Paper Reference(s)

4437/3F

London Examinations IGCSE

Science (Double Award)

Physics

Paper 3F

Foundation Tier

Monday 21 May 2007 – Afternoon

Time: 1 hour 15 minutes

Instructions to Candidates

In the boxes above, write your centre number and 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 in the spaces provided in this question paper.
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 75. The marks for parts of questions are shown in round brackets:
e.g. **(2)**.
Useful formulae are given on page 2.
This paper has 11 questions. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

Turn over

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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. The diagram shows waves on the surface of a lake.
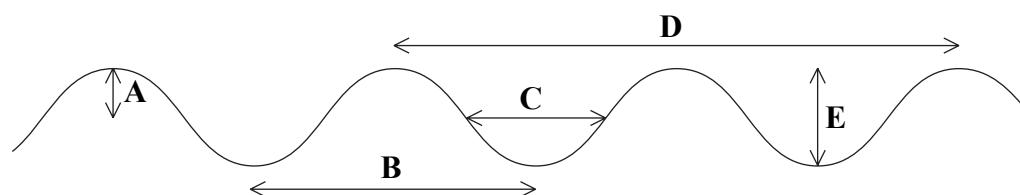
(a) Which measurement, **A**, **B**, **C**, **D** or **E** shows

    (i) the amplitude of the waves? ....

    (1)

    (ii) the wavelength of the waves? ....

    (1)

(b) Choose words from the box to complete the sentences.

amplitude	frequency	longitudinal	period	transverse	wavelength

    (i) The number of waves per second is the ....

    (1)

    (ii) The time taken for each wave is its ....

    (1)

(c) (i) Water waves are transverse waves. Give two other examples of transverse waves.

    1 ....

    2 ....

    (2)

    (ii) Some waves are not transverse waves. What are these waves called?

    ....

    (1)

Q1

(Total 7 marks)

2. (a) The covers are removed from two plugs, **A** and **B**. The diagram shows the inside of the plugs.

green and yellow   green and yellow

X

blue   blue

brown   brown

plug **A**   plug **B**
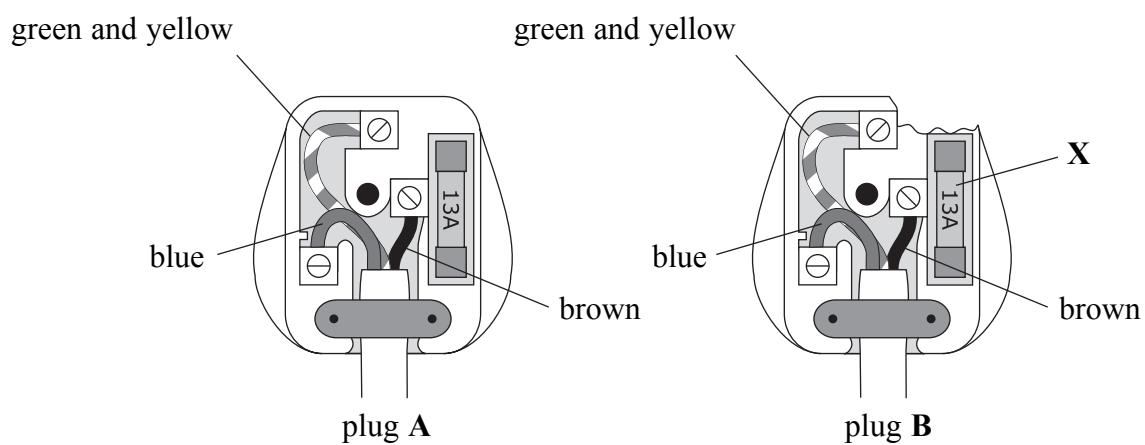
(i) What is wrong with plug **B**?

....

....

(1)

(ii) Explain why this makes plug **B** unsafe.

....

....

....

(2)

(iii) What is the name of part **X**?

....

