Location Entry Codes

As part of CIE's continual commitment to maintaining best practice in assessment, CIE uses different variants of some question papers for our most popular assessments with large and widespread candidature. The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions is unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiners' Reports that are available.

Question Paper	Mark Scheme	Principal Examiner's Report
Introduction	Introduction	Introduction
First variant Question Paper	First variant Mark Scheme	First variant Principal Examiner's Report
Second variant Question Paper	Second variant Mark Scheme	Second variant Principal Examiner's Report

Who can I contact for further information on these changes?
Please direct any questions about this to CIE's Customer Services team at:
international@cie.org.uk

The titles for the variant items should correspond with the table above, so that at the top of the first page of the relevant part of the document and on the header, it has the words:

- First variant Question Paper / Mark Scheme / Principal Examiner's Report

or

- Second variant Question Paper / Mark Scheme / Principal Examiner's Report

as appropriate.

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/31**

Paper 3 Extended **October/November 2008**

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 a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.

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

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1   Fig. 1.1 shows apparatus used to find a relationship between the force applied to a
    and the acceleration caused by the force.
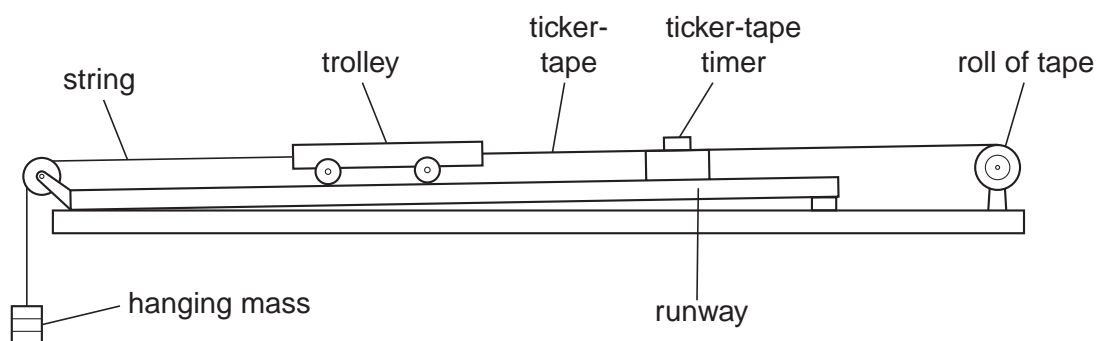
Fig. 1.1

For each mass, hung as shown, the acceleration of the trolley is determined from the tape.
Some of the results are given in the table below.

weight of the hanging mass / N	acceleration of the trolley m/s^2
0.20	0.25
0.40	0.50
0.70	
0.80	1.0

(a) (i) Explain why the trolley accelerates.

    ....

    .... [2]

(ii) Suggest why the runway has a slight slope as shown.

    ....

    .... [1]

(b) Calculate the mass of the trolley, assuming that the accelerating force is equal to the
    weight of the hanging mass.

    mass = ... [2]

(c) Calculate the value missing from the table. Show your working.

value = ... [2]

(d) In one experiment, the hanging mass has a weight of 0.4 N and the trolley starts from rest.

Use data from the table to calculate

(i) the speed of the trolley after 1.2 s,

speed = ... [2]

(ii) the distance travelled by the trolley in 1.2 s.

distance = ... [2]

[Total: 11]

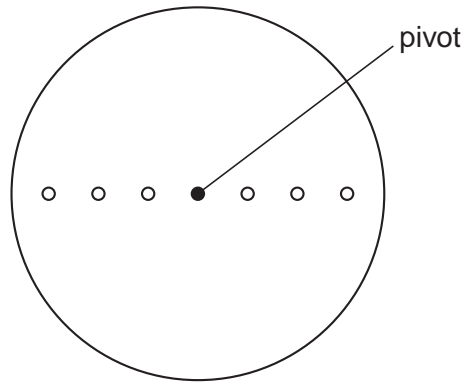**2** Fig. 2.1 shows a circular metal disc of mass 200 g, freely pivoted at its centre.

Fig. 2.1

Masses of 100 g, 200 g, 300 g, 400 g, 500 g and 600 g are available, but only one of each value. These may be hung with string from any of the holes. There are three small holes on each side of the centre, one at 4.0 cm from the pivot, one at 8.0 cm from the pivot and one at 12.0 cm from the pivot.

The apparatus is to be used to show that there is no net moment of force acting on a body when it is in equilibrium.

(a) On Fig. 2.1, draw in **two different** value masses hanging from appropriate holes. The values of the masses should be chosen so that there is no net moment. Alongside the masses chosen, write down their values. [2]

(b) Explain how you would test that your chosen masses give no net moment to the disc.

....

....

....

.... [1]

(c) Calculate the moments about the pivot due to the two masses chosen.

moment due to first mass = ...

moment due to second mass = ...
[2]

(d) Calculate the force on the pivot when the two masses chosen are hanging fr̲‿‿‿ disc.

force = ... [2]

[Total: 7]

3 **(a)** A submarine descends to a depth of 70 m below the surface of water.

