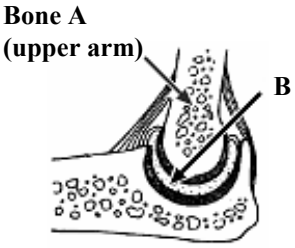
Biology

Question 1 (52)

For examiner use only	
(1)	(2)

(*a*) The diagram shows the structure of an elbow. Name ***bone* A** and identify the ***type*** of moveable ***joint* B.**



Name of bone A _____

Type of joint B _____

(*b*) ***Decomposers*** are living things that release useful materials, from the waste products of plants and animals and from dead plants and animals, for reuse by living organisms. Name **two *kinds of decomposers*** found in the ***soil***.

Names _____

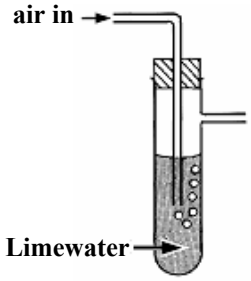
(*c*) Water vapour evaporates from cells in the leaves of plants and exits the leaves by way of tiny pores in their leaves. What is this ***process*** called? How would you ***test*** the drops of liquid inside the plastic bag covering the shoot of the plant shown in the diagram to ***show that the drops are water***?

Name of process _____

Test for water _____

_____

(*d*) The diagram is of an apparatus used to show that ***exhaled air contains carbon dioxide***. When performing this experiment ***a control is required*** to show that inhaled air contains ***less*** carbon dioxide than exhaled air. ***Describe, using a labelled diagram, a suitable control procedure.***

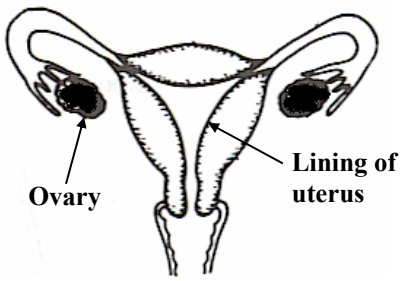


Labelled diagram

For examiner use only

(1) (2)

(*e*) The diagram shows the female reproductive system during the ***fertile period*** of the menstrual cycle. What happens in the ovary during this time? What happens to the lining of the uterus during this time?



What happens in the ovary? _____

_____

What happens to the lining of the uterus? _____

_____

(*f*) Eye colour, hair texture and many other human characteristics are controlled by ***genes***. Name the ***structures*** in the ***nuclei*** of our cells where ***genes*** are located. Name the ***substance*** that genes are made of.

Name of structures _____

Name of substance _____

(*g*) Waste management includes: composting, incineration, landfill and recycling. Pick **one** of the underlined methods of managing waste and say ***how it works*** and give one advantage ***or*** disadvantage of using the method that you have selected.

How it works _____

_____

Advantage/Disadvantage _____

_____

(*h*) The plant shown in the diagram was left in total darkness overnight and then exposed to strong sunlight for four hours. The ***leaf*** with the foil was removed from the plant and ***tested for starch***. Clearly state the ***result*** you would expect from this test? What conclusion can be drawn?

Result _____

Conclusion _____

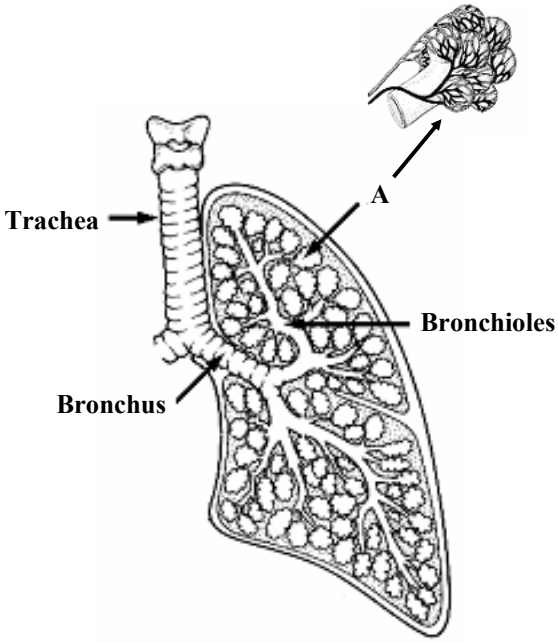
(7 × 6 + 1 × 10)

