Paper Reference(s)

4420/1F

London Examinations IGCSE

Physics

Paper 1F

Foundation Tier

Monday 8 June 2009 – Morning

Time: 1 hour 30 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions. Write your answers in the spaces provided in this question paper.
Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 100. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**. There are 16 questions in this question paper.
Any blank pages are indicated.
Useful formulae are given on page 2.

Advice to Candidates

Write your answers neatly and in good English.

Turn over

FORMULAE

You may find the following formulae useful.

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad\qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad\qquad P = \frac{W}{t}$$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad\qquad f = \frac{1}{T}$$

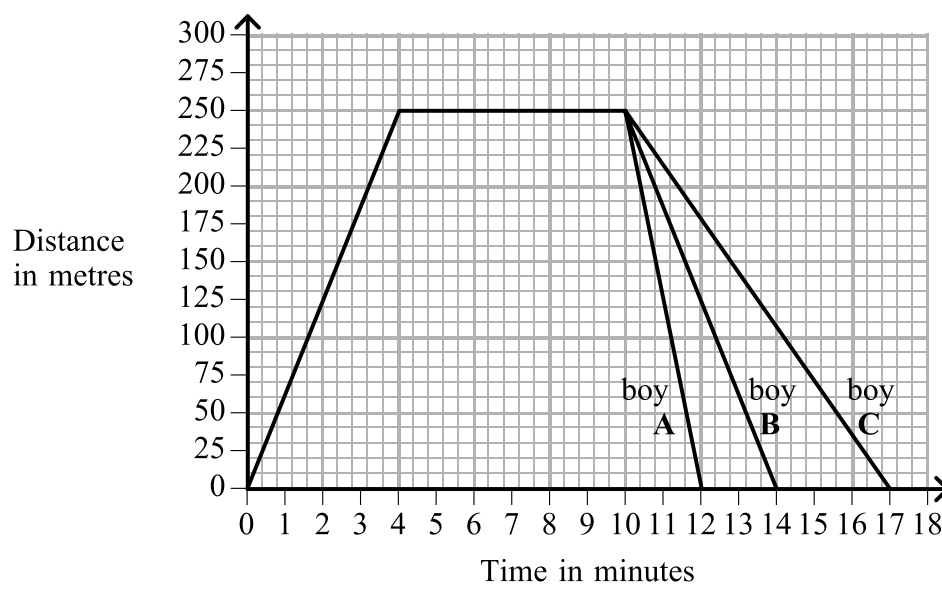Where necessary, assume the acceleration of free fall, $g = 10 \text{ m/s}^2$.

1. Three brothers, **A**, **B** and **C**, all walk together from their home to a shop.

    When they leave the shop

    - one boy runs home
    - one boy walks home
    - one boy walks home slowly

    The graph shows how their distance from home varies with time.


    Complete the spaces in the following sentences.

    (a) The shop is at a distance of .... metres from the boys' home.

    (1)

    (b) The boys are in the shop for a time of .... minutes.

    (1)

    (c) Boy .... walks home slowly, boy .... walks home and

         boy .... runs home.

    (1)

    (d) Boy **C** takes .... minutes more than boy **A** to get home.

    (1)

    (e) The slowest boy is away from home for .... minutes.

    (1)   Q1

    (Total 5 marks)

