Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/32**

Paper 3 Theory (Core) **May/June 2023**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

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1 A student measures the diameter of some identical steel balls. Fig. 1.1 shows the arrangement she uses.

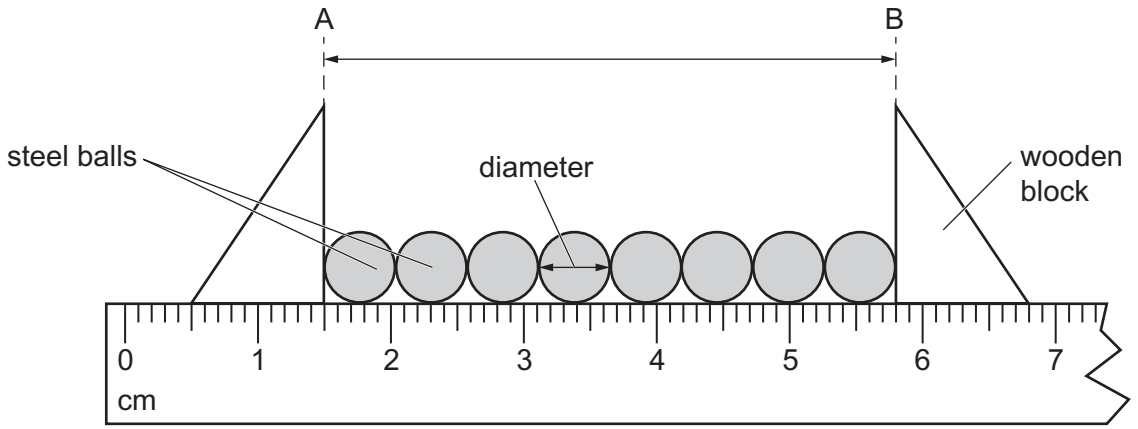

Fig. 1.1 (not to scale)

(a) **(i)** Using the ruler in Fig. 1.1, determine the distance AB on Fig. 1.1.

View solution

distance AB = ... cm [2]

(ii) Use the distance AB to determine the diameter of one steel ball.

View solution

diameter of one steel ball = ... cm [2]

(b) The mass of some steel balls is 54 g and the total volume of these steel balls is 6.9 cm^3.

View solution

Calculate the density of the steel.

density of steel = ... g/cm^3 [3]

[Total: 7]

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2 Fig. 2.1 shows the speed–time graph for a cyclist.

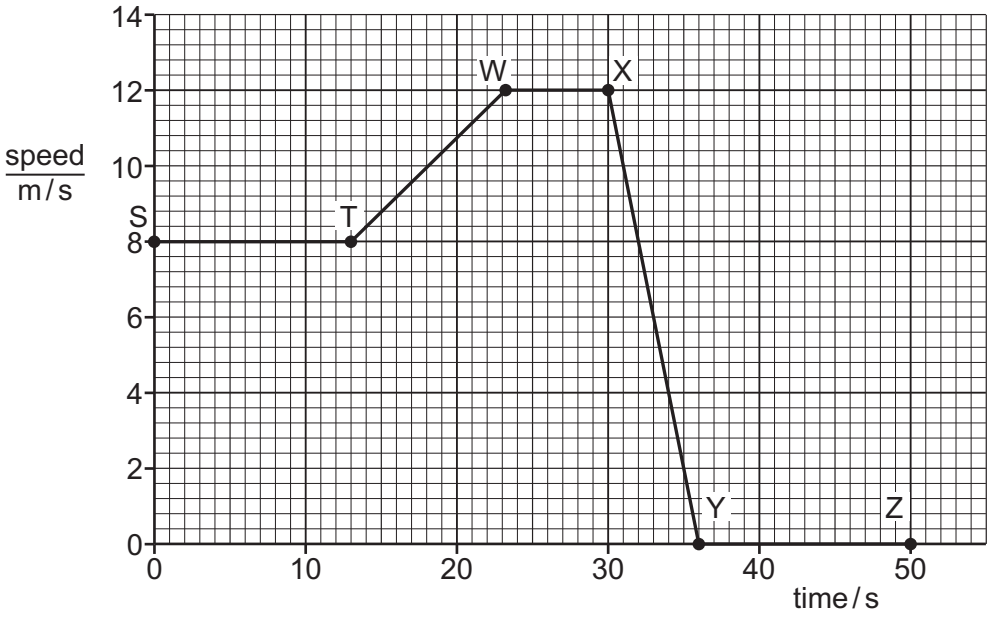

Fig. 2.1

(a) In Fig. 2.1, the sections ST, TW, WX, XY and YZ indicate stages of the cyclist's journey.

