Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4420/1F

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Physics

Paper 1F

Foundation Tier

Monday 31 October 2005 – Morning

Time: 1 hour 30 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Question Number	Leave Blank
1	
2	
3	
4	
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11	
12	
13	
14	
15	
16	
Total	

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 100. The marks for parts of questions are shown in round brackets: e.g. (**2**).
This paper has 16 questions. All blank pages are indicated.
Useful formulae are given on page 3.

Advice to Candidates

Write your answers neatly and in good English.

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FORMULAE

You may find the following formulae useful.

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

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

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

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

Leave blank

1. (a) Choose the correct word from the box to complete the sentence.

energy	**moment**	**pull**	**work**

A force is any kind of push or .....

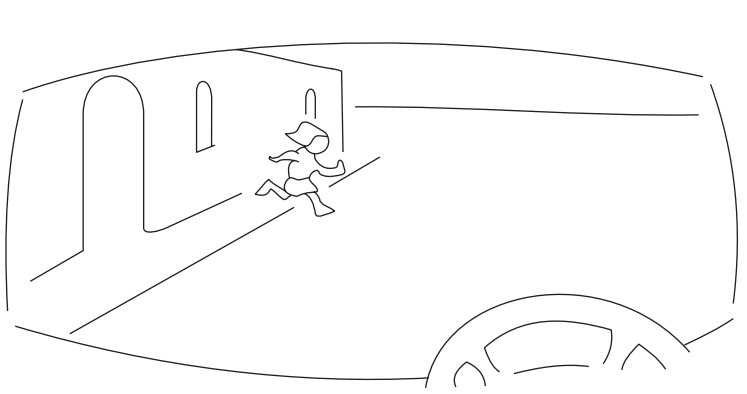
(1)

(b) Complete the table. Name the force in each example.

Example	Name of the force
A girl oils the chain on her bicycle to reduce this force.	.....
Everything on and near the Earth is pulled downwards by this force.	.....
This force acts between two charged electrical insulators.	.....

(3)

(c) A lorry driver sees a child step out into the road. The driver applies the brakes.



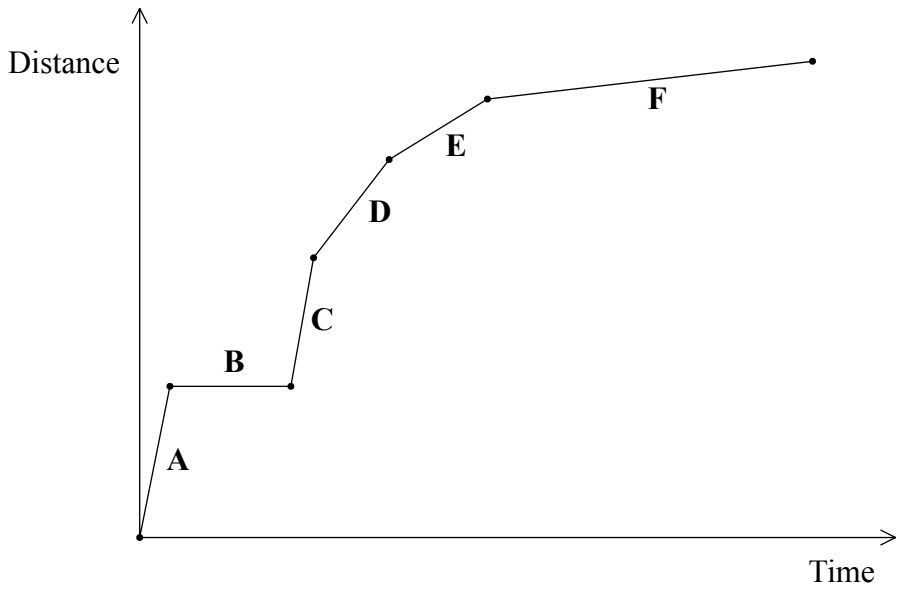
In the box, ring the three factors which may reduce the stopping distance of the lorry.

large mass of the lorry	**small mass of the lorry**
high speed of the lorry	**slow speed of the lorry**
long reaction time of the driver	**short reaction time of the driver**

(2)

Leave blank

(d) A car makes a journey along a straight road. The sketch graph shows a distance–time graph for this journey.