2. A child looks at her finger in a plane mirror.

mirror

X

Y

b

a

c

g

d

f

e

child

image
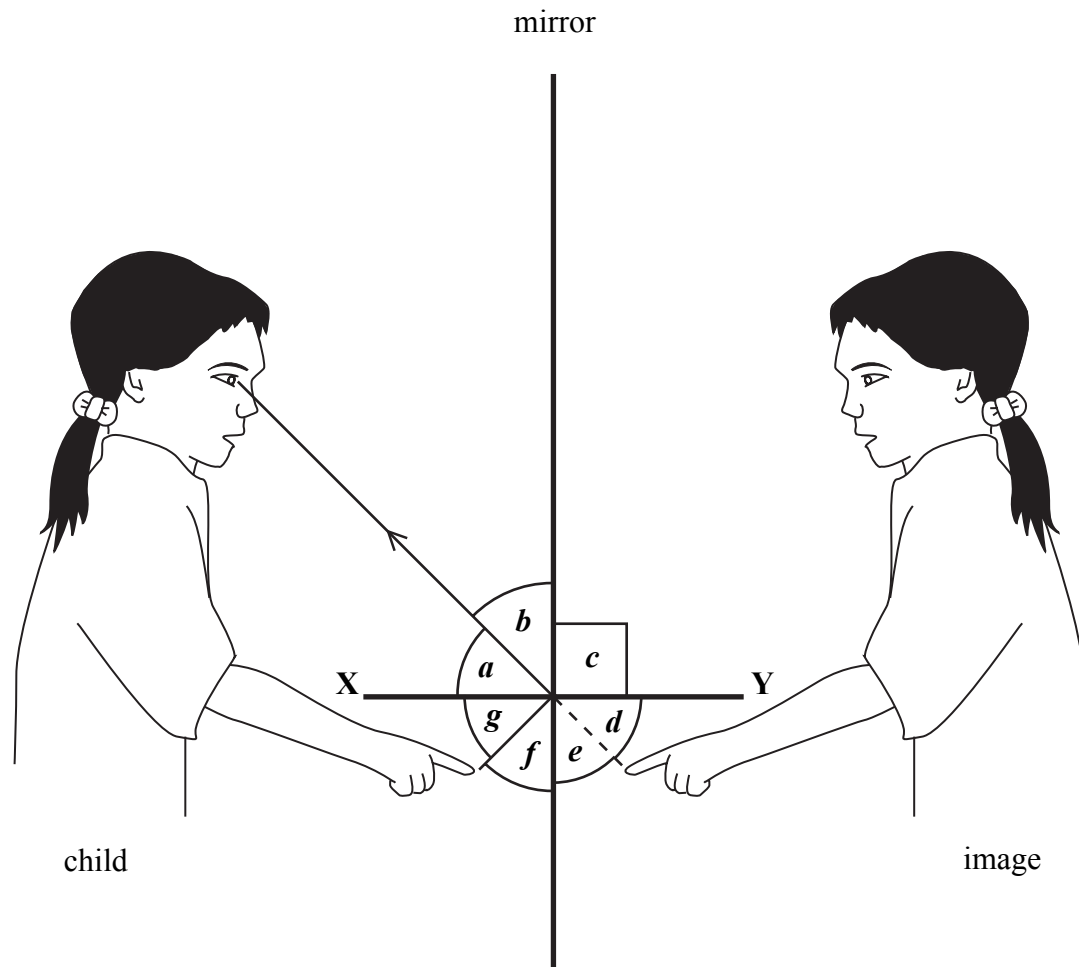
(a) Complete the sentence by putting a cross (☒) in the correct box.

The mirror is described as plane because it is

☒ flat

☒ shiny

☒ vertical

(1)

(b) A process takes place at the mirror.

    (i) Name this process.

    ....

    (1)

    (ii) A law applies to this process.

        Use **two** of the angles a, b, c, d, e, f and g, to write an equation for this law.

    ....

    (1)

    (iii) Name the line **XY**.

    ....

    (1)

(c) The child sees an image in the mirror.

    (i) Is this image real or virtual?

    ....

    (1)

    (ii) How can you tell?

    ....

    (1)   **Q2**

(Total 6 marks)

3. The diagram shows a small screwdriver.

plastic handle

steel blade
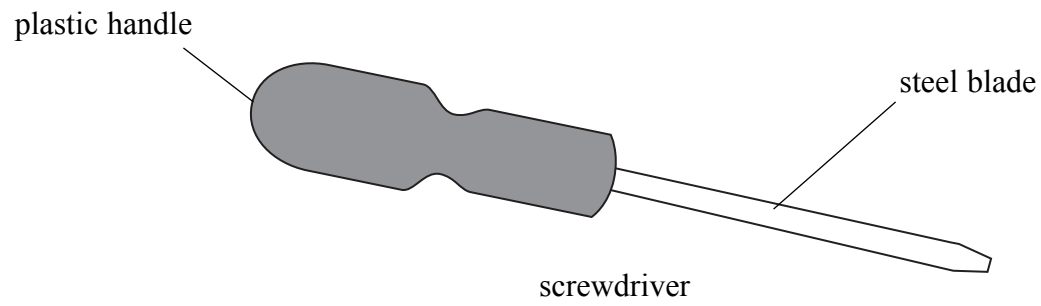
screwdriver

(a) (i) Which part, or parts, can conduct electricity easily? Put a cross (☒) next to the correct answer.