(1)

(iv) The diagram shows the structure of part **X**.

wire   glass tube

metal end
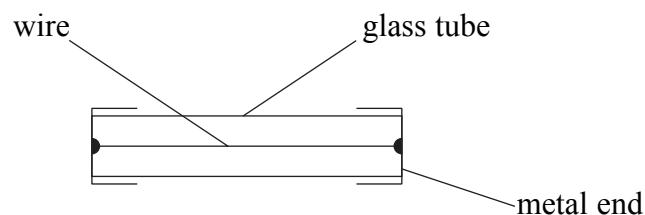
State **two** changes which occur in part **X** when the current is too large.

1 ....

....

2 ....

....

(2)

(b) The diagram shows two light fittings, **Y** and **Z**.

plastic

metal
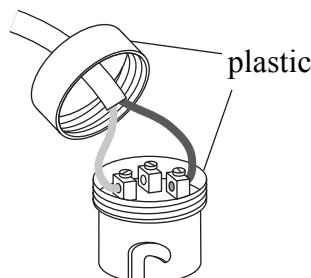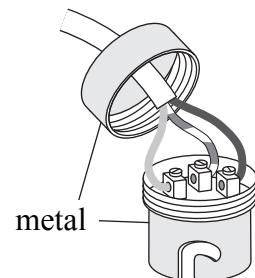
Y   Z

When the tops are screwed on, each fitting is safe to use.

(i) Explain why light fitting **Y** is safe to use.

....

....

....

....

(2)

(ii) Explain why light fitting **Z** is safe to use.

....

....

....

....

(2)

Q2

(Total 10 marks)

3. The table gives information about a journey made by a cyclist.

Time (hours)	Distance (km)
0	0
1	15
2	30
3	45
4	60
5	75
6	90

(a) Plot these points on the grid on the next page.

(3)

(b) (i) Use your graph to find the distance in kilometres which the cyclist travelled in 4.5 hours.

Distance = ... km

(1)

(ii) Use your graph to find the time in hours taken by the cyclist to travel 35 kilometres.

Time = ... hours

(1)

(c) State the equation which relates average speed, distance moved and time taken.

....

(1)