(i) Describe the motion of the car in part **B** of its journey.

.....

(1)

(ii) During two parts of its journey the car is travelling at the same steady speed. Which parts are these? Complete the spaces.

Part ..... and part .....

(1)

Complete the sentence.

You can tell from the graph that the speed is the same because the ..... is the same.

(1)

Q1

(Total 9 marks)

Leave blank

2. (a) The box contains the names of colours in the visible spectrum in order.
Add the names of the two missing colours.

red	.....	yellow	.....	blue	indigo	violet

(2)

(b) (i) The box contains the names of different parts of the electromagnetic spectrum in order. Add the missing name.

radio waves	microwaves	infra-red radiation	.....	ultraviolet radiation	X-rays	gamma rays

(1)

(ii) Draw a line linking the statement to its correct ending.

The parts of the electromagnetic spectrum are listed, from left to right, in order of increasing ...	frequency.
	speed.
	wavelength.

(1)

(c) State two uses for microwaves.

1 .....

2 .....

(2)

(d) Complete the sentence.

Gamma rays are used to ..... food and medical equipment.

(1)

(e) How will a high dose of infra-red radiation damage your skin?

.....

(1)

Q2

(Total 8 marks)

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TURN OVER FOR QUESTION 3

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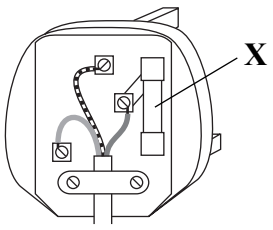
3. (a) The diagram shows the inside of a three-pin plug.



(i) Name the part labelled **X**. .....

(1)

(ii) The plug is pushed into a socket. State and explain the danger if you push it in when your hands are wet.

.....

.....

.....

(2)

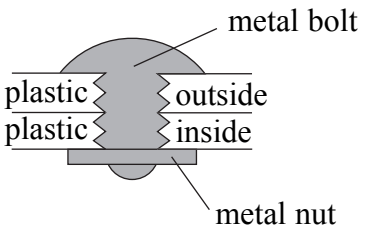
(b) The plug should be connected to a suitable cable.
Complete the sentence.

The cable may get hot if it carries a high ..... and then the insulation around the wires may .....

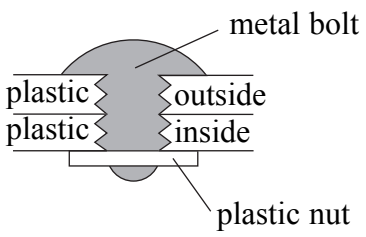
(2)

Leave blank

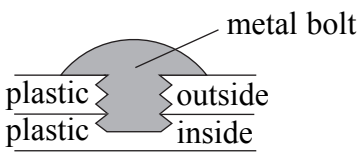
(c) The outside case of an electric drill is fastened to the inside parts with bolts. The diagrams show four ways of doing this.



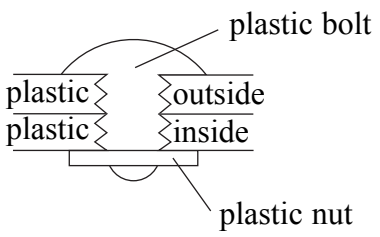
Method A ☐



Method B ☐



Method C ☐



Method D ☐

(i) Tick two boxes to show which two methods would give the electric drill double insulation.

(1)

(ii) Explain your answer.

.....

.....

.....