State **one** section which shows the cyclist **moving** with:

(i) constant speed

..... [1]

(ii) constant deceleration

..... [1]

(iii) constant non-zero acceleration.

..... [1]

(b) Calculate the distance travelled by the cyclist in section ST.

distance travelled = ... m [3]

(c) Fig. 2.2 shows the horizontal forces on a cyclist.

View solution



Fig. 2.2

(i) Calculate the size of the resultant force on the cyclist.

resultant force = ... N [1]

(ii) State the effect, if any, of the resultant force on the motion of the cyclist.

..... [1]

[Total: 8]

View solution

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3 A student has a battery-powered torch. Fig. 3.1 shows the torch.

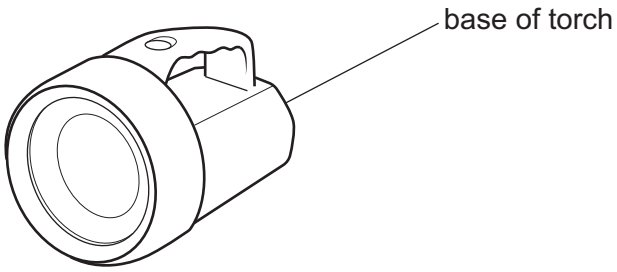
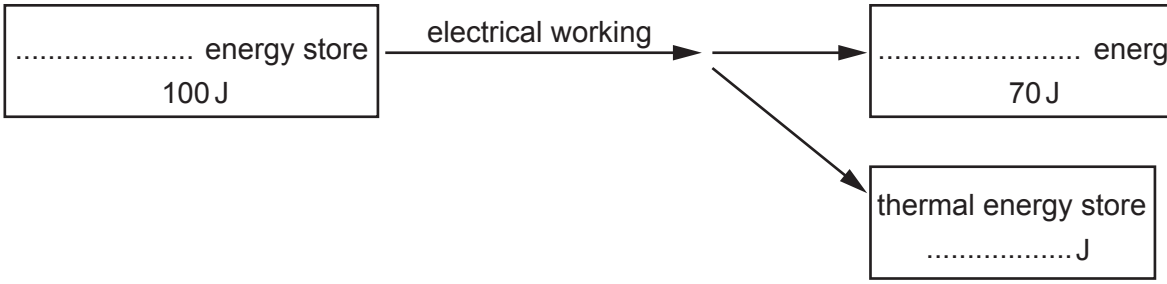


Fig. 3.1

(a) Fig. 3.2 shows the energy transfers when the torch is switched on. The diagram is incomplete.



View solution

Fig. 3.2

Show the energy transfers in the torch by completing the labels on Fig. 3.2. [3]

(b) The weight of the torch is 8.5 N. The student lifts the torch a vertical distance of 0.80 m to place it on a shelf.

Calculate the work done on the torch by the student.

View solution

work done = ... J [3]

(c) The student places the torch on its base on a shelf. The area of the base of the torch is 44 cm^2. The weight of the torch is 8.5 N.

Calculate the pressure on the shelf due to the torch.

View solution

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

[Total: 9]

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4 A student has a block of solid metal at room temperature.

(a) (i) Describe the arrangement, separation and motion of the particles in the solid metal.

View solution

.....

.....

.....

..... [3]

(ii) The student cools the block of metal in a freezer.

View solution

State the effect, if any, of cooling on the kinetic energy of the particles in the block of metal.

..... [1]

(b) (i) State the name of the temperature at which particles have the least kinetic energy.

..... [1]

(ii) State the value of temperature at which particles have the least kinetic energy. Include the unit.

..... [1]

(c) The metal block emits thermal radiation from its surface.

View solution

State **two** features of a surface that is a good emitter of thermal radiation.

1 .....

2 .....

[2]

[Total: 8]

5 An observer stands at P and looks into a rock quarry. A small explosion takes place at X in the quarry.

Fig. 5.1 shows the situation.