90

80

70

60

50

Distance
in km

40

30

20

10

0

0　　　　1　　　　2　　　　3　　　　4　　　　5　　　　6

Time in hours

(Total 6 marks)
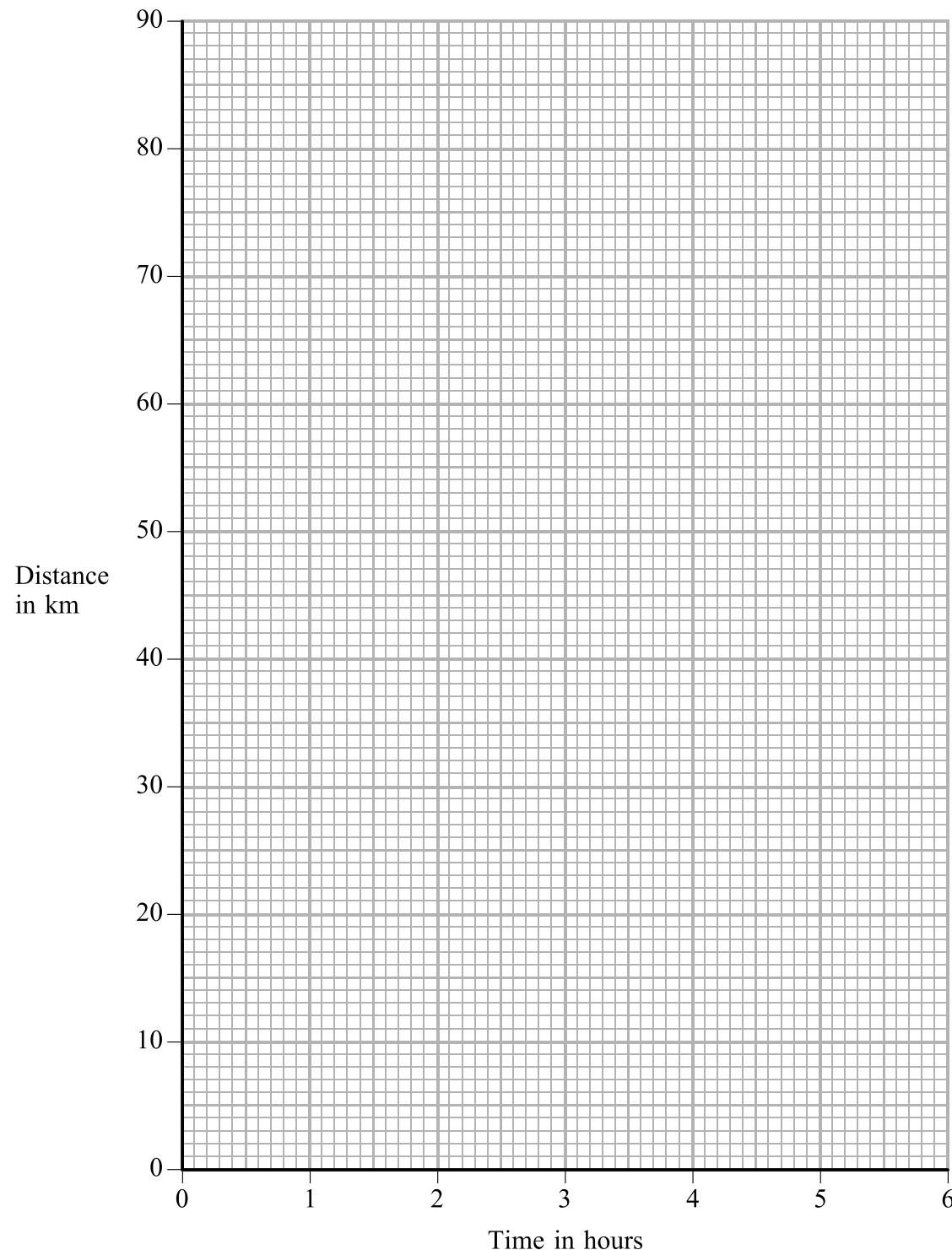
4. (a) In deserts the temperature falls quickly in the evening. People put on extra layers of clothing to keep warm. Air is trapped between the layers of clothing.

Choose words from the box to complete the sentence.

conduction	convection	insulation	radiation

The trapped air is a very good method of .... and reduces energy

transfer by .... through the clothing.

(2)

(b) In the morning the Sun heats the air above the surface of the desert.

Choose words from the box to complete the sentences. You may use each word once, more than once or not at all.

cold	warm	conduction	convection	radiation	up	down

Currents of .... air move .... and

currents of .... air move ....

This happens because .... air is denser than

.... air.

The currents are called .... currents.

(4)

(Total 6 marks)

Q4

5. (a) State the equation which relates density, mass and volume.

....
(1)

(b) The diagram shows a rectangular glass block.
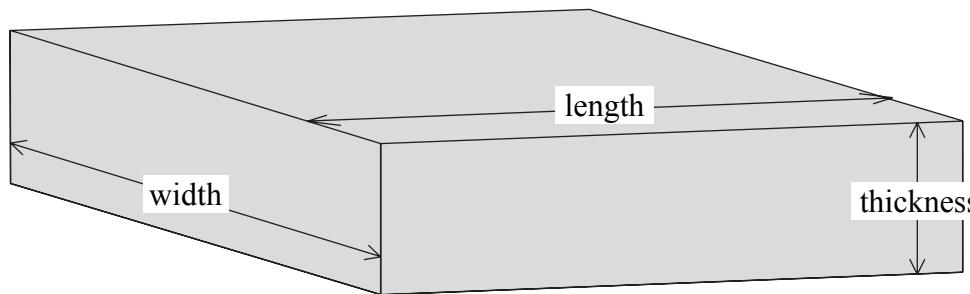
(i) State the equation for the volume of the block.

....
(1)

(ii) A student wants to calculate the volume in mm^3. What units should he use to measure the length, the thickness and the width?

....
(1)

(c) The density of the wood in a block is $0.8 \, g/cm^3$. A student cuts the block into four equal pieces. What effect does this have on the density?

....
(1)

(d) The density of the metal in a block is $2.7 \, g/cm^3$. Another block of the same metal has twice the mass. What is the density of the metal in this larger block?