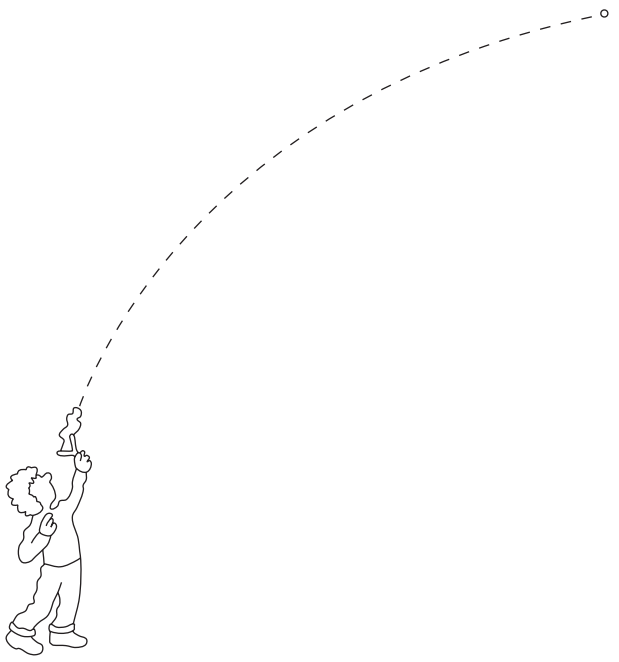
(2)

(Total 8 marks)

Q3

Leave blank

4. A child uses a strong rubber band to send a stone high into the air.



(a) What form of potential energy does the rubber band have when it is pulled back?

.....

(1)

(b) Name a form of energy which the stone has when it moves through the air.

.....

(1)

(c) Name a force which opposes the motion of the stone.

.....

(1)

(d) What form of potential energy does the stone have when it is high in the air?

.....

(1)

Q4

(Total 4 marks)

Leave blank

5. (a) On a hot day cool air moves downwards and pushes warm air upwards.
This cool air then becomes warm and gets pushed upwards.

(i) Name this energy transfer process.

.....

(1)

(ii) Draw a line linking the statement to its correct ending.

When air is heated its density ...	gets less.
	gets more.
	stays the same.

(1)

(b) It can get cold at night.

Explain how an extra blanket on your bed reduces the heat transfer from your body to your bedroom.

.....

.....

.....

.....

(3)

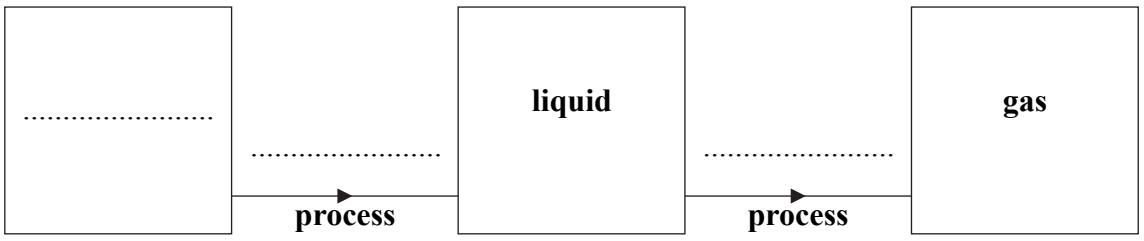
(Total 5 marks)

Q5

Leave blank

6. (a) The diagram shows the changes of state when a substance is heated.

Add the name of the first state and the names of the processes involved.



(3)

(b) The statements are about the particles in a liquid. Tick (✓) two boxes to show which statements are correct.

The particles are about as far apart as they are in a solid. ☐

The particles are in a regular structure. ☐

The particles are liquid. ☐

The particles are much further apart than they are in a solid. ☐

The particles move randomly. ☐

The particles vibrate about fixed positions. ☐

(2)

(c) A cylinder contains some gas. Explain what effect the particles in the gas have on the inside of the cylinder.

.....

.....

.....