The density of the water is 1050 kg/m^3. Atmospheric pressure is 1.0×10^5 Pa.

Calculate

(i) the increase in pressure as it descends from the surface to a depth of 70 m,

increase in pressure = ... [2]

(ii) the total pressure on the submarine at a depth of 70 m.

total pressure = ... [1]

(b) On another dive, the submarine experiences a total pressure of 6.5×10^5 Pa. A hatch cover on the submarine has an area of 2.5 m^2.

Calculate the force on the outside of the cover.

force = ... [2]

(c) The submarine undergoes tests in fresh water of density 1000 kg/m^3.

Explain why the pressure on the submarine is less at the same depth.

....

.... [1]

[Total: 6]

4 The whole of a sealed, empty, dusty room is kept at a constant temperature of 15 °C. shines into the room through a small outside window.

An observer points a TV camera with a magnifying lens into the room through a second small window, set in an inside wall at right angles to the outside wall.

Dust particles in the room show up on the TV monitor screen as tiny specks of light.

(a) In the space below draw a diagram to show the motion of one of the specks of light over a short period of time.

[1]

(b) After a period of one hour the specks are still observed, showing that the dust particles have not fallen to the floor.

Explain why the dust particles have not fallen to the floor. You may draw a labelled diagram to help your explanation.

....
....
....
.... [2]

(c) On another day, the temperature of the room is only 5 °C. All other conditions are the same and the specks of light are again observed.

Suggest any differences that you would expect in the movement of the specks when the temperature is 5 °C, compared to before.

....
....
.... [1]

[Total: 4]

5 Fig. 5.1 shows apparatus that could be used to determine the specific latent heat of fu
ice.

40 W electric heater

finely crushed ice

glass funnel
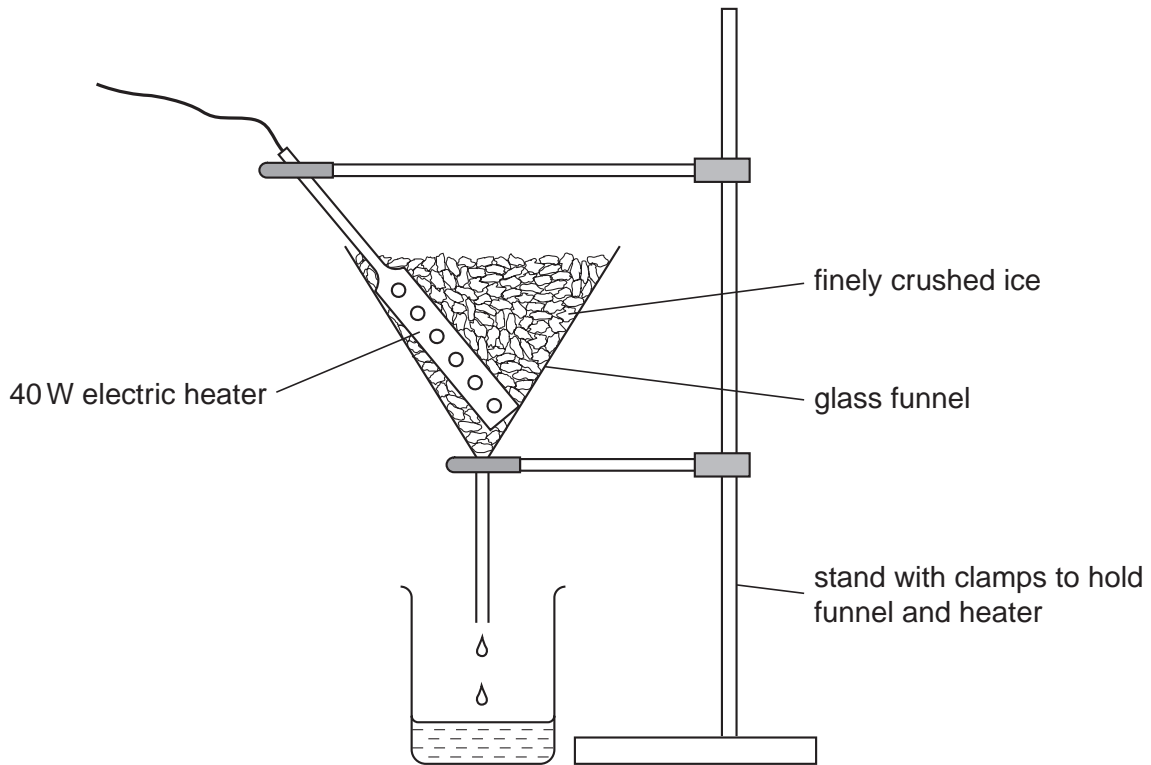
stand with clamps to hold funnel and heater

Fig. 5.1

(a) In order to obtain as accurate a result as possible, state why it is necessary to

(i) wait until water is dripping into the beaker at a constant rate before taking readings,

....

.... [1]

(ii) use finely crushed ice rather than large pieces.

....

.... [1]

(b) The power of the heater and the time for which water is collected are known. Write down all the other readings that are needed to obtain a value for the specific latent heat of fusion of ice.