Question 2 (39)

For examiner use only

(1) | (2)

(*a*) The diagram shows the structure of a human lung. Air passes in and out of the lungs, via the trachea, bronchi and bronchioles. ***Gaseous exchange*** takes place in the structures labelled **A**.



(*i*) Name ***structure*** **A**. (3)

_____

(*ii*) How does ***gaseous exchange*** take place in the structures labelled **A**? (6)

_____

_____

_____

_____

_____

_____

_____

(*b*) Blood is a liquid tissue. The diagram shows blood viewed through a microscope.

(*i*) Name **any two** components of blood shown in the diagram. (6)

Component 1 _____

Component 2 _____

(*ii*) Give the ***function*** of **each** of the components of blood you have named. (6)

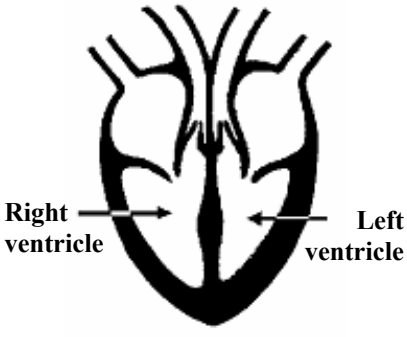
Function of 1 _____

Function of 2 _____

For examiner use only

(1) (2)

(*iii*) The diagram shows the human heart.



Why has the left ventricle got a ***thicker wall*** than the right ventricle? (3)

_____

_____

_____

(*c*) The diagram shows a person's ***pulse rate*** being taken.

(*i*) ***What*** causes a ***person's pulse***? (3)

_____

_____

(*ii*) ***How*** is a person's ***pulse rate measured*** using this method? (6)

_____

_____

_____

_____

(*iii*) An athlete's resting pulse rate is 58. After 10 minutes strenuous exercise their pulse rate was 120. After resting for 5 minutes their pulse rate reduced to 63. ***Clearly account for the rise and fall in pulse rate*** experienced by the athlete. (6)

_____

_____

_____

_____

_____

_____

_____

Question 3 (39)

For examiner use only

(1) (2)

(*a*) This nutritional information was given on a packet of wheat bran. Wheat bran is used with breakfast cereals and is added to brown bread.

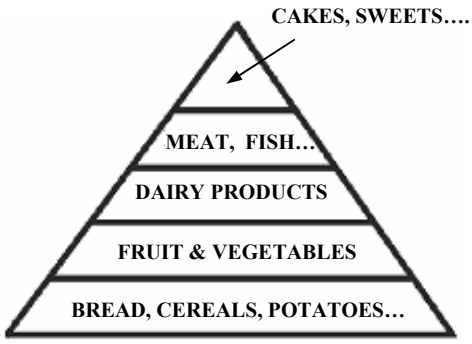
Nutritional Information per 100 g	
Energy	**872 kJ / 206 kcal**
Protein	**15 g**
Carbohydrate	**26.8 g**
(of which sugars)	**3.8 g**
Fat	**2.5 g**
(of which saturates)	**0.5 g**
Fibre	**36.5 g**
Sodium	**0.028 g**

(*i*) Select **any two *nutrients*** from the list given and say what ***role*** each one has in maintaining health. (6)

Nutrient 1 _____ **Role of 1** _____

Nutrient 2 _____ **Role of 2** _____

(*ii*) The diagram shows a food pyramid.