(2)

Q6

(Total 7 marks)

Leave blank

7. (a) Underline the names of the materials which may be attracted to a magnet.

aluminium	**copper**	**iron**	**lead**	**steel**	**tungsten**

(2)

(b) Magnetism may be induced in some materials when they are placed in a magnetic field.

Underline the names of the materials for which this is true.

aluminium	**copper**	**iron**	**lead**	**steel**	**tungsten**

(2)

(c) You have three metal bars which seem identical. Two of them are magnets but one is not.

Without using any other equipment, explain how you can tell which bars are the magnets.

.....

.....

.....

(2)

Q7

(Total 6 marks)

Leave blank

8. Ionising radiations are given out by radioactive materials.

(a) Ring the names of two items which can be used to detect ionising radiations.

ammeter	**circuit breaker**	**Geiger-Muller tube**	**magnet**
photographic film	**solar cell**	**thermometer**	**voltmeter**

(2)

(b) Use words from the box to solve the clues in the table.
Each word may be used once, more than once or not at all.

alpha (α)	**becquerel**	**beta (β)**	**electrons**	**gamma (γ)**	**isotopes**
lead	**neutrons**	**nucleus**	**protons**	**rocks**	**unstable**

Clue	Word
The central part of an atom.	.....
The most penetrating type of radiation.	.....
A source of background radiation.	.....
Beta (β) particles are these.	.....
These nuclei will emit ionising radiations.	.....
Atoms with the same number of protons but different numbers of neutrons.	.....

(6)

Q8

(Total 8 marks)

Leave blank

9. (a) Are sound waves in air transverse or longitudinal?

.....

(1)

(b) A sound wave has a frequency of 384 Hz and a wavelength of 0.86 m.
Calculate its speed in m/s.

.....

.....

Speed = ... m/s

(2)

(c) Another sound wave has a frequency of 38 400 Hz.

(i) Would you be able to hear this sound wave?

.....

(1)

(ii) Explain your answer.

.....

.....

(1) **Q9**

(Total 5 marks)

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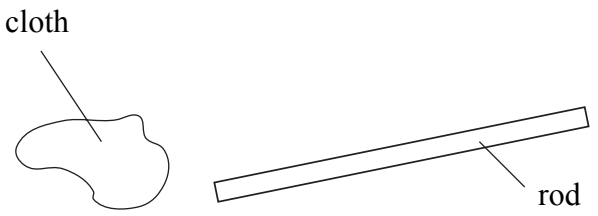
10. A student holds a rod and charges it by friction using a cloth.

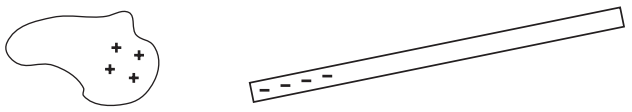


(a) Tick (✓) the boxes to show if the cloth and rod are insulators or conductors.

	Insulator	**Conductor**
cloth		
rod		

(2)

(b) Explain in terms of electrons how the rod and cloth become charged as shown.



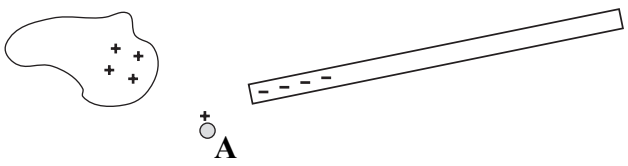
.....

.....

.....

(2)

(c)



A small positively-charged plastic sphere is placed at **A**.

(i) State the direction in which the sphere moves.

.....

(1)

(ii) Explain your answer.

.....