Density = ... g/cm^3
(1)

Q5

(Total 5 marks)

6. (a) Every atomic nucleus can be represented like this.

$$_{Z}^{A}\text{X}$$
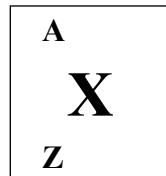
Use the letters **A**, **X** and **Z** to complete the table.

	Letter
atomic number	
chemical symbol	
mass number	

(2)

(b) Complete the sentences.

(i) The atomic number of an atom is the number of .... in

its ....

(2)

(ii) The mass number of an atom is its atomic number plus its number

of ....

(1)

(iii) Isotopes of the same element have the same number of ....

but different numbers of ....

(2)

(iv) For a neutral atom the number of .... is equal to the number

of ....

(1)

(v) If the nucleus of an atom is unstable it may emit .... particles,

.... particles or .... rays.

(3)

Q6

(Total 11 marks)

7. A model train travels between two stations. The velocity–time graph shows the train's motion.

velocity

A   B   C

0   time
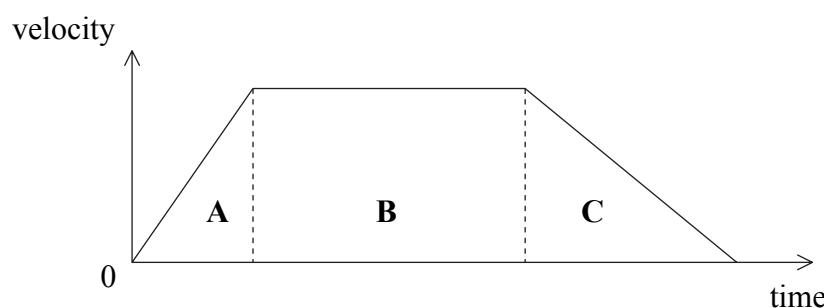
(a) (i) State in which part of the journey **A**, **B** or **C** the train is decelerating.

....
(1)

(ii) Explain your answer.

....
(1)

(iii) What does the graph show about the deceleration?

....
(1)

(b) (i) What feature of the graph represents the distance travelled between the two stations?

....
(1)

(ii) A second train travels between the two stations at a constant velocity. It takes the same time as the first train. On the axes above, draw a line showing the motion of the second train.

(3)

Q7

(Total 7 marks)

8. A student connects a series circuit as shown.

+   –

A
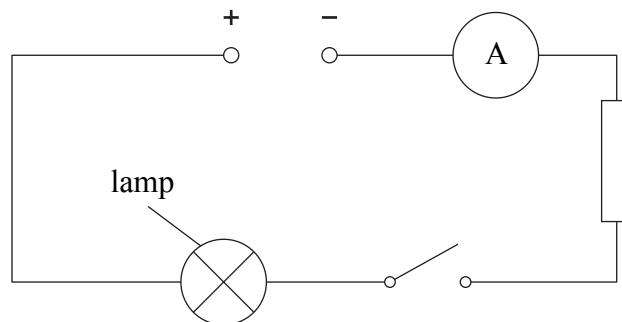
lamp

(a) (i) The switch is closed. Name two components in the circuit, other than the lamp, which affect the size of the current.

1 ....

2 ....

(2)

(ii) The current is 0.40 A. Calculate the charge that flows during a time of 20 s.

....

....

Charge = ...C

(2)

(b) You are asked to connect a second lamp so that each lamp can be switched on and off independently. Show, by drawing on the circuit above, how this can be done.

(2)

Q8

(Total 6 marks)

9. (a) State the law of reflection.

....

