Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	3	7	/	3	F	Signature	

Paper Reference(s)

4437/3F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Science (Double Award)

Physics

Paper 3F

Foundation Tier

Wednesday 16 June 2010 – Morning

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
4	
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9	
10	
11	
Total	

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 75. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**. There are 11 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.

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Turn over

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FORMULAE

You may find the following formulae useful.

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

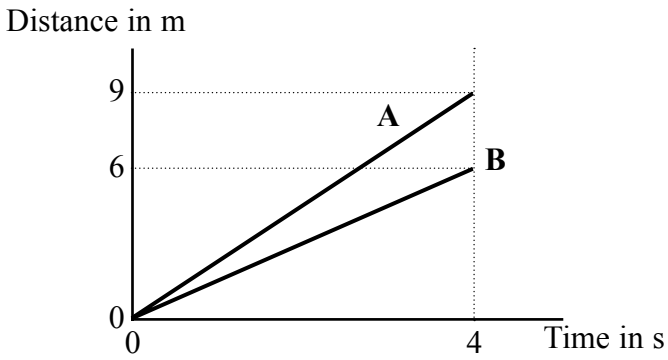
$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

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

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

Leave blank

1. (a) Two students, **A** and **B**, walk across a classroom. The other students take readings of distance and time.
The readings are used to plot the following graph.



(i) Complete the sentence.

The line for student **A** is steeper than the line for student **B**.

This shows that student **A** is walking ..... than student **B**.
(1)

(ii) Use words from the box to complete the sentence.

acceleration	**horizontal**	**speed**	**straight**	**vertical**

The graph shows that each student walks at a steady .....

because the lines are both ..... .
(2)

(b) After 4 seconds, what is the distance between the students **A** and **B**?

Distance = ... m
(2)

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

.....

.....

.....
(1)

(ii) Calculate the average speed of student **B**, giving the unit.

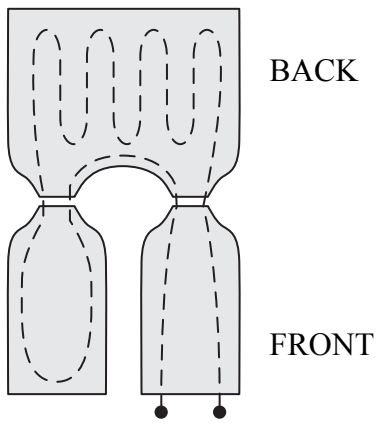
Speed of student **B** = ...
(2)

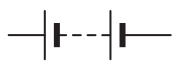
Q1

(Total 8 marks)

Leave blank

2. An electric body warmer is worn by a motorcyclist.
The diagram shows a design for an electric body warmer.





The dashed line shows a wire. When a 12 V battery is connected to the body warmer there is a current in the wire.

(a) On the diagram draw wires connecting the body warmer to the battery.

(1)

(b) Place a cross (☒) in one box to show which of the following terms best describes the circuit.

☒ **A** Parallel

☒ **B** Racing

☒ **C** Series

☒ **D** Short

(1)

(c) Explain why, in this design, the front of the body warmer would produce less heat than the back.

.....

.....

.....

(1)

(d) Suggest one other design fault.

.....

.....

(1)

Leave blank

(e) Place a cross (☒) in one box to show which of the following properties of the wire needs to be known if the current in the body warmer is to be calculated.

☒ **A** colour

☒ **B** density

☒ **C** mass

☒ **D** resistance

(1)

(f) Name two appliances which use electrical heating in the home.

1 .....

2 .....

(2) **Q2**

(Total 7 marks)

Leave blank

3. (a) The box contains the names of different parts of the electromagnetic spectrum.

gamma rays	**infra-red**	**microwaves**	**radio waves**	**ultraviolet**	**visible**	**X-rays**

(i) Fill in the gaps in the chart below to put these parts into their correct order.

radio waves			**visible**			**gamma rays**

(3)

(ii) Use words from the box below to complete the sentences.

You may use each word once, more than once or not at all.

amplitude	**frequency**	**speed**	**wavelength**

Listing the parts from radio waves to gamma rays puts them in order

of increasing ..... and

decreasing ..... .

All the parts have the same ..... in free space.

(3)

(b) State

(i) a use of infra-red;

.....

(1)

(ii) a harmful effect of over-exposure to infra-red.

.....