☐ both parts

☐ neither part

☐ only the blade

☐ only the handle

(1)

(ii) A child pushes the screwdriver into a mains electricity socket. This is very dangerous. Why?

....

....

(1)

(b) Give an example of **one** device in the home in which electrical heating is used.

....
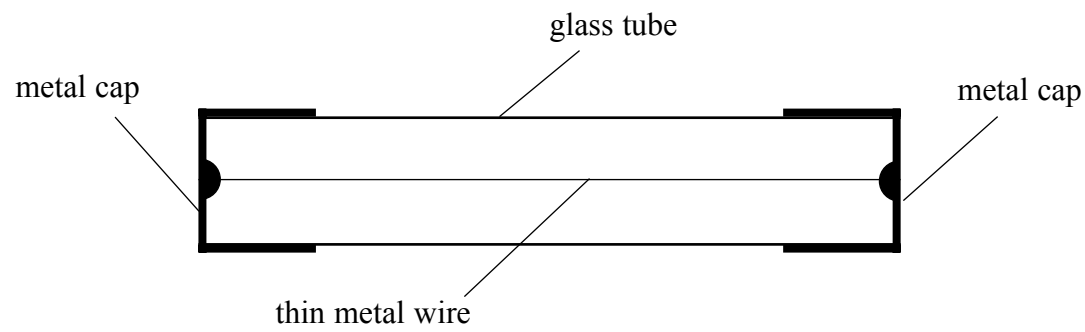
(1)

(c) The diagram shows one kind of fuse.

(i) Electricity passes from one end of the fuse to the other. What path does it take?

....

....

(1)

(ii) When there is a current in the fuse a transfer of energy takes place.

Complete the boxes for this transfer.
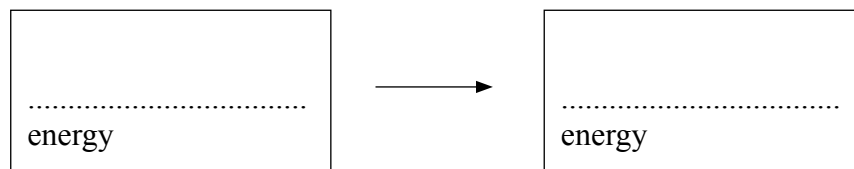
(2)

(iii) Complete the sentence by putting a cross (☒) in the correct box.

When the current increases, the temperature of the fuse will

☒ decrease

☒ increase

☒ stay the same

(1)

(iv) Explain why fuses are used.

....

....

....

(2)

(Total 9 marks)

Leave blank column, Q3, page 7, barcode, Turn over.

Q3

4. (a) The box gives the names of several colours in the visible spectrum.

| red | orange | yellow | blue | indigo | violet |

Complete the sentences.

(i) The colours are arranged in order of decreasing ....

(1)

(ii) The colour green is missing from the box.

It should go between .... and ....

(1)

(b) This box gives the names of several radiations in the electromagnetic spectrum.

| radio waves | microwaves | infra-red | ultraviolet | X-rays | gamma rays |

Complete the sentences.

(i) The radiations are arranged in order of increasing ....

and decreasing.. .

(2)

(ii) Visible light is missing from the box.

It should go between .... and ....

(1)

(iii) All the radiations in the electromagnetic spectrum travel at the same

.... in free space.

(1)

(iv) Gamma rays are used to sterilise .... because

gamma rays kill ....