....

.... [2]

(c) Using a 40W heater, 16.3 g of ice is melted in 2.0 minutes. The heater is then s̶ off. In a further 2.0 minutes, 2.1 g of ice is melted.

Calculate the value of the specific latent heat of fusion of ice from these results.

specific latent heat of fusion of ice = ... [4]

[Total: 8]

6 Fig. 6.1 shows two rays of monochromatic light, one entering the prism along the no~~r~~
and the second one along PQ.

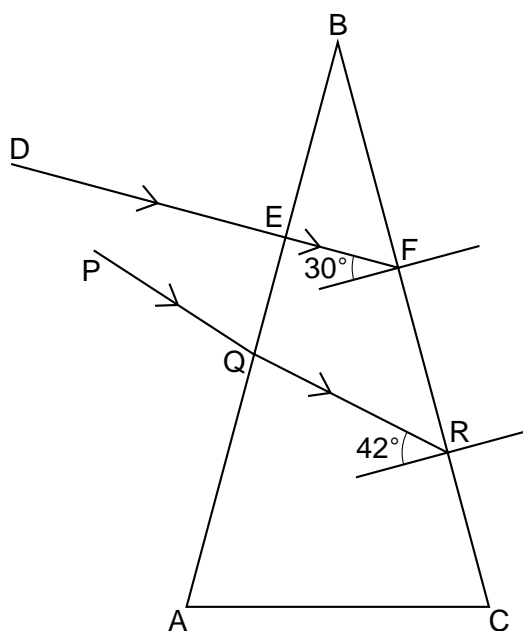**Fig. 6.1**

(a) State what is meant by *monochromatic* light.

.... [1]

(b) The refractive index of the glass of the prism is 1.49. The ray EF is refracted at F. Use information from Fig. 6.1 to calculate the angle of refraction at F.

angle of refraction = ... [3]

(c) On Fig. 6.1, draw in the refracted ray, starting from F. [1]

(d) State how the refraction, starting at F, would be different if the monochromatic ray were replaced by a ray of white light.

.... [1]

(e) The critical angle for the glass of the prism is just over 42°. State the approximate angle of refraction for the ray striking BC at R.

.... [1]

(f) Another monochromatic ray, not shown in Fig. 6.1, passes through the prism and strikes BC at an angle of incidence of 50°. State what happens to this ray at the point where it strikes BC.

.... [1]

7 Fig. 7.1 shows a scale drawing of plane waves approaching a gap in a barrier.

Fig. 7.1

(a) On Fig. 7.1, draw in the pattern of the waves after they have passed the gap. [3]

(b) The waves approaching the barrier have a wavelength of 2.5 cm and a speed of 20 cm/s. Calculate the frequency of the waves.

frequency = ... [2]

(c) State the frequency of the diffracted waves.

.... [1]

[Total: 6]

8 Fig. 8.1 shows a car battery being charged from a 200 V a.c. mains supply.

200 V

car battery

Fig. 8.1

(a) State the function of the diode.

....

.... [1]

(b) The average charging current is 2.0 A and the battery takes 12 hours to charge fully.

Calculate the charge that the battery stores when fully charged.

charge stored .... [2]

(c) The battery has an electromotive force (e.m.f.) of 12 V and, when connected to a circuit, supplies energy to the circuit components.

State what is meant by an *electromotive force of 12 V*.

....

....

.... [2]

(d) (i) In the space below, draw a circuit diagram to show how two 6.0V lamps sh[...]
connected to a 12V battery so that both lamps glow with normal brightness.

(ii) The power of each lamp is 8.0W. Calculate the current in the circuit.

current = ... [2]

(iii) Calculate the energy used by the two lamps when both are lit for one hour.

energy = ... [2]

[Total: 10]

9 Fig. 9.1 is a block diagram of an electrical energy supply system, using the output of a coal fired power station.
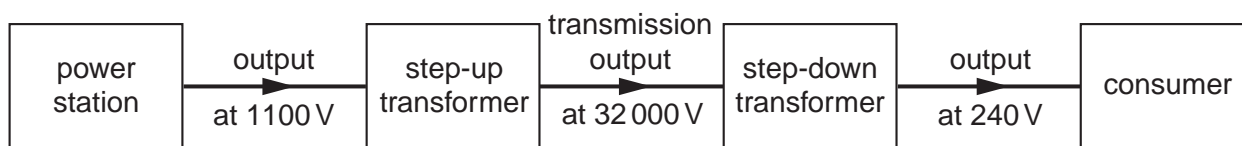

Fig. 9.1

(a) Suggest **one** possible way of storing surplus energy when the demand from the consumers falls below the output of the power station.

....

.... [1]

(b) State why electrical energy is transmitted at high voltage.

.... [1]

(c) A transmission cable of resistance R carries a current I. Write down a formula that gives the power loss in the cable in terms of R and I.

.... [1]

(d) The step-up transformer has 1200 turns on the primary coil. Using the values in Fig. 9.1, calculate the number of turns on its secondary coil. Assume that the transformer has no energy losses.

number of turns = ... [2]

(e) The input to the step-up transformer is 800 kW.