(1)

Q10

(Total 6 marks)

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TURN OVER FOR QUESTION 11

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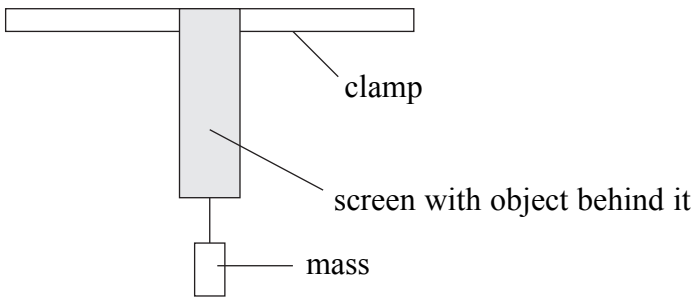
11. A teacher suspends an object from a clamp. She places a small screen in front of the object so that the students cannot see it. She then attaches a mass to the bottom of the object. The mass applies a force to the object and the object extends.

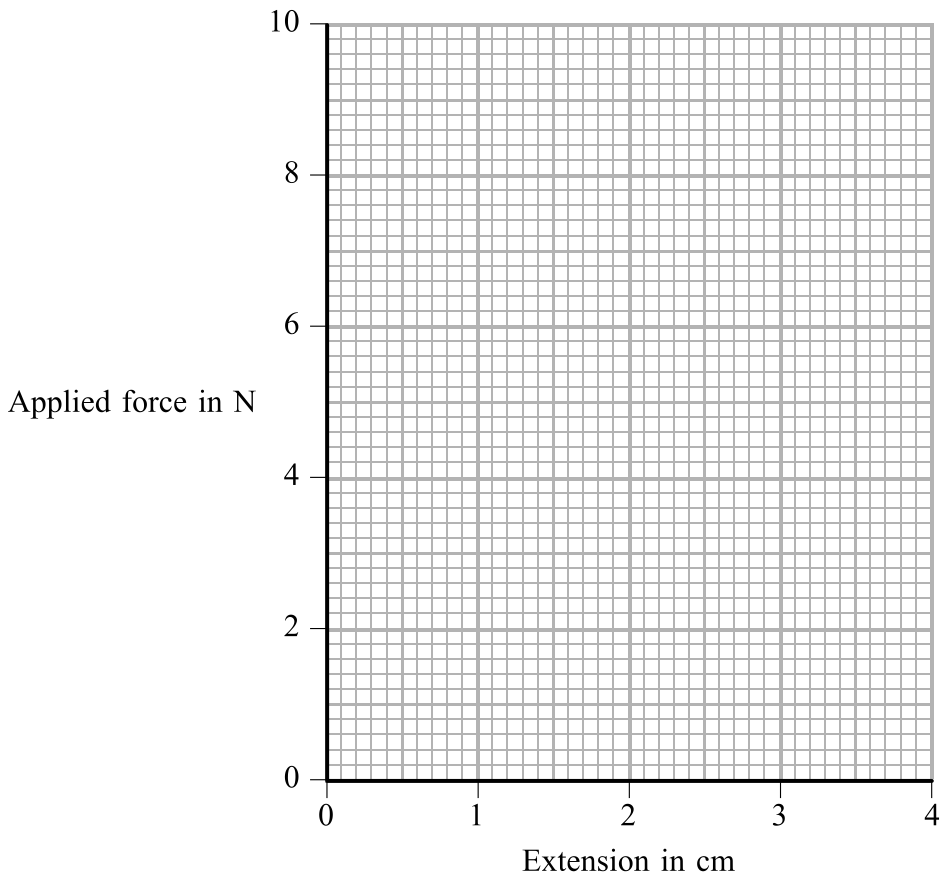


(a) Different masses are attached to the bottom of the object.
The teacher measures the extension and the students calculate the value of the applied force.

The table shows the results.

Extension (cm)	0.0	1.1	1.8	2.5	3.5
Applied force (N)	0.0	3.0	5.0	7.0	9.5

Plot the points on the grid. Draw the best straight line through the plotted points.



(3)

Leave blank

(b) Use your graph to find the extension for a force of 8.0 N.

.....

(1)

(c) Explain why the extension for a force of 800 N is unlikely to be one hundred times the value in (b).