Explain how to use a food pyramid to plan a healthy diet. (6)

_____

_____

_____

_____

(*iii*) Tests were carried out on three foods by a pupil in a school laboratory. The results of these tests are given in the table.

A plus (+) sign means a positive result to a test.

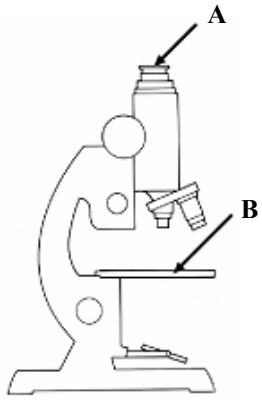
A minus (–) sign means a negative result to a test.

Food Tested	Food Tests			
	Starch	Reducing sugar	Protein	Fat
Food A	+	–	–	+
Food B	–	–	+	+
Food C	+	–	+	+

Which **one** of the foods, **A**, **B** or **C** would most likely be cheese, meat, or fish? _____ (3)

Which **one** of the foods, **A**, **B** or **C** would most likely be crisps, or chips? _____ (3)

(*b*) The diagram shows a laboratory microscope.



(*i*) What are the ***functions*** of parts labelled **A *and* B**? (6)

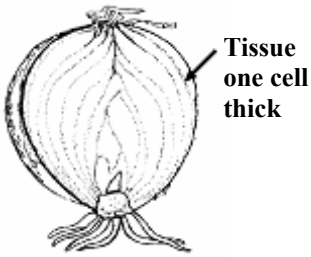
Function of A _____

_____

Function of B _____

_____

(*ii*) Onion epidermis is a tissue only one cell thick. It is used in school laboratories on microscope slides to investigate plant cell structure using a microscope.



Describe how to ***prepare a microscope slide*** from a plant tissue. (6)

_____

_____

_____

_____

_____

_____

_____

(*iii*) Draw a ***labelled diagram***, in the box provided, of a ***plant cell***. (9)

Labelled diagram

For examiner use only

(1) | (2)

Chemistry

Question 4 (52)

For examiner use only

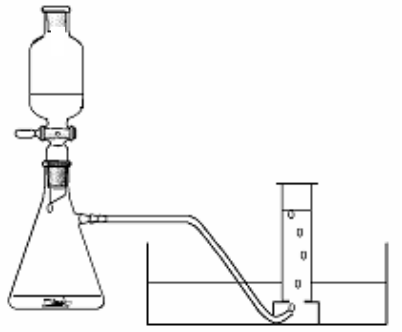
(1) (2)

(*a*) Define the term '***isotope***'. _____

_____

_____

(*b*) In 1774 Joseph Priestley, an English chemist, discovered oxygen.
Name the **two *chemicals*** that you reacted together to ***prepare oxygen*** in the school laboratory. One of the chemicals acted as a ***catalyst***.

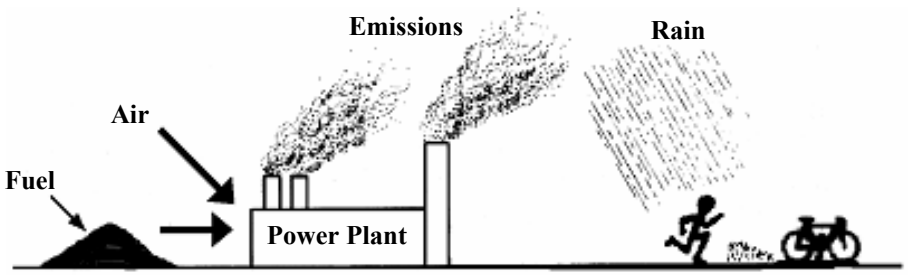


Names of chemicals _____

Which one of the two chemicals used was the ***catalyst***?

_____

(*c*)



Fossil fuels are burnt to provide energy to generate electricity.
Give the **name** <u>*or*</u> **formula** of a compound of ***sulfur*** formed when a sulfur containing fossil fuel ***burns in air***.