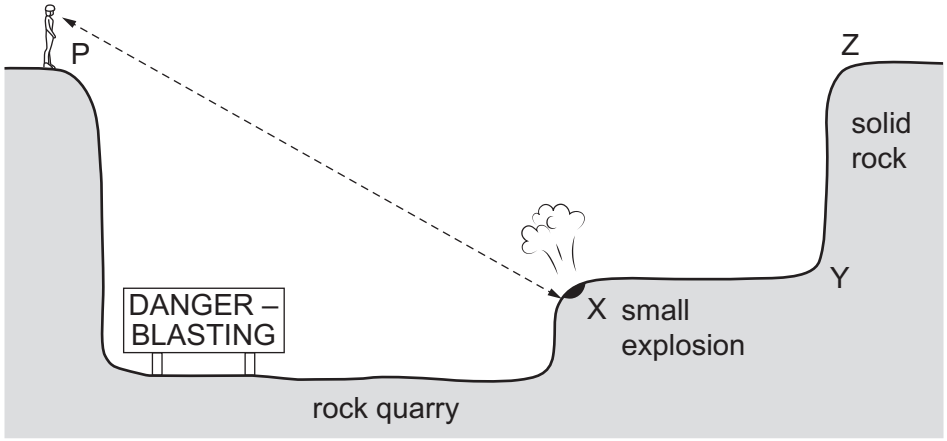

Fig. 5.1 (not to scale)

(a) The observer first hears the sound from the explosion 1.8 s after the explosion occurs. The speed of the sound is 340 m / s.

View solution

(i) Calculate the distance XP from the explosion at X to the observer at P.

distance XP = ... m [3]

(ii) The observer then hears a quieter sound from the explosion.

View solution

Suggest how the quieter sound waves reach the observer.

.....

..... [2]

(b) Before the explosion, a warning siren produces a sound. The wavelength of the sound is 0.28 m.

View solution

The speed of the sound is 340 m / s.

Calculate the frequency of the sound.

frequency = ... Hz [3]

[Total: 8]

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6 Fig. 6.1 shows light waves passing from air into a glass block.

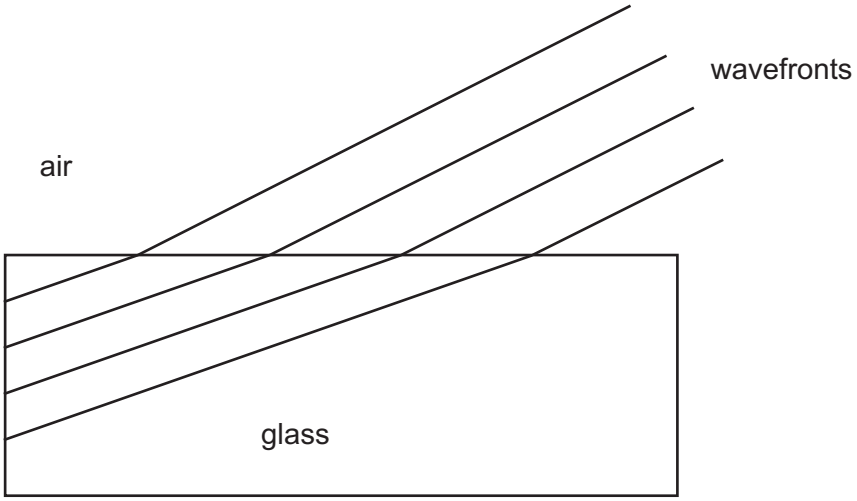

Fig. 6.1 (not to scale)

View solution

(a) (i) State the name of the process shown in Fig. 6.1 as the wavefronts enter the glass block.

..... [1]

(ii) State **two** changes in the light waves as they pass from air into glass.

View solution

1 .....

2 .....

[2]

(b) Fig. 6.2 shows a ray of red light travelling through a glass fibre. The glass fibre is made of solid glass.

View solution

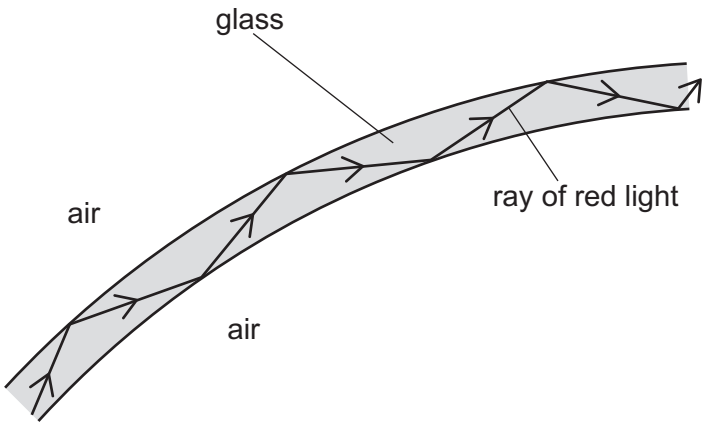

Fig. 6.2

State and explain how the ray of red light travels through the glass fibre as shown in Fig. 6.2.

.....

.....

..... [3]

[Total: 6]

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7 A student uses a permanent magnet to lift some unmagnetised nails. Some of the nails are made of iron and some are made of steel. Fig. 7.1 shows the magnet lifting the nails.