(2)

(Total 8 marks)

5. The diagrams show a wind turbine-generator and the energy flow for the system.
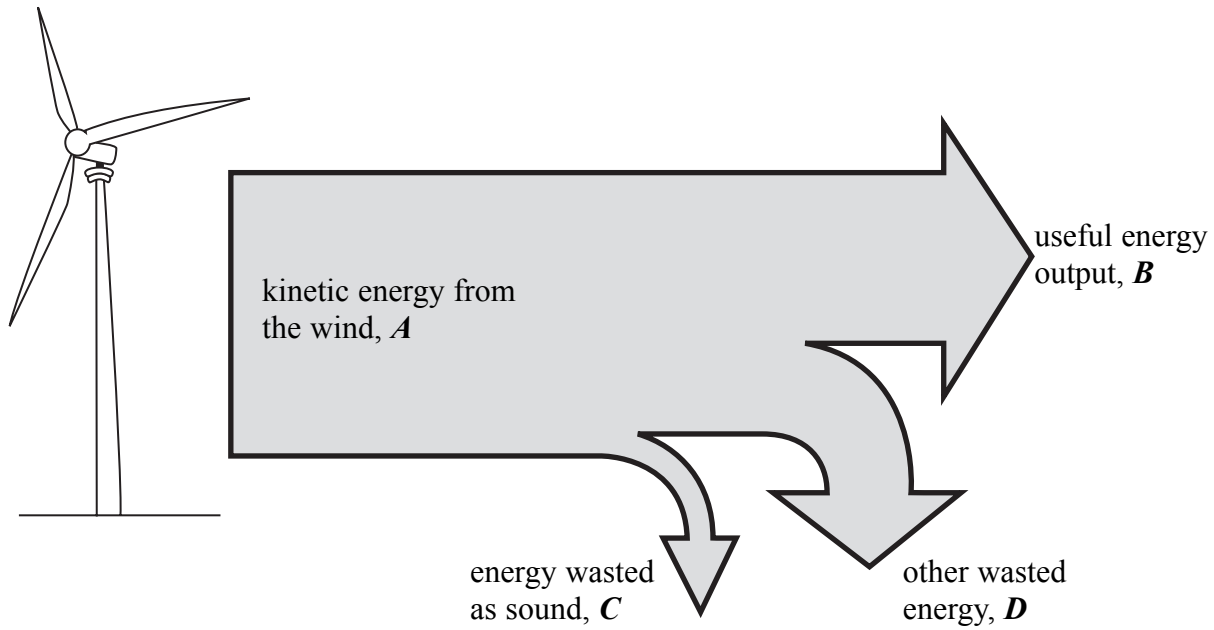
(a) Complete the equation for the relationship between **A**, **B**, **C** and **D**.

A = ...

(1)

(b) In what form is the useful energy output, **B**?

....

(1)

(c) In what form is the other wasted energy, **D**?

....

(1)

(d) Complete the equation for the efficiency of this system.

efficiency = ...

(1)

Q5

(Total 4 marks)

Turn over

6. A student uses a set of LEDs (light emitting diodes) to make a sign. Her sign can be used to show different messages. The diagram shows FIRE EXIT as an example.
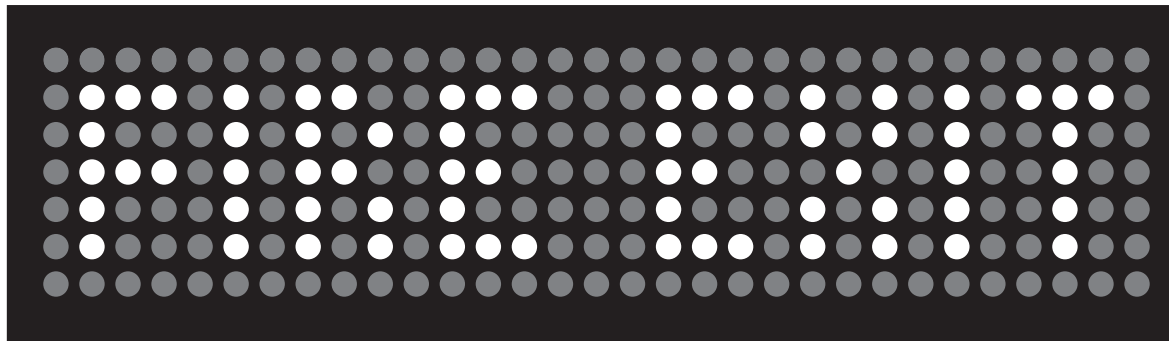
(a) (i) Are the LEDs connected in series or in parallel?