.....

.....

(1)

(d) The teacher tells her pupils that the object is one of three things:

- a helical spring
- a metal wire
- an elastic band.

(i) Which one could it be?

.....

(1)

(ii) Give two reasons for your choice.

1 .....

2 .....

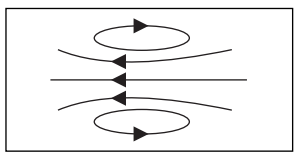
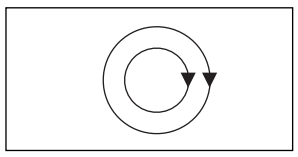
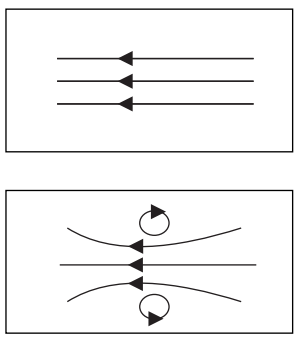
(2)

Q11

(Total 8 marks)

Leave blank

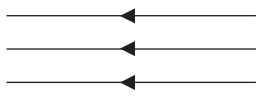
12. (a) An electric current produces a magnetic field.
Draw a line from each box to its correct magnetic field pattern.

current in a straight wire	
current in a flat circular coil	
current in a solenoid	

(3)

(b) A charged particle travels towards and enters a magnetic field.

charged particle



magnetic field

(i) Describe the magnetic force acting on the charged particle when it is moving in the magnetic field.

.....

(1)

(ii) Explain your answer.

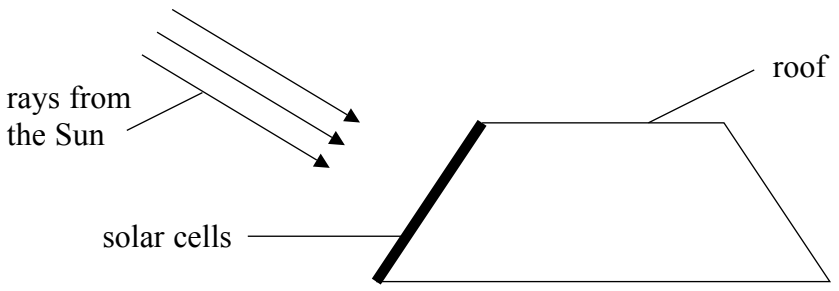
.....

(1) **Q12**

(Total 5 marks)

Leave blank

13. There are some solar cells on the roof of a school.



(a) Complete the boxes to show the useful energy transfer taking place in the solar cells.

Useful input		Useful output
..... energy	→	..... energy

(2)

(b) At a certain time of day the amount of useful energy transferred is 6000 J during a period of 2 minutes.

(i) Calculate the rate of transfer of energy in watts during this time.

.....

.....

Rate of transfer of energy = ...W

(2)

(ii) Give two reasons why the rate of transfer of energy in the solar cells changes throughout the day.

1 .....

2 .....

(2) **Q13**

(Total 6 marks)