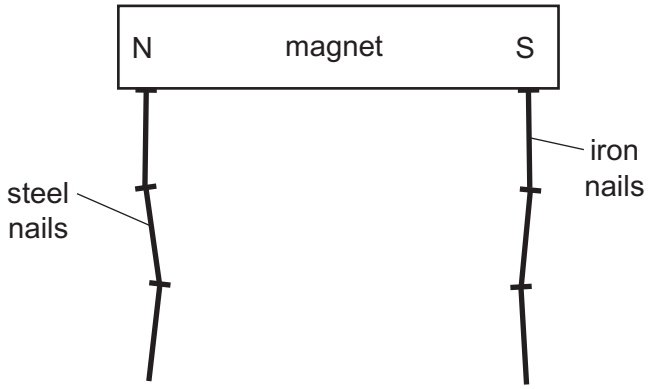

Fig. 7.1

View solution

(a) (i) Each nail lifts the nail below it by induced magnetism.

Describe what is meant by induced magnetism.

.....

..... [2]

(ii) The student leaves the nails attached to the magnet for several hours, then removes the magnet.

State a difference between a magnetic property of the iron nails and of the steel nails.

.....

..... [1]

(b) A metal wire XY is connected to a voltmeter. The wire is placed between the poles of a permanent magnet. Fig. 7.2 shows the arrangement.

View solution

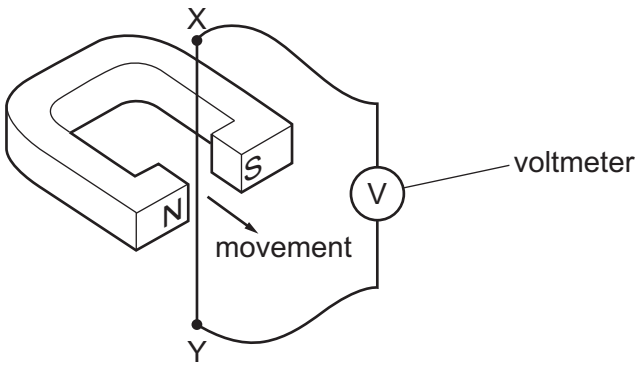

Fig. 7.2

(i) State the reading on the voltmeter when the wire is stationary between the poles.

..... [1]

(ii) Give a reason for the reading on the voltmeter when the wire is moving in the direction shown in Fig. 7.2.

.....

..... [1]

[Total: 5]

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8 A student uses the circuit in Fig. 8.1 to measure the resistance of the heater in the circuit.

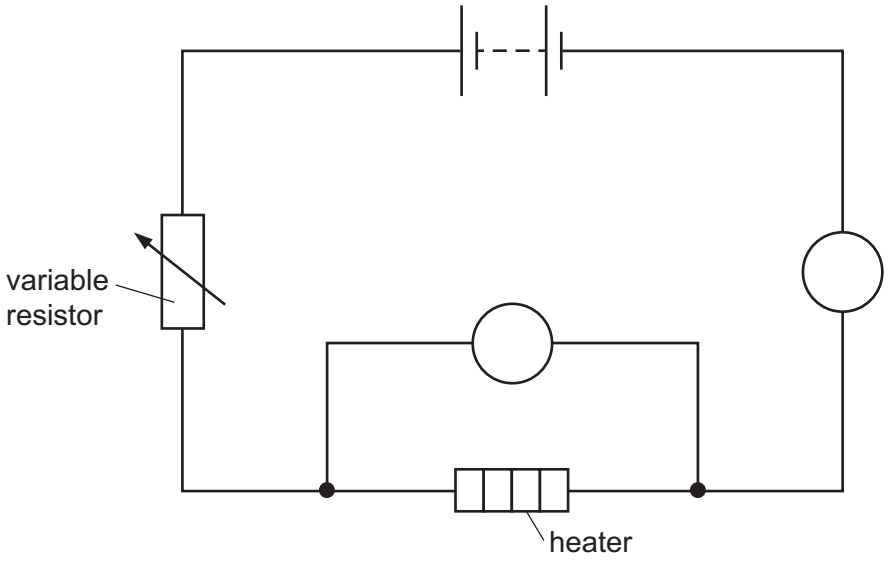

Fig. 8.1

(a) The symbols for the meters in Fig. 8.1 are incomplete.

View solution

Complete the symbols for the two meters by writing in the circles in Fig. 8.1. [2]

(b) The current in the heater is 1.4 A and the potential difference (p.d.) across the heater is 8.0 V.