Name <u>*or*</u> formula _____

Acid rain is formed when this sulfur compound dissolves in and reacts with water in the atmosphere. Describe the ***effect of acid rain*** on limestone.

Effect on limestone _____

(*d*) How would you show that ***water contains dissolved solids***?

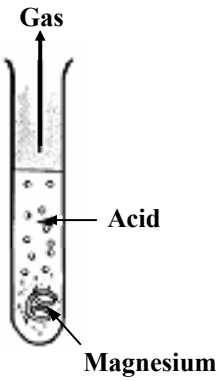
_____

_____

For examiner use only

(1) (2)

(*e*) Reactivity tests were carried out on calcium, copper, magnesium and zinc in four test tubes containing an acid. The test carried out using magnesium is shown.



State ***one thing*** you would do ***to make the tests fair***.

List the **four *metals in order of reactivity with the acid***, starting with the ***most reactive***.

State one thing _____

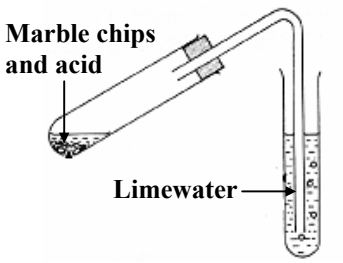
_____

Metals in order of reactivity _____

(*f*) Niels Bohr received the Nobel Prize for physics in 1922 for his model of the electronic structure of the atom. Potassium has an atomic number of 19. Give the arrangement of the electrons in an atom of potassium.

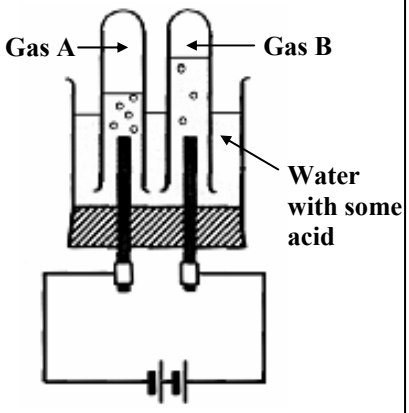
_____

(*g*) Carbon dioxide turns limewater milky. Complete the ***chemical equation*** for the reaction of carbon dioxide with limewater.



$Ca(OH)_2$ + CO_2 ⟶

(*h*) The diagram shows the electrolysis of water.



Why is ***some acid added*** to the water?

Why? _____

Give a ***test*** for ***gas*** **A**.

Test _____

The volume of gas **A** is twice that of gas **B**. What does this tell us about the composition of water?

What? _____

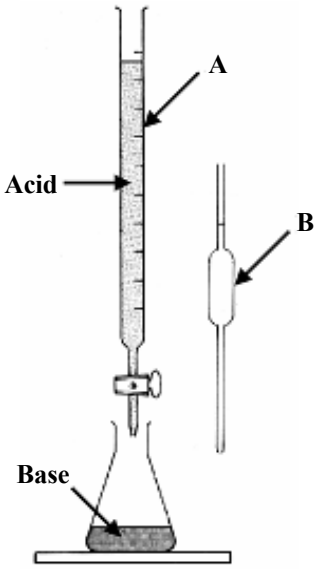
(7 × 6 + 1 × 10)

Question 5 (39)

For examiner use only

(1) (2)

(*a*) The pieces of laboratory equipment shown, together with some other items, were used to ***prepare a sample of sodium chloride***.



(*i*) Name item **A** *or* item **B** (3)

A _____ ***or*** **B** _____

(*ii*) There were 25 cm^3 volumes of base used in this experiment. Describe how the piece of equipment **A** was used to ***measure the volume of acid*** required to neutralise this amount of base. (6)

_____

_____

_____

_____

(*iii*) Name a ***suitable acid*** and name a ***suitable base*** for the preparation of sodium chloride by this method. (6)

Acid _____ **Base** _____

(*iv*) Write a ***chemical equation*** for the reaction between the ***acid*** and the ***base*** that you have named. (6)

_____

(*b*) Different plastics have different properties.