Leave blank

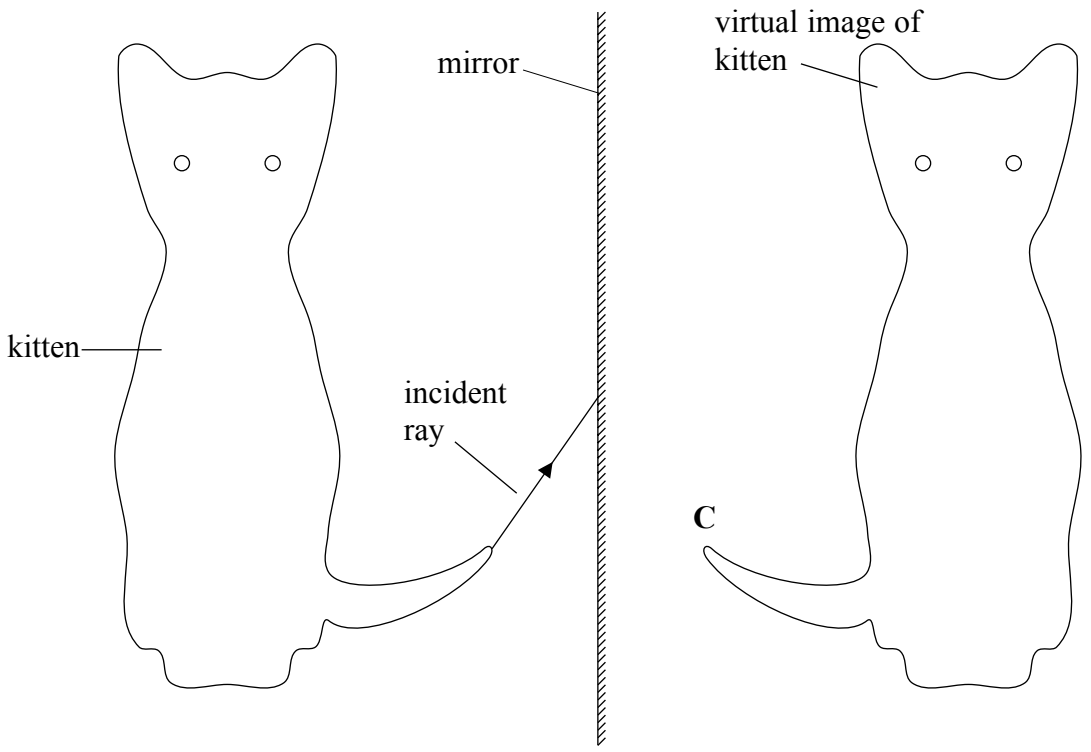
14. (a) Complete the sentence.

When light is incident on a mirror the angle of incidence equals

the angle of .....

(1)

(b) The diagram shows a kitten sitting in front of a mirror. A virtual image of the kitten is formed by the mirror.



The image of the end of the kitten's tail is formed at **C**.
One incident ray from the tail is shown. Draw its reflected ray and then construct further rays to show the image formation at **C**.

(3) **Q14**

(Total 4 marks)

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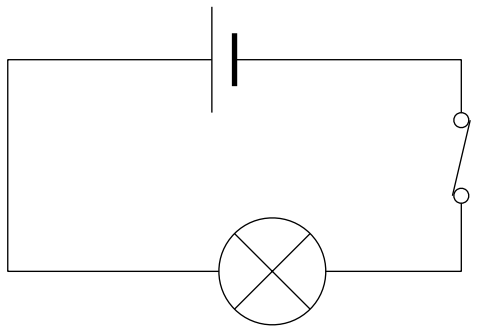
15. In the series circuit below, a lamp is lit to full brightness by direct current from a 1.5 V cell.



(a) State two differences between mains electricity and that supplied by the 1.5 V cell.

1 .....

2 .....

(2)

(b) Draw a parallel circuit using the 1.5 V cell to show how two lamps could be switched on and off independently and lit to full brightness.

(2) **Q15**

(Total 4 marks)

TURN OVER FOR QUESTION 16

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16. (a) Two students record the mass and volume for a small cube of copper and a small cube of iron.

The table shows the results.

	Mass (kg)	**Volume (m^3)**
copper	1.125	0.000 125
iron	1.728	0.000 216

(i) Calculate the density in kg/m^3 for copper and iron.

Density of copper = ... kg/m^3

Density of iron = ... kg/m^3

(2)

(ii) Which of the two materials is less dense?

.....

(1)

(iii) Which of the two cubes has less weight?

.....

(1)

(b) How would you find the volume of the metal cubes?

.....

.....

.....

(3)

Q16

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

END