(1) **Q3**

(Total 8 marks)

Leave blank

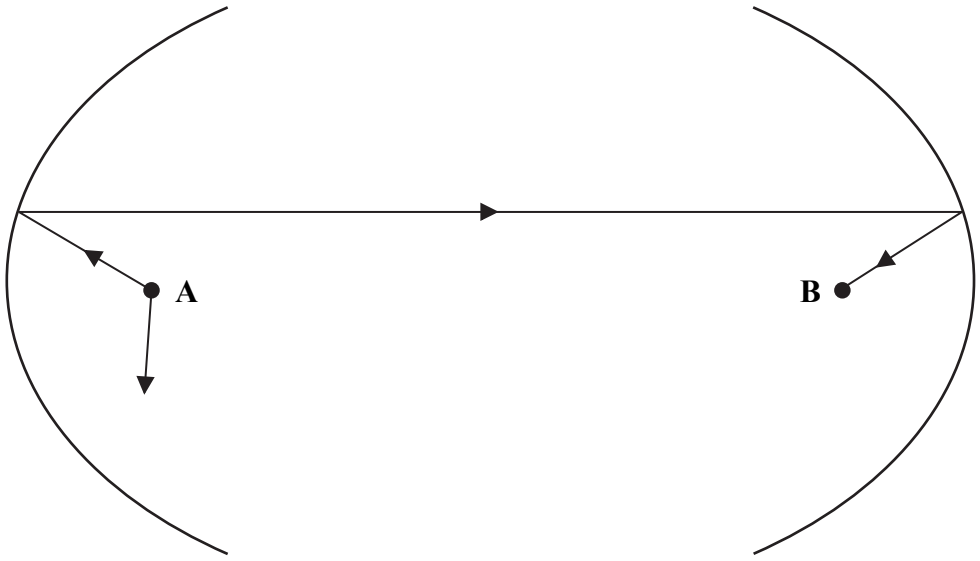
4. (a) Complete the sentence.

When sound waves are reflected from a surface, the angle of

..... equals the angle of ..... .

(1)

(b) The diagram shows a pair of reflectors.
All sound waves starting from the point **A** reflect off the reflectors to the point **B**.
The path of one wave has been drawn.



(i) Complete the path of the other wave.

(2)

(ii) Why is the sound loud at point **B**?

.....

.....

(1)

(c) What type of wave is a sound wave in air?

.....

(1)

(d) A source of sound is removed from **A** and a heater is placed at point **B**.
What would be noticed at point **A**?

.....

(1)

Q4

(Total 6 marks)

Leave blank

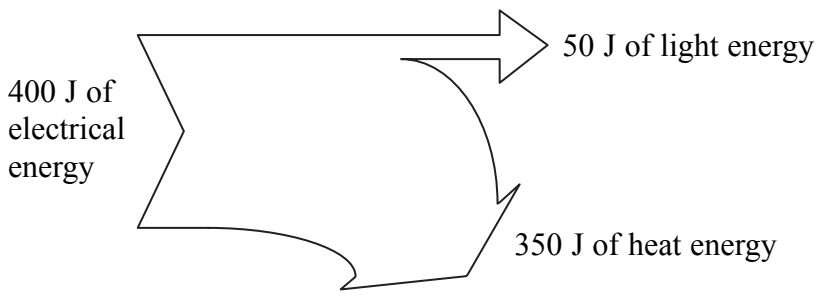
5. (a) Use terms from the box to complete the equation for efficiency.

total energy input	**total energy output**
useful energy input	**useful energy output**

Efficiency = _____

(1)

(b) The flow diagram shows the energy transfer for a lamp.



(i) Use words from the box to complete the sentence.

conserved	**convected**	**efficient**	**inefficient**

The diagram shows that energy is ..... and

that the lamp is ..... as a source of light.

(2)

(ii) The lamp gives out 50 joules of light energy in 10 seconds.
How much light energy does it give out in one second?

.....

.....

Light energy per second = ... J/s

(2)

(iii) What other unit is the same as a joule per second?

.....

(1)

Q5

(Total 6 marks)

Leave blank

6. (a) Name two sources of background radiation.

1 .....

2 .....

(2)

(b) A radioactive source has an activity of 40 Bq. It has a half-life of 3 hours.

(i) What is the name of the unit which the letters Bq represent?

.....

.....

(1)

(ii) What is meant by half-life?

.....

.....

(2)

(iii) How long does it take for the measured activity to change from 40 Bq to 10 Bq?

.....

.....