The dust pan and brush set shown is made from ***two different plastics***. The bristles are made of ***type*** **A** and the other parts are made of ***type*** **B** plastic. Give **one** ***property*** of ***type*** **A** and **one** ***property*** of ***type*** **B** plastic that that make them suitable for their use in this product. (6)

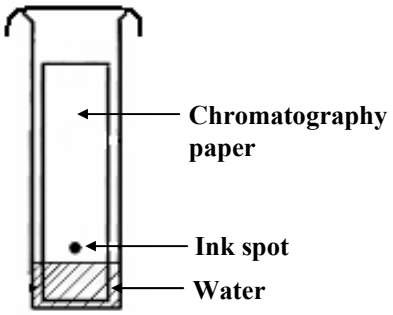
Property of type A _____

Property of type B _____

For examiner use only

(1) (2)

(*c*) A spot of water-soluble ink was put on a piece of chromatography paper and set up as shown in the diagram. The ink used was a ***mixture*** of different coloured dyes.



(*i*) What happens to the ink spot as the water moves up the paper? (3)

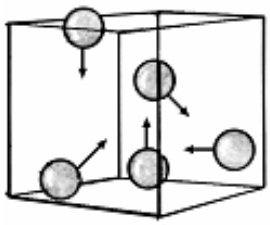
_____

_____

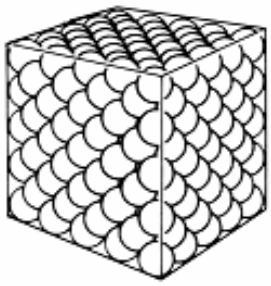
(*ii*) What would happen to a spot of water-soluble ink consisting of a ***single coloured dye*** if it were used in the above experiment? (3)

_____

(*d*) Study the diagram carefully. It ***shows the ways that the particles of gases and solids occupy space***.



Particles of a gas



Particles of a solid

The particles of ***gas*** have ***lots of space*** and ***move randomly*** at high speeds in three dimensions and ***collide*** with each other and with their container. The arrows represent the velocities of the gas particles.
The particles of a ***solid*** are ***packed closely together*** and ***cannot move around*** but they can ***vibrate***.

Give **one** ***property of a gas*** and **one** ***property of a solid***, that you have observed, and is consistent with (matches) this micro-view of these states of matter. (6)

One property of a gas _____

One property of a solid _____

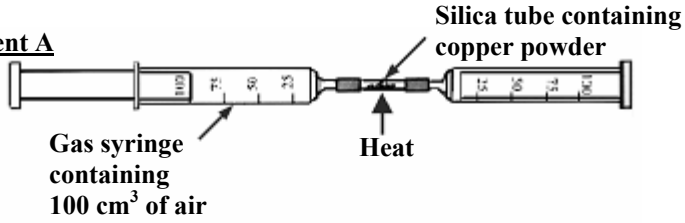
Question 6 (39)

For examiner use only

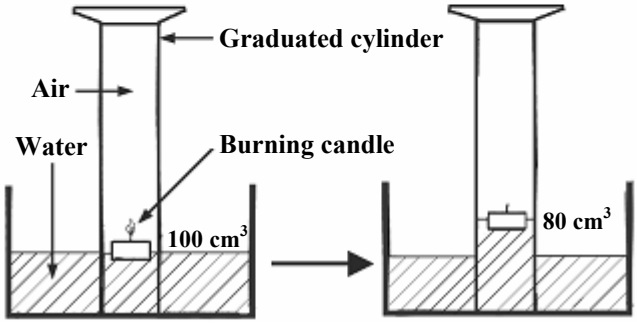
(1) (2)

(*a*) The composition of air can be investigated in different ways.
Two experiments are shown in the diagram.