Using the values in Fig. 9.1, calculate the current in the transmission cables, assuming that the transformer is 100% efficient.

current = ... [3]

[Total: 8]

10   Fig. 10.1 shows a circuit for a warning lamp that comes on when the external light in
     falls below a pre-set level.

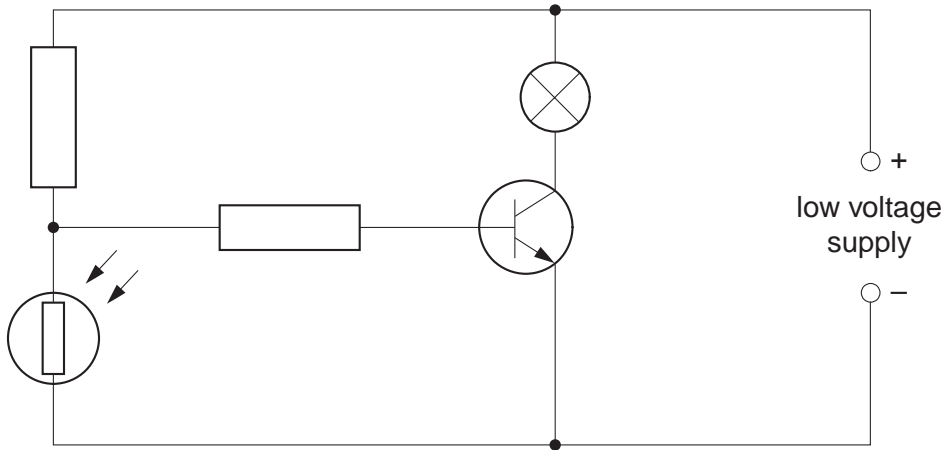**Fig. 10.1**

(a) On Fig. 10.1, label

  (i)   with the letter X the component that detects the change in external light intensity,

  (ii)   with the letter Y the lamp,

  (iii)   with the letter Z the component that switches the lamp on and off.

                                                                                      [3]

(b) Describe how the circuit works as the external light intensity decreases and the lamp
     comes on.

     ....

     ....

     ....

     ....

     ....

     ....

     .... [3]

                                                                             [Total: 6]

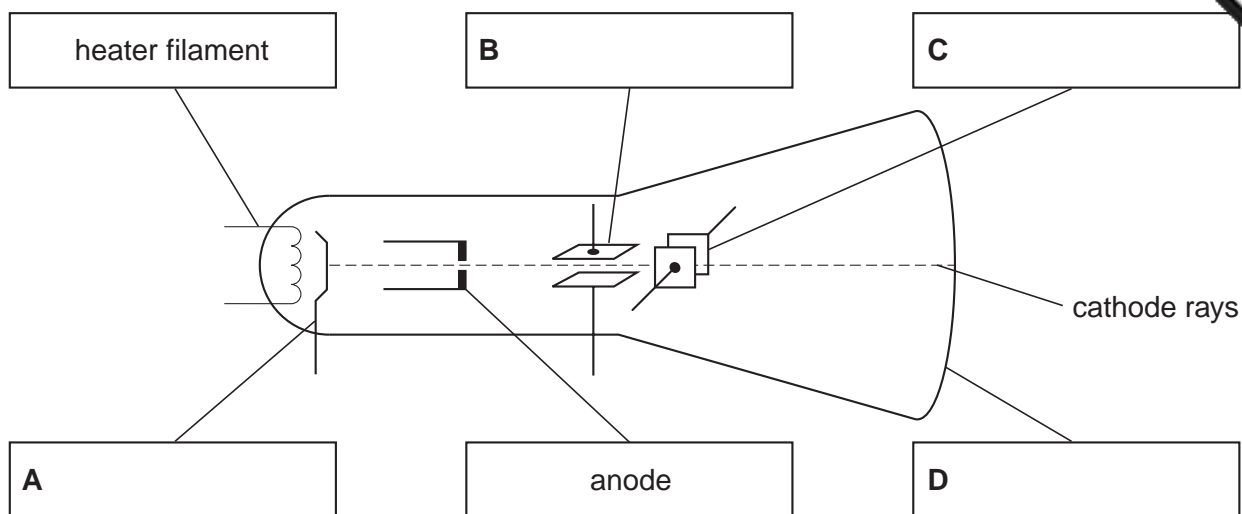**11** Fig. 11.1 shows the basic design of the tube of a cathode ray oscilloscope (CRO).

heater filament		B		C

cathode rays

A		anode		D

Fig. 11.1

(a) On Fig. 11.1, write the names of parts **A**, **B**, **C** and **D** in the boxes provided.   [2]

(b) State the function of:

part **A**, ...

....

part **B**. ....

.... [2]

(c) A varying p.d. from a 12V supply is connected to a CRO, so that the waveform of the supply is shown on the screen.

To which of the components in Fig. 11.1

(i) is the 12V supply connected,

.... [1]

(ii) is the time-base connected?