....
(1)

(ii) Explain.

....

....
(1)

(b) There is only a very small current in each lit LED. Which unit is used for this current?
Put a cross (☒) in the correct box.

☒ **mA**

☒ **mC**

☒ **mΩ**

☒ **mV**

(1)

(c)

Each LED lets charge flow in only one direction. A direct current (d.c.) gives a flow of charge in only one direction.

(i) Which word in the box means the 'rate of flow of charge'?

....

(1)

(ii) Give an example of a d.c. supply.

....

(1)

(d) What does the abbreviation a.c. mean?

....

(1)

(Total 6 marks)

Q6

7. (a) Most atoms contain the following particles

- electrons
- neutrons
- protons

State which of these particles

(i) is the smallest ....

(1)

(ii) has no charge ....

(1)

(iii) has a negative charge ....

(1)

(iv) are in the nucleus .... and ....

(1)

(b) Some atoms emit ionising radiations and are described as radioactive.

(i) Which part of a radioactive atom emits ionising radiations?

....

(1)

(ii) Which **two** of the following can be used to investigate ionising radiations? Put a cross (⊠) next to the **two** correct answers.

⊠ Geiger-Müller detector

⊠ joulemeter

⊠ litmus paper
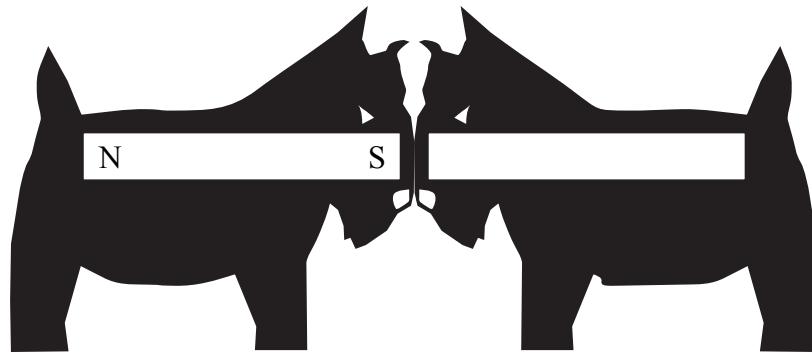
⊠ newtonmeter

⊠ photographic film

⊠ thermometer

(2)

(Total 7 marks)

Q7

8. The diagram shows a pair of toy dogs. Each toy dog is made of plastic with a sealed bar magnet inside. The dogs are free to move but are not doing so.

(a) (i) Complete the diagram above by adding the magnetic poles to the second magnet.

(1)

(ii) Why are the dogs not moving?

....

....

(1)

(b) The small bar magnets are made out of a magnetically hard material.

(i) Give an example of a magnetically hard material.

....

(1)

(ii) Explain why this is more suitable than using a magnetically soft material.

....

....

....

(2)

(Total 5 marks)

Q8

9. (a) Use words from the box to complete the sentence.

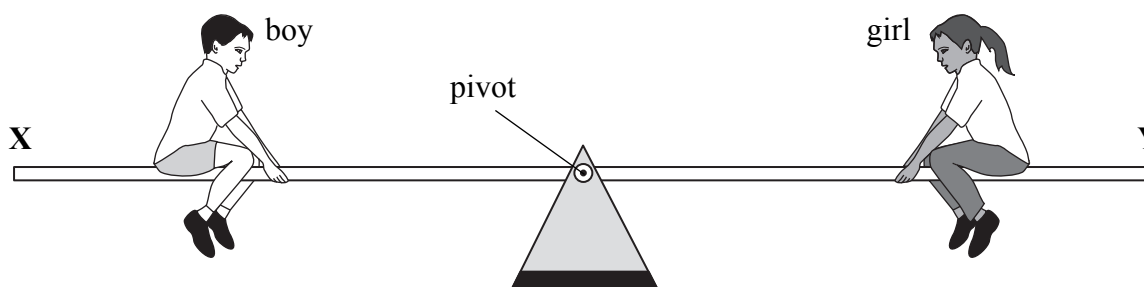Each word may be used once, more than once or not at all.