Experiment A



Experiment B



In **Experiment A** the air was pushed repeatedly over the heated copper powder and only 79 cm^3 of gas remained at the end of the experiment.

(*i*) Why is it necessary to let the apparatus cool down before measuring the volume of the remaining gas? (3)

_____

(*ii*) Why did the volume of gas decrease and then remain steady? (3)

_____

(*iii*) What is the remaining gas mainly composed of? (3)

_____

(*iv*) Experiment **B** is less accurate than Experiment **A**.
Give a reason why this is so. (6)

_____

For examiner use only

(1) (2)

(*b*) (*i*) Show, clearly using shading and labelling, the ***location*** of the ***alkaline earth metals*** on the blank periodic table given. (3)

(*ii*) Name an ***alkaline earth metal***. **Name** _____ (3)

(*c*) The millennium spire, in Dublin, is made from steel. Iron and steel are can suffer from ***corrosion***.

Iron and steel show ***visible signs of corrosion***.

Give one visible sign of corrosion.

_____

_____ (3)

Oxygen and water together are necessary for the corrosion of iron or steel.
Describe, with the aid of labelled diagrams, experiments to show that:

(*i*) ***oxygen alone***, will ***not*** lead to the ***corrosion of iron (or steel)***

(*ii*) ***water alone*** will ***not*** lead to the ***corrosion of iron (or steel)***. (15)

_____

_____

_____

_____

_____

Labelled diagram

Physics

Question 7 (52)

For examiner use only

(1) (2)

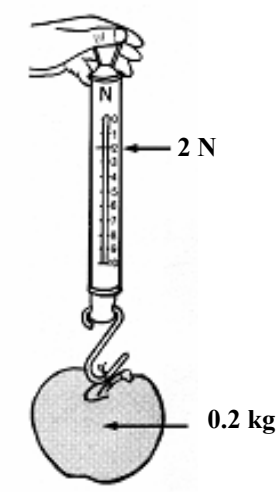
(*a*) A pupil measured the ***weight*** of an apple of ***mass*** 0.2 kg using a spring balance and got a reading of 2 N.

Distinguish between ***weight*** and ***mass***.

_____

_____

_____



(*b*) How are ***echoes*** produced?

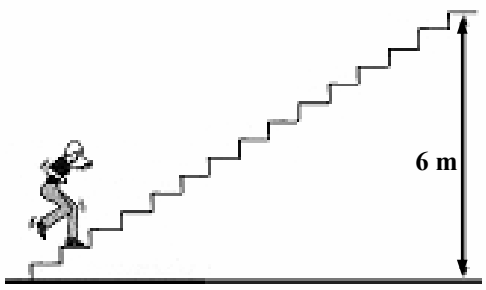
_____

_____

_____

(*c*) A girl of mass 60 kg (weight 600 N) climbed a 6 m high stairs in 15 seconds.

Calculate the ***work*** she did and the average ***power*** she developed while climbing the stairs.



Work _____

Power _____

(*d*) What is ***refraction*** of light?

Give an everyday example of an effect caused by refraction.

What? _____

Example _____

For examiner use only

(1) (2)

(*e*) Define ***temperature*** and give a ***unit*** used to express temperature measurements.

Definition _____

Unit _____

(*f*) Explain, clearly, the ***safety role*** of ***fuses*** in household electrical circuits.

_____

(*g*) Name the mode of ***heat transfer*** from the hot liquid, through the ***spoon***, to the hand.

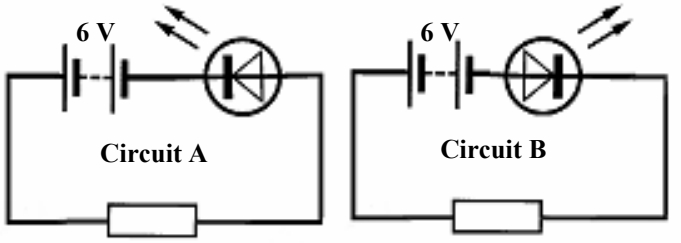
Name _____

Heat moves in liquids by convection. Give **one** ***difference*** between convection and the way heat moves along the spoon.

