattern and direction of the magnetic field in the gap. [2]

(b) Fig. 10.2 shows a horizontal copper wire PQ between two opposite magnetic poles.

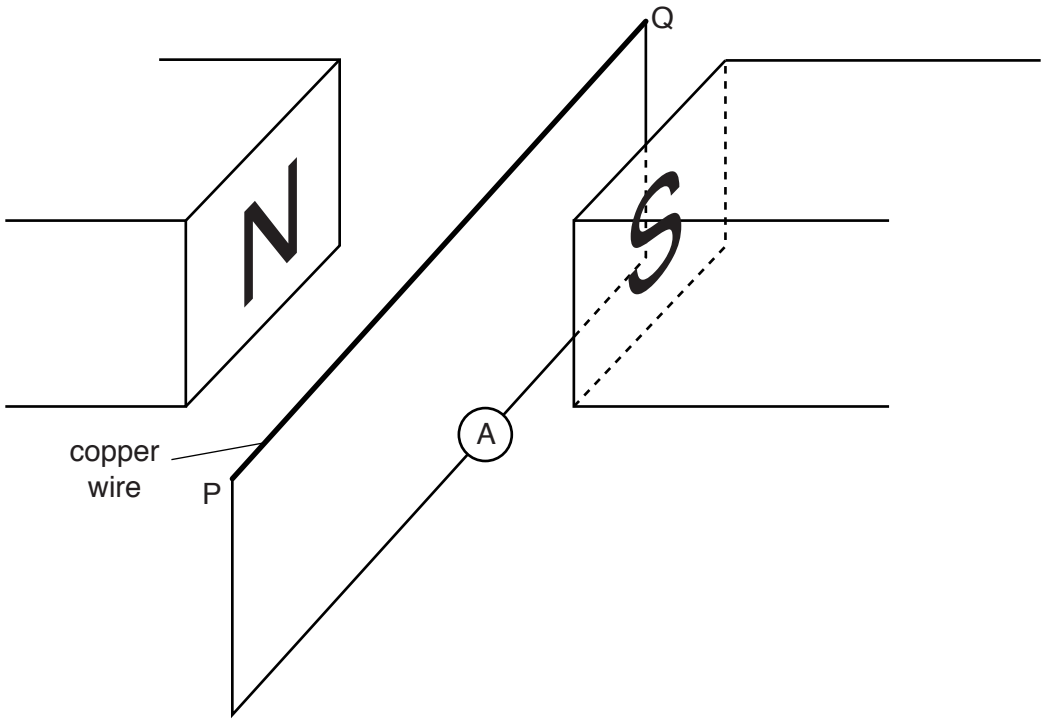

Fig. 10.2

A circuit is made by connecting a sensitive digital ammeter between P and Q. The wire PQ is then moved vertically downwards.

(i) State and explain what is observed on the ammeter.

.....

.....

.....

.....[3]

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(ii) State what is observed on the ammeter when PQ is moved

1. vertically downwards at a greater speed,

.....[1]

2. vertically upwards at the same speed as in **1**.

.....[1]

[Total: 7]

11 **(a)** The counter of a radiation detector placed close to a radioactive source gives a count rate of 1600 counts / s. The half-life of the source is 1 week.

Ignoring background radiation, calculate the count rate

(i) 1 week after the first measurement,

count rate = ...[1]

(ii) 3 weeks after the first measurement.

count rate = ...[1]

(b) Fig. 11.1 shows the arrangement for an experiment to investigate the shielding of radioactive sources.

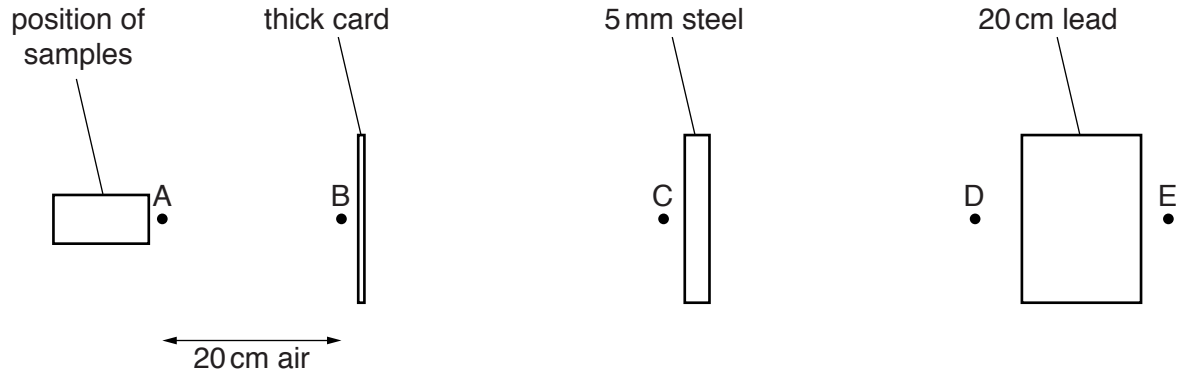

Fig. 11.1 (not to scale)

Samples containing three different radioactive sources are placed, one at a time, in the position shown.

The table shows the count rates when a radiation detector is placed at the positions A to E.

Complete the table to indicate whether α-particles, β-particles or γ-rays are emitted from each sample.

	A	B	C	D	E	type of radiation emitted
sample 1	high	high	high	high	low	
sample 2	high	high	low	0	0	
sample 3	high	0	0	0	0	

[3]

(c) State which type of radiation, α, β or γ, is the most strongly ionising.

.....[1]

[Total: 6]

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