Time taken = ... hours

(2)

(iv) What assumption have you made about background radiation in your answer to (iii)?

.....

(1)

(c) State two uses of radioactivity.

1 .....

.....

2 .....

.....

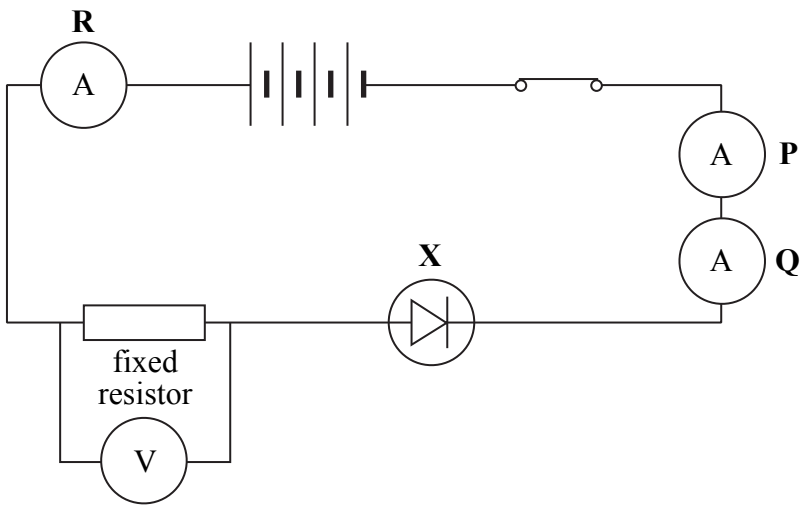
(2)

Q6

(Total 10 marks)

Leave blank

7. The circuit diagram shows how a student connects several components.
These include four identical 1.5 volt cells.



(a) Identify component **X**.

.....

(1)

(b) State a difference between a fixed resistor and a variable resistor.

.....

.....

(1)

(c) (i) Complete the sentence.

The four 1.5 volt cells are called a .....

(1)

(ii) Calculate the voltage, in volts, across the four cells.

.....

Voltage = ... V

(1)

(iii) The voltage across the fixed resistor is 3.8 V.
Calculate the voltage, in volts, across the rest of the circuit.

.....

Voltage across the rest of the circuit = ... V

(1)

Leave blank

(d) The reading on ammeter **R** is 40 mA.
State the reading in milliamps on each of the other two ammeters.

ammeter **P** = ... mA ammeter **Q** = ... mA

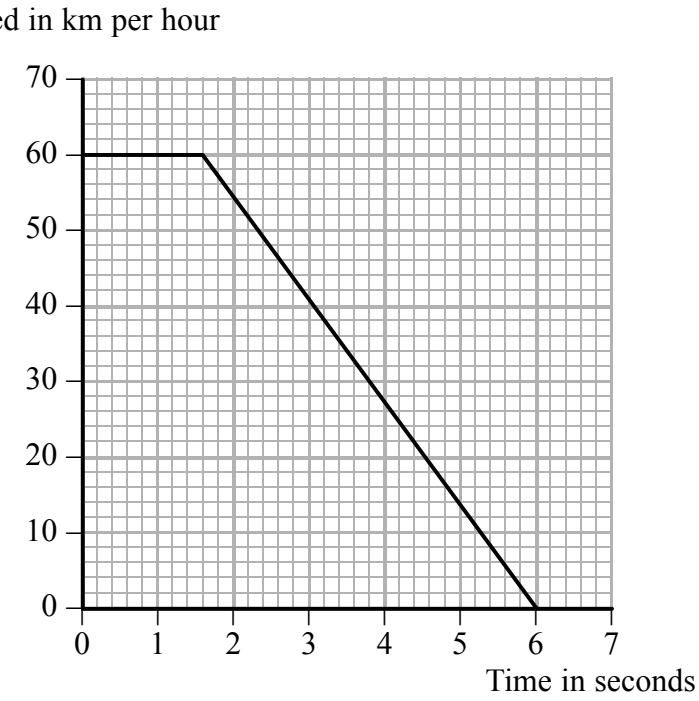
(1)

Q7

(Total 6 marks)

Leave blank

8. A child runs out in front of a truck. The driver makes an emergency stop.
The graph shows the speed of the truck from the time when the driver first sees the child.



(a) (i) State the time, in seconds, for the driver to react.

Time = ... s
(1)

(ii) Calculate the time, in seconds, for the brakes to stop the truck.