Difference _____

_____

(*h*) A pupil carried out an investigation into ***the effect of a diode on d.c. and on a.c.*** circuits using an LED. The following circuits were initially set up.



What is ***observed*** in circuit **A** and in circuit **B**?

Circuit A _____

Circuit B _____

When the batteries in circuits **A** and **B** were replaced by 6 V a.c. supplies the LEDs glowed dimly in both circuits. Explain this ***observation***.

Explanation _____

_____

($7 \times 6 + 1 \times 10$)

Question 8 (39)

For examiner use only

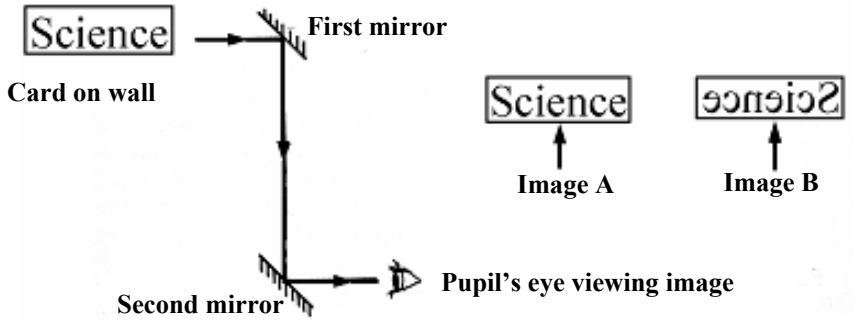
(1) (2)

(*a*) (*i*) Why is the word **Ambulance** painted in reverse on the front of many ambulances? (3)

Why? _____

_____

(*ii*) A pupil made a ***simple periscope*** using two plane (flat) mirrors. The mirrors were arranged as shown in the diagram. The pupil looked through the periscope at the word 'Science' written on a card pinned to the laboratory wall.



Did the pupil see **image A *or* image B** when she looked through the periscope? Give a ***reason*** for your answer. (9)

Image? _____

Reason _____

_____

(*b*) Describe an experiment to show the ***expansion of water*** when it ***freezes***. You may include a labelled diagram if you wish. (9)

_____

_____

_____

_____

_____

_____

_____

_____

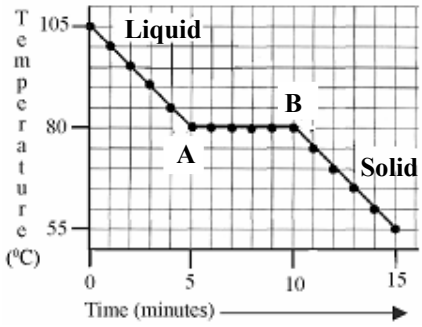
Optional labelled diagram

For examiner use only

(1) | (2)

(*c*) The graph is a ***cooling curve***. The substance used in this experiment was naphthalene. Naphthalene has a melting point of 80 ^{o}C.
The rate of heat loss was constant throughout the experiment.

(*i*) What is ***happening*** to the naphthalene between points **A** and **B** on the graph? (3)



(*ii*) What is the ***heat loss***, between points **A** and **B**, on the curve called? (3)

(*d*) In Ireland ***90% of electricity*** is generated ***by burning fossil fuels*** compared to other European countries who have an average of 50% use of fossil fuels and a 30% use of fossil fuels in the USA.