distance	equilibrium	force	moment	pivot

The principle of moments states that the total clockwise ....

is equal to the total anticlockwise .... when a system

is in ....

(3)

(b) The diagram shows a boy and a girl on a see-saw.

The see-saw is balanced.

Complete the sentence.

To make end **Y** of the see-saw move upwards either the boy needs to move

.... or the girl needs to move

....
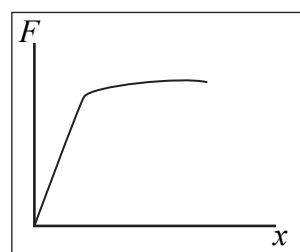
(2)

(Total 5 marks)

10. (a) Graphs **A**, **B**, **C** and **D** show how the extension x changes with the applied force F for different objects.
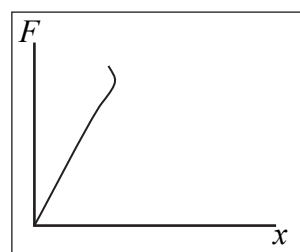
Draw a line linking each object to its graph.

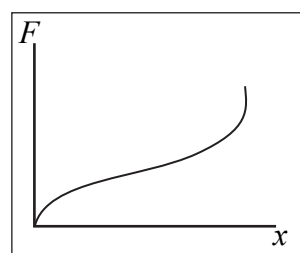**Object**   **Graph**

helical spring

metal wire
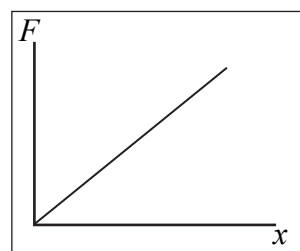
rubber band

(3)

(b) (i) Complete the sentence.

An object obeys Hooke's Law when the .... and the

.... are .... proportional to

each other.

(2)

(ii) Which of the graphs in (a) is for an object that obeys Hooke's Law throughout?

....

(1)

(Total 6 marks)

Q10

11. A student ties one end of a rope to a chair. She uses the rope to demonstrate wave behaviour to her class.

(a) She produces a transverse wave as shown below. **A** is the direction of vibration and **B** is the direction of the wave.
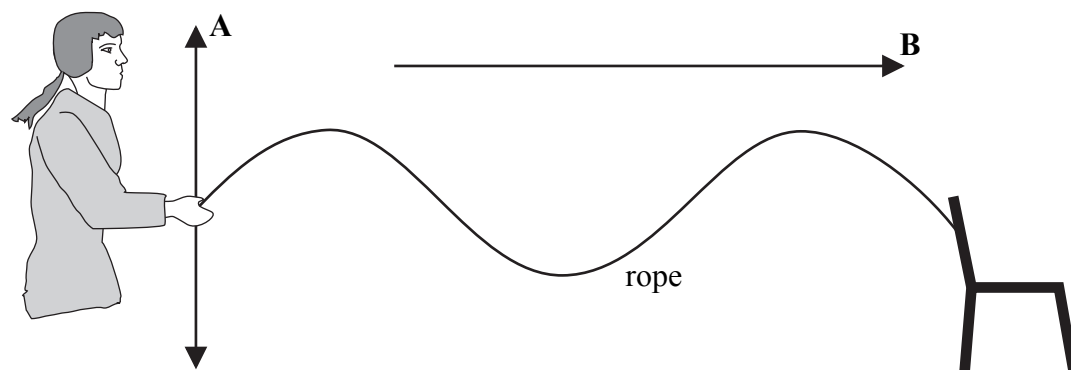
    (i) State how the student could increase the amplitude of the wave.

....