Time = ... s
(1)

(b) The driver had been drinking alcohol. State the effect this may have had on:

(i) the time for the driver to react;

.....
(1)

(ii) the time for the brakes to stop the truck.

.....
(1)

Leave blank

(c) Give one feature of the road conditions which may increase the stopping distance of a vehicle.

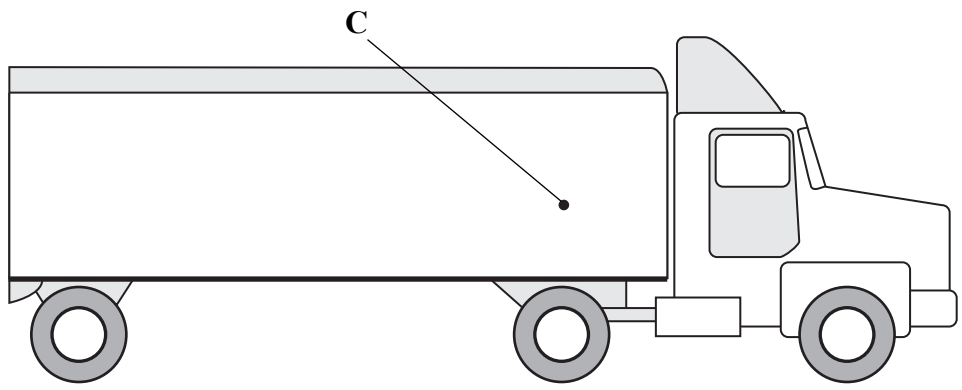
.....

(1)

(d) The diagram shows a truck.

(i) The centre of gravity of the truck and its load is at the point labelled **C**.
Add to the diagram an arrow showing the total weight.

(1)



(ii) State the name of a force which opposes the motion of the truck.

.....

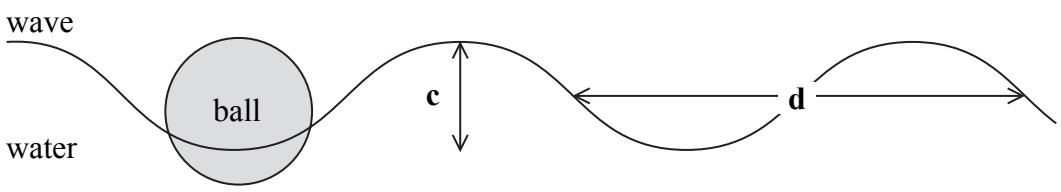
(1)

Q8

(Total 7 marks)

Leave blank

9. The diagram shows a wave on the surface of the water of a swimming pool and a ball floating on the water.



(a) Identify the features of the wave shown by:

(i) distance **c**;

.....

(1)

(ii) distance **d**.

.....

(1)

(b) A student observes the wave.
There are thirty complete cycles in one minute.

Calculate the frequency, in hertz, of the waves.

.....

.....

Frequency = ... Hz

(2)

(c) (i) Identify the type of wave.

.....

(1)

(ii) Describe the motion of the ball as the wave occurs.

.....

.....

(1)

Q9

(Total 6 marks)

Leave blank

10. This question is about two types of power station.
In each case complete the sentences to identify the forms of energy involved in the energy transfers.

(a) In an oil-burning power station, oil is burned to heat water.
The water boils to give steam.
The steam spins a turbine connected to a generator.

(i) The oil has ..... energy.

(1)

(ii) The spinning turbine has ..... energy.

(1)

(iii) The useful energy output from the generator is ..... energy.

(1)

(b) In a hydroelectric power station, water from a high dam falls down a pipe and spins a turbine.

(i) The useful energy transfer in the pipe is

from ..... energy to ..... energy.

(2)

(ii) Some energy is wasted as ..... energy.

(1)

Q10

(Total 6 marks)

Leave blank

11. (a) Complete the symbol in the box to describe the nucleus of carbon-14.

C 6

(1)

(b) The atomic number of carbon is 6.
Complete the sentence.

The atomic number is the number of ..... in the

..... .

(1)

(c) Complete the sentence.

Carbon-12 and carbon-14 are ..... of carbon.

(1)

(d) Alpha, beta and gamma are ionising radiations.
Complete the sentences.

(i) The two which are particles are ..... and ..... .

(1)

(ii) Ionising radiations are emitted from unstable nuclei in a radioactive decay process which is ..... .

(1) **Q11**

(Total 5 marks)

TOTAL FOR PAPER: 75 MARKS

END