(*i*) List **two *disadvantages***, excluding acid rain, of this heavy reliance on fossil fuels for the production of electricity. (6)

Disadvantage one _____

Disadvantage two _____

(*ii*) Suggest **two *alternative sources*** of energy for the generation of electricity in Ireland. (6)

Source one _____

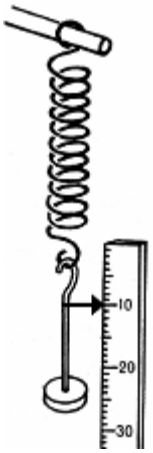
Source two _____

Question 9 (39)

For examiner use only

(1) (2)

(*a*) Robert Hooke (1635-1703) made a number of discoveries including the effect of force on elastic bodies now known as Hooke's law. ***State Hooke's law***. (6)



Hooke's law _____

_____

A student was given a box of identical springs and asked to analyse them so that they could be used as newton meters.

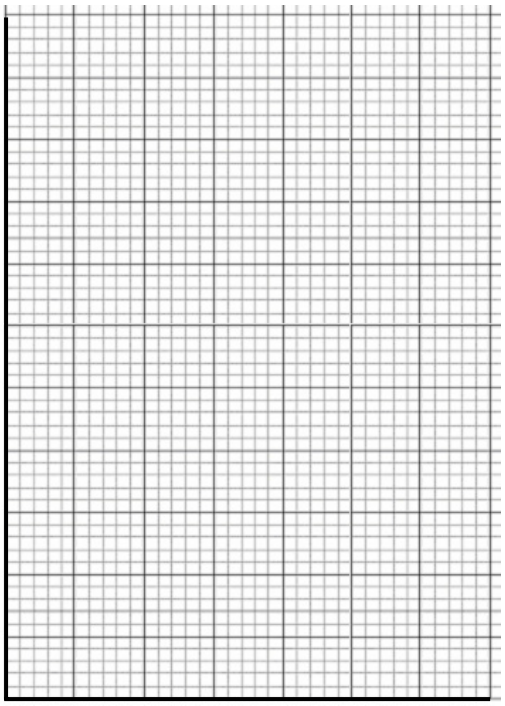
The student performed an experiment, using the apparatus shown in the diagram, on one of the springs.

In the experiment the student measured the increase in length of the spring caused by a number of weights. The spring was tested to destruction (that is weights were added until the spring was damaged).

The data from the experiment is given in the table.

Weight (N)	0.0	0.4	0.8	1.2	1.6	2.0	2.4
Extension (cm)	0.0	2.0	4.0	6.0	8.0	8.5	8.6

(*i*) Plot a ***graph of extension*** (increase in length) ***against weight*** (*x*-axis). in the grid provided on the right. (9)



(*ii*) Use the graph to find the ***weight*** that would produce an ***extension*** of 5 cm in the spring. (3)

Weight _____

(*iii*) Study your graph carefully. The spring obeys Hooke's law for the earlier extensions and then when the spring becomes damaged it does not appear to do so.
Estimate, from your graph, ***the weight after the addition of which the law seems no longer to apply***. (3)

_____

(*b*) Components, e.g. bulbs, in electrical circuits can be connected in ***series*** or in ***parallel***.

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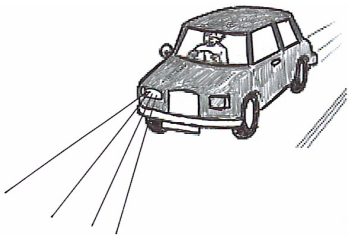
(1) (2)

(*i*) It is noticed that, when one headlight fails (blows) in a car, the second remains lighting.



State ***the way the headlights are connected*** and give a ***reason*** why this mode of connection is used. (6)

State the way _____

Reason _____

_____

(*ii*) All of the bulbs go out in an old set of Christmas tree lights, when one of bulbs fails (blows). In ***what way are the bulbs connected*** in this set of lights?

Explain why, when ***one bulb blows, they all go out***. (6)

What way? _____

Explain _____

(*iii*) Calculate the ***resistance of the filament*** of a car headlamp when 12 V produces a current of 5 A in it.
In what unit is resistance measured? (6)

Resistance _____

Unit of resistance _____