....

(1)

    (ii) State how the student could decrease the wavelength to produce the wave shown below.

....

....

(2)
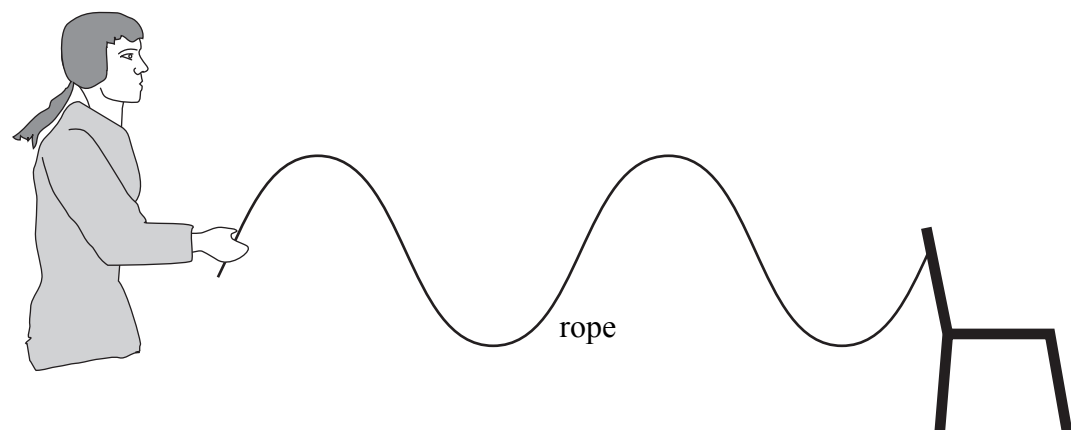
(b) When the frequency of the wave is 1.5 Hz, the wavelength is 0.80 m. Calculate the speed in m/s of the wave.

....

....

Speed = ... m/s

(3)

(c) The student then uses a spring to demonstrate the behaviour of a longitudinal wave.

Draw arrows on this diagram to show

(i) the direction of vibration, and label this **A**.

(ii) the direction of the wave, and label this **B**.

(2)

(Total 8 marks)

Q11

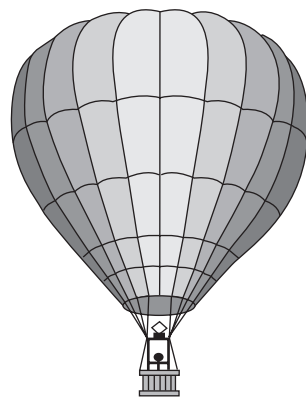**12.** The first hot air balloon to cross the Pacific Ocean did so in 1991. It took 46 hours to travel 10 700 km.

(a) Choose words from the box to complete the sentences.
Each word may be used once, more than once or not at all.

conduction	contracts	convection	expands
increases	less	more	radiation	reduces

In a hot air balloon the air inside the balloon is heated.

The heated air .... and becomes ....

dense. Some of the air is pushed out of the balloon.

This .... the mass of air in the balloon and the balloon

rises. The hot air inside the balloon rises and hence transfers heat energy by a process

known as .... Two other processes of transferring heat

energy are .... and ....

(6)

(b) A hot air balloon carries a mass of 3500 kg.

Calculate the weight in N of this mass.

....

Weight = ... N

(2) **Q12**

(Total 8 marks)

H34025A01824

13. (a) Phosphorus-32 (P-32) is a radioactive isotope. It has a half-life of 14 days. It is used to treat some bone diseases. The activity of a sample of P-32 is 10 000 Bq.

(i) What is Bq an abbreviation of?

....
(1)

(ii) Calculate the activity, in Bq, of this sample after 28 days.

....

....

Activity = ... Bq
(2)

(b) Another radioactive isotope of phosphorus, P-34, has a half-life of 12.4 seconds.

(i) State what is meant by the term **isotope**.

....

....
(2)

(ii) After 28 days, some activity is still detected close to a sample of P-34. What do we call this activity?

....
(1)

(c) State two non-medical uses of radioactivity.

1 ....