(1)

(b) A student is playing in goal in a football match. The window of a nearby building reflects sunlight into his eyes.

ray of sunlight   window
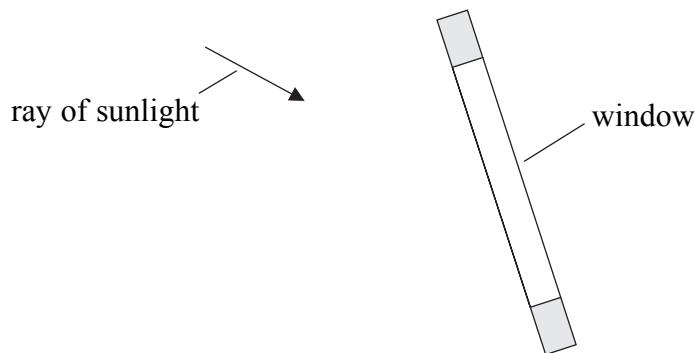
(i) Complete the diagram to show the reflection of the ray from the front of the window.

(2)

(ii) What could you do to stop sunlight being reflected into the student's eyes from this window?

....

(1)

(c) Light is part of the electromagnetic spectrum. If players are not protected from some electromagnetic waves they can suffer ill effects. State which part of the electromagnetic spectrum can cause

(i) skin burns

....

(1)

(ii) blindness.

....

(1)

(d) What do all parts of the electromagnetic spectrum have in common?

....

(1)   Q9

(Total 7 marks)

Turn over

10. (a) The diagram shows an energy flow for a motorbike.
Fill in the gaps in the diagram.

50 000 J of

.... energy

20 000 J of
kinetic energy

.... J of

.... energy
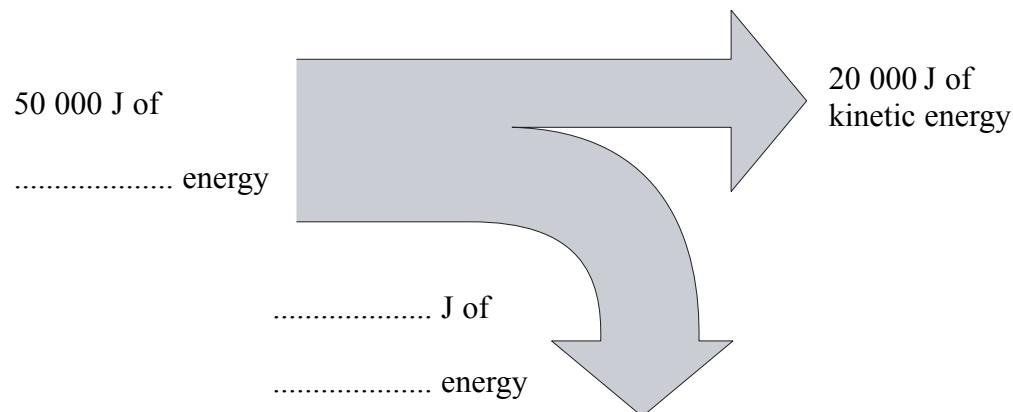
(3)

(b) The motorbike travels 2.0 km. The driving force is 700 N. Calculate the work done in joules by this driving force.

....

....

Work done = ... J

(3)

Q10

(Total 6 marks)

11. (a) A student has a dynamo on her bicycle. When the front wheel turns, a magnet rotates within coils of wire and a lamp on the bicycle lights up.

rotating magnet

coils of wire   coils of wire

N   S
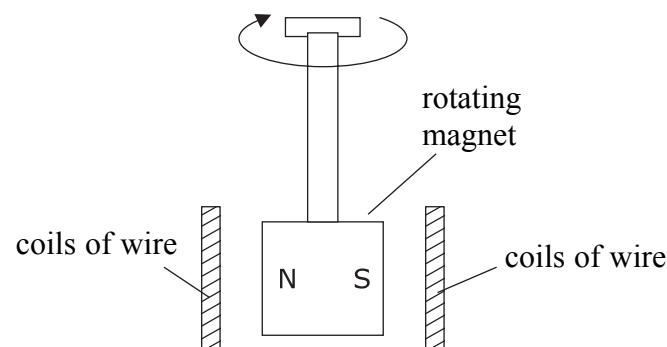
Explain how the rotation of the magnet causes the lamp to light.

....

....

....

(3)

(b) State one way in which the brightness of the lamp could be increased.

....

(1)   Q11

(Total 4 marks)

TOTAL FOR PAPER: 75 MARKS

END

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