.... [1]

[Total: 6]

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICS **0625/32**

Paper 3 Extended **October/November 2008**

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 a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1   (a) A truck of mass 12 kg is rolling down a very slight incline as shown in Fig. 1.1.
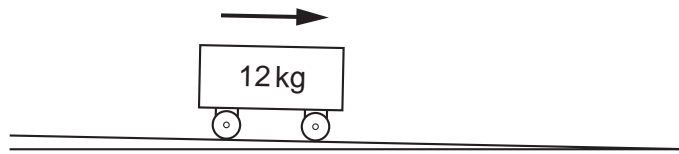
Fig. 1.1

The truck travels at constant speed.

Explain why, although the truck is on an incline, it nevertheless does not accelerate.

....

.... [1]

(b) The slope of the incline is increased. As a result of this, the truck now accelerates.

(i) Explain why there is now acceleration.

....

.... [1]

(ii) Write down an equation linking the resultant force on the truck and the acceleration of the truck.

[1]

(iii) The truck's acceleration is 2.0 m/s^2.

Calculate the resultant force on the truck.

resultant force = ... [2]

(c) The friction force up the slope in **(b)(iii)** was 14.0 N.

By suitable lubrication, the friction force is now almost totally removed.

(i) Calculate the new acceleration of the truck.

acceleration = ... [3]

(ii) The lubricated truck travels down the incline, starting from rest at the top of the incline. It takes 2.5 s to reach the bottom of the incline.

Calculate its speed as it reaches the bottom of the incline.

speed = ... [2]

(d) The incline is reduced to the original value and the lubricated truck is placed on it.

Describe the motion of the truck when it is released.

....

....

....

.... [1]

[Total: 11]

2 Fig. 2.1 shows a circular metal disc of mass 200 g, freely pivoted at its centre.
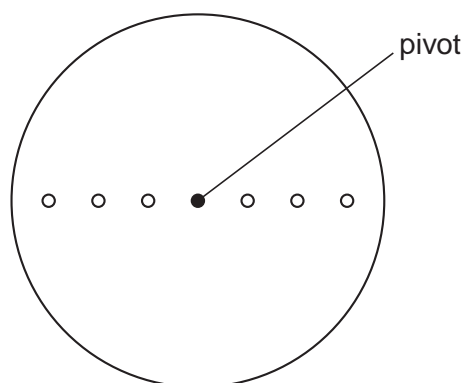
Fig. 2.1

Masses of 100 g, 200 g, 300 g, 400 g, 500 g and 600 g are available, but only one of each value. These may be hung with string from any of the holes. There are three small holes on each side of the centre, one at 4.0 cm from the pivot, one at 8.0 cm from the pivot and one at 12.0 cm from the pivot.

The apparatus is to be used to show that there is no net moment of force acting on a body when it is in equilibrium.

(a) On Fig. 2.1, draw in **two different** value masses hanging from appropriate holes. The values of the masses should be chosen so that there is no net moment. Alongside the masses chosen, write down their values.   [2]

(b) Explain how you would test that your chosen masses give no net moment to the disc.

....

....

....

.... [1]

(c) Calculate the moments about the pivot due to the two masses chosen.

moment due to first mass = ...

moment due to second mass = ...
                                                                                      [2]

(d) Calculate the force on the pivot when the two masses chosen are hanging f̶ disc.

force = ... [2]

[Total: 7]

3 **(a)** A submarine descends to a depth of 70 m below the surface of water.

The density of the water is 1050 kg/m^3. Atmospheric pressure is 1.0×10^5 Pa.

Calculate

(i) the increase in pressure as it descends from the surface to a depth of 70 m,

increase in pressure = ... [2]

(ii) the total pressure on the submarine at a depth of 70 m.

total pressure = ... [1]

(b) On another dive, the submarine experiences a total pressure of 6.5×10^5 Pa. A hatch cover on the submarine has an area of 2.5 m^2.

Calculate the force on the outside of the cover.

force = ... [2]

(c) The submarine undergoes tests in fresh water of density 1000 kg/m^3.

Explain why the pressure on the submarine is less at the same depth.

....

.... [1]

[Total: 6]

4 The whole of a sealed, empty, dusty room is kept at a constant temperature o~~~~~. Light shines into the room through a small outside window.

An observer points a TV camera with a magnifying lens into the room through a second small window, set in an inside wall at right angles to the outside wall.

Dust particles in the room show up on the TV monitor screen as tiny specks of light.

(a) In the space below draw a diagram to show the motion of one of the specks of light over a short period of time.

[1]

(b) After a period of one hour the specks are still observed, showing that the dust particles have not fallen to the floor.

Explain why the dust particles have not fallen to the floor. You may draw a labelled diagram to help your explanation.

....

....

....

.... [2]

(c) On another day, the temperature of the room is only 5 °C. All other conditions are the same and the specks of light are again observed.

Suggest any differences that you would expect in the movement of the specks when the temperature is 5 °C, compared to before.

....

....