2 ....
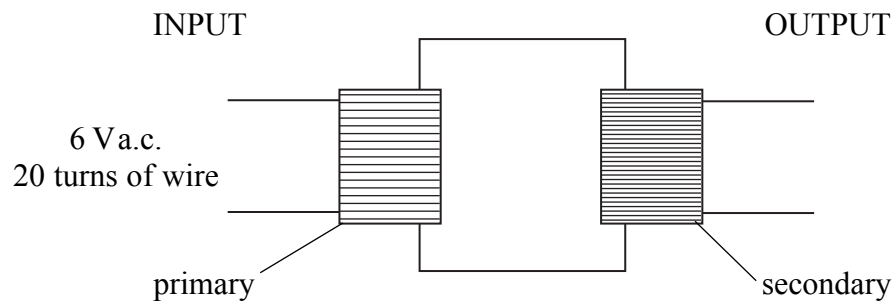**(2)**

(Total 8 marks)

Q13

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14. A class uses a step-up transformer in a model transmission line.
The transformer is shown below.
The input voltage is 6 V a.c. and there are 20 primary turns.

INPUT   OUTPUT

6 V a.c.
20 turns of wire

primary   secondary

(a) The output voltage is 24 V a.c.   How many secondary turns does the transformer have?

....

....

Number of turns = ...
(2)

(b) State how this transformer could be used as a step-down transformer.

....

....
(1)

(c) A student wants to use an input voltage of 60 V a.c. Why does the teacher tell him that this is not a good idea?

....

....
(1)

(d) A step-up transformer is used just outside a power station to increase the voltage. State why the voltage is increased.

....

....
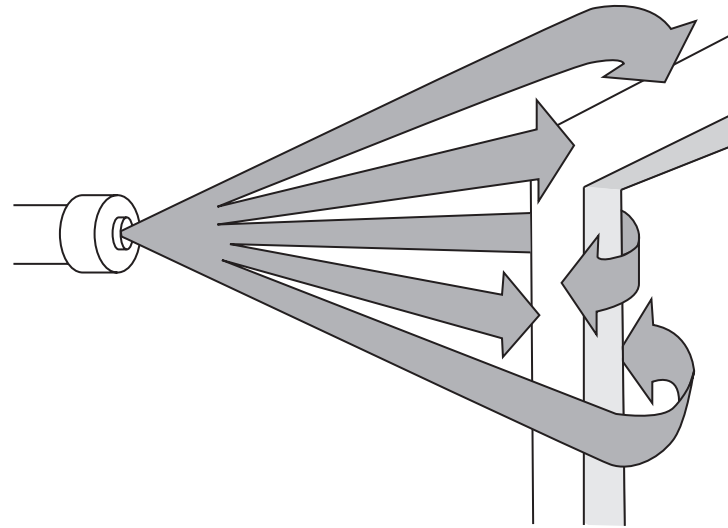**(1)**

Q14

(Total 5 marks)

15. In electrostatic paint spraying, the surface being painted is given a negative charge. The paint emerges from the paint sprayer carrying a positive charge.

(a) The diagram shows a metal frame being painted.

(i) Why is the paint attracted to the surface of the frame?

....
(1)

(ii) After one coat of this paint the paint is no longer attracted to the frame. Explain why this is.

....
(1)

(b) A feature of electrostatic paint spraying is that the back of the metal frame is painted. Explain why this happens.

....

....
(1)

(c) A disadvantage of electrostatic paint spraying is that many other things like walls get painted as well. Suggest how this can be avoided.

....

....
(1)

(d) Name two other uses of electrostatic charges.

1 ....

2 ....

(2)

(Total 6 marks)

H 3 4 0 2 5 A 0 2 3 2 4

16. (a) Particles both in a solid and a liquid are close-packed but the particles move in different ways.

State how the particles move

(i) in a solid,

....

....

(1)

(ii) in a liquid.

....

....

(1)

(b) State one difference in the arrangement of the particles in a gas compared to those in solids and liquids.

....

....

(1)

(c) Name a process by which a liquid changes to a gas.

....

(1)

Q16

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END