Calculate the resistance of the heater.

View solution

resistance = ... Ω [3]

(c) The heater is switched on for 30 s. The current in the heater is 1.4 A and the p.d. across it is 8.0 V.

Calculate the electrical energy transferred by the heater during the 30 s.

View solution

energy transferred = ... J [3]

[Total: 8]

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9 A student has a desktop computer that connects to the 240 V a.c. mains electrical supply. Fig. 9.1 shows the desktop computer.

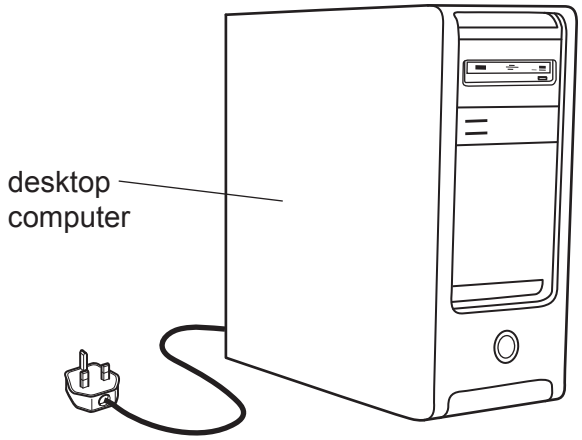

Fig. 9.1

(a) The desktop computer has an on-off switch in one of the wires that connect it to the mains supply.

State and explain which wire includes the switch.

View solution

.....

.....

..... [3]

(b) The desktop computer uses a transformer to change the 240 V a.c. voltage to a 12 V a.c. voltage.

(i) State the name of this type of transformer.

View solution

..... [1]

(ii) Describe the construction of this transformer. You may include a labelled diagram.

View solution

.....

.....

.....

..... [4]

[Total: 8]

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10 Iodine-131 is a radioactive isotope of the element iodine. Fig. 10.1 shows the nuclide notation for a nucleus of iodine-131.

$$^{131}_{53}\mathrm{I}$$

Fig. 10.1

(a) (i) Determine the number of protons in one nucleus of iodine-131.

View solution

number of protons = ... [1]

(ii) Determine the number of neutrons in one nucleus of iodine-131.

View solution

number of neutrons = ... [1]

(b) When a nucleus of iodine-131 decays, it emits a beta (β)-particle and a gamma (γ) ray.

View solution

State the nature of a beta-particle and a gamma ray.

A beta-particle is .....

A gamma ray is .....

[2]

(c) A sample contains 1.6 mg of iodine-131.
The half-life of iodine-131 is 8.0 days.

View solution

Calculate the mass of iodine-131 remaining in the sample after 24.0 days.

mass of iodine-131 remaining = ... mg [3]

[Total: 7]

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11 Fig. 11.1 shows the Sun and the four innermost planets, A, B, C, and D, of the Solar System.

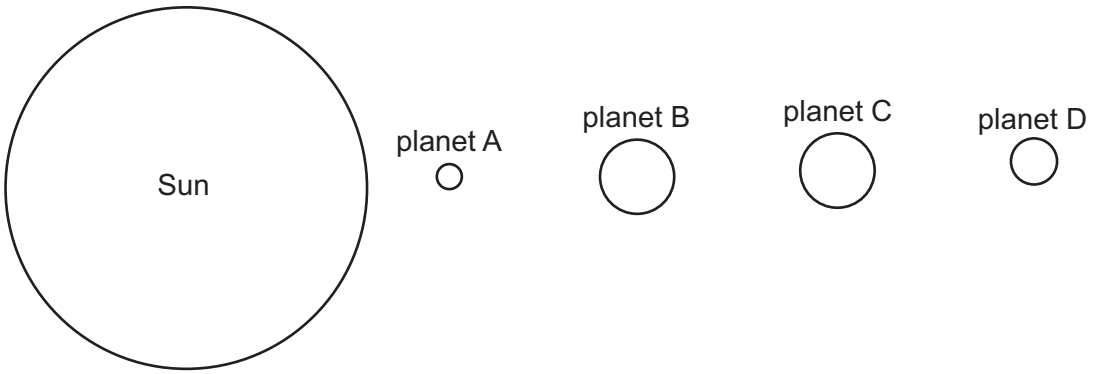

Fig. 11.1 (not to scale)

(a) In Table 11.1, write the names of the innermost planets. One is done for you.

View solution

Table 11.1

planet	name of planet
A	
B	Venus
C	
D	

[2]

(b) Describe how the four innermost planets of the Solar System were formed.

View solution

.....

.....

.....

..... [4]

[Total: 6]

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