.... [1]

[Total: 4]

5   Fig. 5.1 shows apparatus that could be used to determine the specific latent heat of
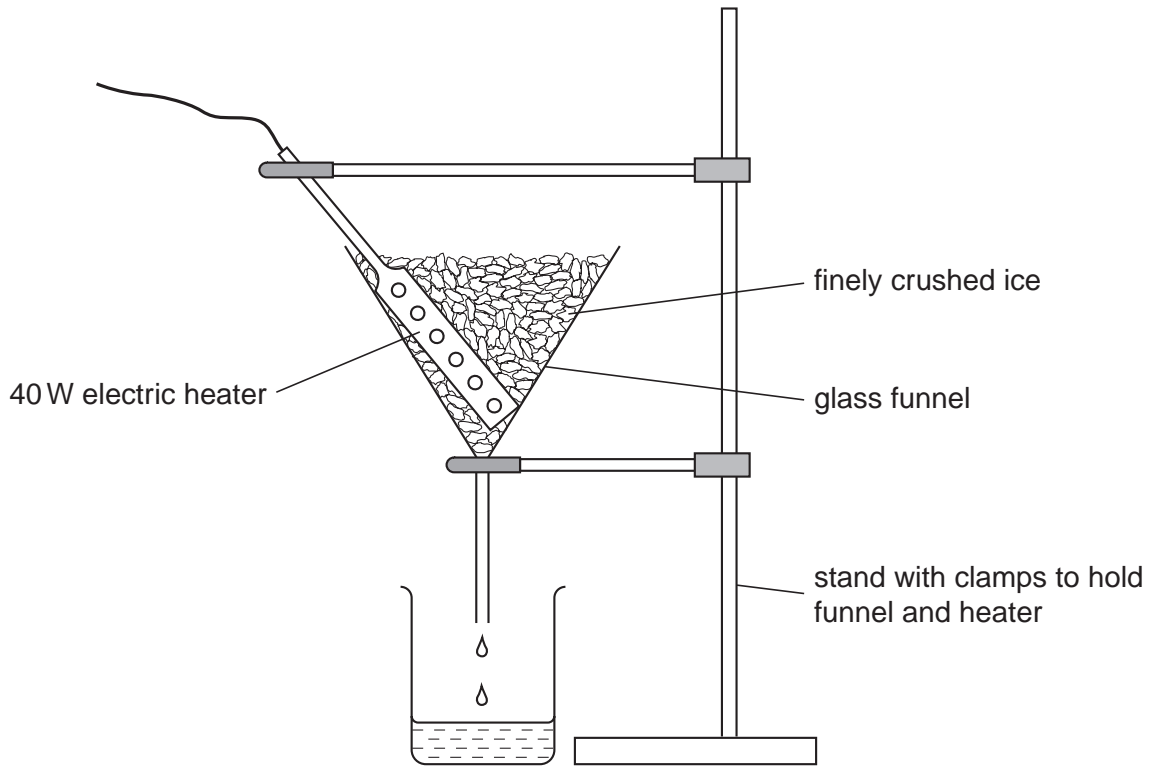   of ice.

Fig. 5.1

(a) In order to obtain as accurate a result as possible, state why it is necessary to

   (i)   wait until water is dripping into the beaker at a constant rate before taking
            readings,

   ....

   .... [1]

   (ii) use finely crushed ice rather than large pieces.

   ....

   .... [1]

(b) The power of the heater and the time for which water is collected are known. Write down
        all the other readings that are needed to obtain a value for the specific latent heat of
        fusion of ice.

   ....

   .... [2]

(c) (i) Using a 40W heater, 250g of water is heated for 3.0 minutes. The temperat of the water is 5.9°C.

Use these values to calculate a value for the specific heat capacity of water.

specific heat capacity = ... [3]

(ii) The accepted value for the specific heat capacity of water is 4.2 J/(g°C).

State **one** possible reason why the value you obtained in **(c)(i)** is different from this.

.... [1]

[Total: 8]

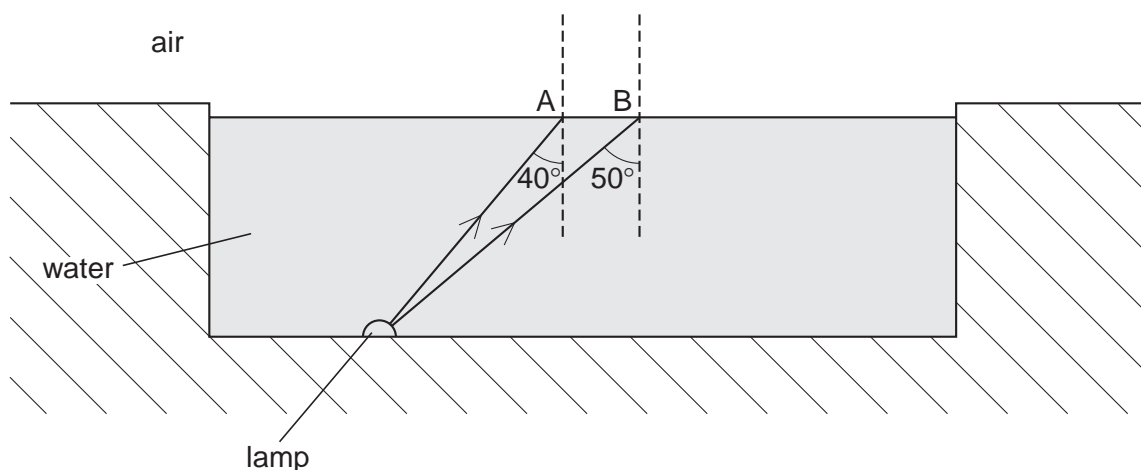**6** Fig. 6.1 shows a cross-section through a swimming pool.

Fig. 6.1

(a) A ray of monochromatic light from a lamp at the bottom of the pool strikes the surface at A, as shown.

(i) State what is meant by *monochromatic* light.

.... [1]

(ii) The water in the swimming pool has a refractive index of 1.33.

Using information from Fig. 6.1, calculate the angle of refraction at A.

angle of refraction = ... [3]

(iii) On Fig. 6.1, draw the refracted ray. [1]

(b) The critical angle for the water-air surface is 48.8°.

Another ray of monochromatic light from the lamp strikes the surface at B, as shown in Fig. 6.1.

(i) State and explain what happens to the ray after reaching B.

....

.... [2]

(ii) On Fig. 6.1, draw this ray. [1]

[Total: 8]

7 Fig. 7.1 shows a scale drawing of plane waves approaching a gap in a barrier.
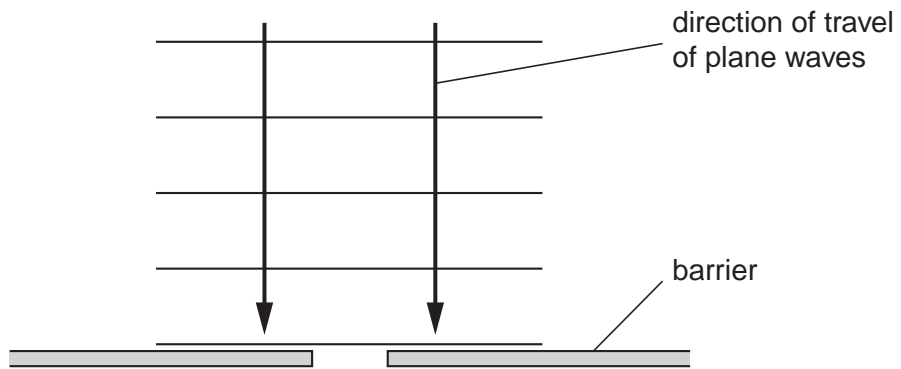
direction of travel
of plane waves

barrier

Fig. 7.1

(a) On Fig. 7.1, draw in the pattern of the waves after they have passed the gap. [3]

(b) The waves approaching the barrier have a wavelength of 2.5 cm and a speed of 20 cm/s. Calculate the frequency of the waves.

frequency = ... [2]

(c) State the frequency of the diffracted waves.

.... [1]

[Total: 6]

8 Fig. 8.1 shows a car battery being charged from a 200 V a.c. mains supply.

Fig. 8.1

(a) State the function of the diode.

....

.... [1]

(b) The average charging current is 2.0 A and the battery takes 12 hours to charge fully.

Calculate the charge that the battery stores when fully charged.

charge stored .... [2]

(c) The battery has an electromotive force (e.m.f.) of 12 V and, when connected to a circuit, supplies energy to the circuit components.

State what is meant by an *electromotive force of 12 V*.

....

....

.... [2]

(d) **(i)** In the space below, draw a circuit diagram to show how two 6.0V lamps should be connected to a 12V battery so that both lamps glow with normal brightness.

(ii) The power of each lamp is 8.0W. Calculate the current in the circuit.

current = ... [2]

(iii) Calculate the energy used by the two lamps when both are lit for one hour.

energy = ... [2]

[Total: 10]

9 Fig. 9.1 is a block diagram of an electrical energy supply system, using the output of [ ] fired power station.

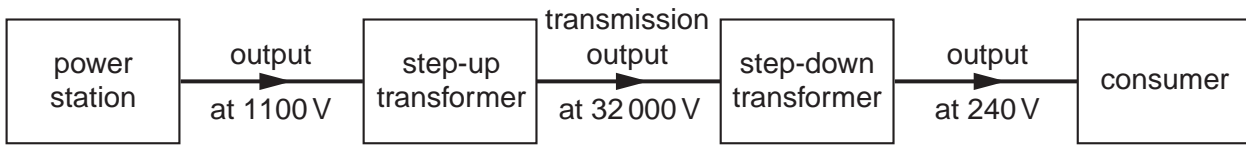| power station | output at 1100 V → | step-up transformer | transmission output at 32 000 V → | step-down transformer | output at 240 V → | consumer |

Fig. 9.1

(a) Suggest **one** possible way of storing surplus energy when the demand from the consumers falls below the output of the power station.

....

.... [1]

(b) State why electrical energy is transmitted at high voltage.

.... [1]

(c) A transmission cable of resistance R carries a current I. Write down a formula that gives the power loss in the cable in terms of R and I.

.... [1]

(d) The step-up transformer has 1200 turns on the primary coil. Using the values in Fig. 9.1, calculate the number of turns on its secondary coil. Assume that the transformer has no energy losses.

number of turns = ... [2]

(e) The input to the step-up transformer is 800 kW.

Using the values in Fig. 9.1, calculate the current in the transmission cables, assuming that the transformer is 100% efficient.

current = ... [3]

[Total: 8]

10 Fig. 10.1 shows a circuit for a warning lamp that comes on when the external light intensity falls below a pre-set level.
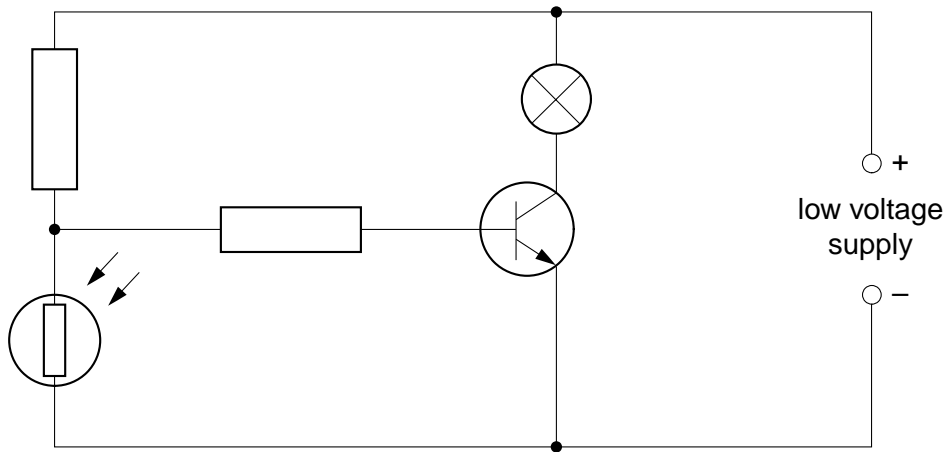

Fig. 10.1

(a) On Fig. 10.1, label

    (i) with the letter X the component that detects the change in external light intensity,

    (ii) with the letter Y the lamp,

    (iii) with the letter Z the component that switches the lamp on and off. [3]

(b) Describe how the circuit works as the external light intensity decreases and the lamp comes on.

....

....

....

....

....

....

.... [3]

[Total: 6]

11 Fig. 11.1 shows the basic design of the tube of a cathode ray oscilloscope (CRO).

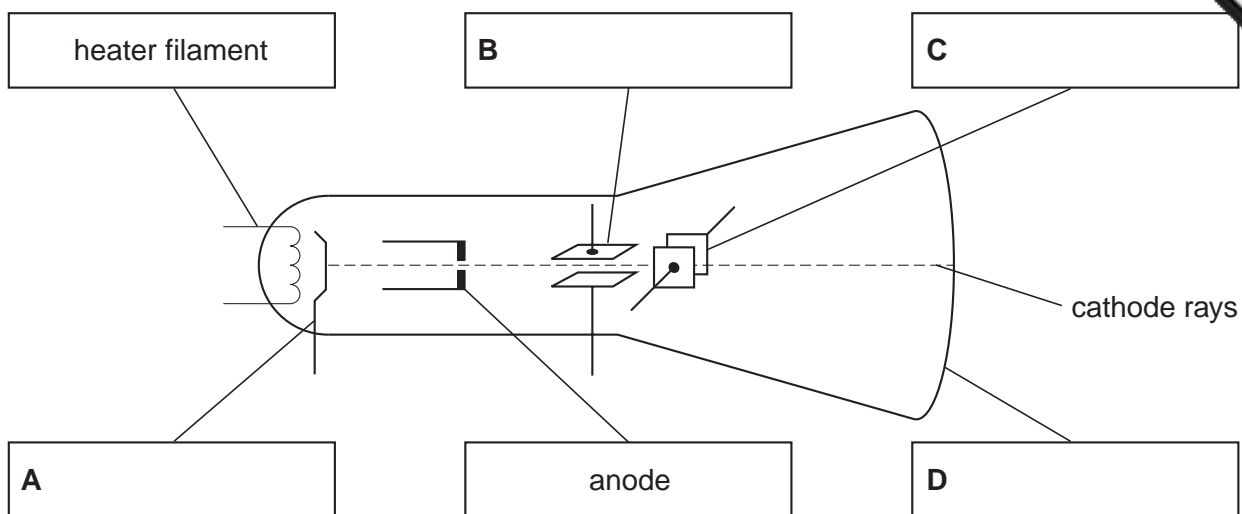| heater filament | | B | | C | |

cathode rays

| A | | anode | | D | |

Fig. 11.1

(a) On Fig. 11.1, write the names of parts **A**, **B**, **C** and **D** in the boxes provided. [2]

(b) State the function of:

part **A**, ...

....

part **B**. ....

.... [2]

(c) A varying p.d. from a 12V supply is connected to a CRO, so that the waveform of the supply is shown on the screen.

To which of the components in Fig. 11.1

(i) is the 12V supply connected,

.... [1]

(ii) is the time-base connected?

.... [1]

[Total: 6]