2009. S26

Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2009

SCIENCE (REVISED SYLLABUS) – HIGHER LEVEL

THURSDAY, 11 JUNE – MORNING 9.30 to 11.30

INSTRUCTIONS

1. Write your **examination number** in the box provided on this page.
2. Answer **all** questions.
3. Answer the questions in the spaces provided in this booklet. If you require extra space, an extra page is provided at the back of this booklet.

Centre Number

Examination Number
_____

For examiner use only	
Section/Question	**Mark**
Biology	
Q.1 (52)	
Q.2 (39)	
Q.3 (39)	
Chemistry	
Q.4 (52)	
Q.5 (39)	
Q.6 (39)	
Physics	
Q.7 (52)	
Q.8 (39)	
Q.9 (39)	
Total (Paper)	
Bonus for Irish	
Grand Total Paper (390)	
Coursework	
Coursework A (60)	
Coursework B (150)	
Grand Total (600)	

Biology

For Examiner use only

Question 1 (52)

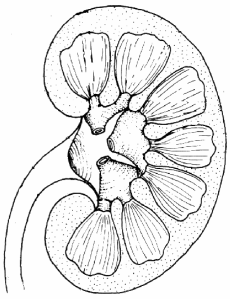
(*a*) Name ***two processes*** that the ***leaves*** of ***green plants*** carry out.

(*i*) _____

(*ii*) _____

(1) (2)

(*b*) (*i*) Name the ***organ*** shown in the diagram.

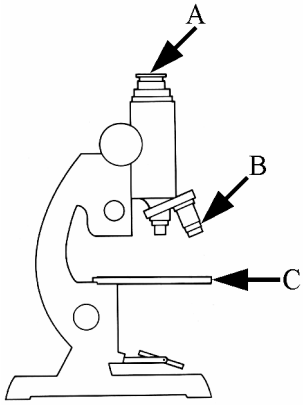


Name _____

(*ii*) Give the ***function*** of the organ shown.

Function _____

(*c*) The parts labelled **A** and **B** in the diagram of the microscope work together to perform a single function.



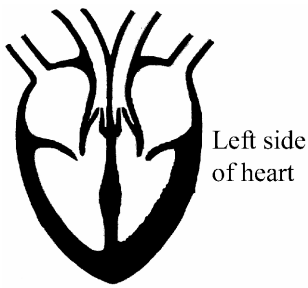
(*i*) What is the ***combined function*** of **A** and **B**?

What? _____

(*ii*) Name the ***part labelled*** **C** in the diagram.

Name _____

(*d*) Label clearly the ***pulmonary artery with an*** **A,** and the ***pulmonary vein with a*** **V** in the diagram of the heart.



For Examiner use only

(1) (2)

(*e*) The child in the photograph is helping a dandelion to disperse its seeds.

(*i*) Why is ***seed dispersion*** important for plants?

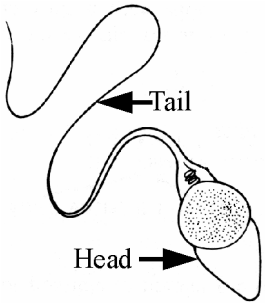
Why? _____

_____

(*ii*) Give a ***second way***, excluding wind, by which ***plants disperse seeds***.

Give _____

(*f*) The diagram shows a sperm. The tail enables the sperm to swim.



(*i*) Why does the sperm need to be able to swim?

Why? _____

(*ii*) Where does fertilisation occur?

Where? _____

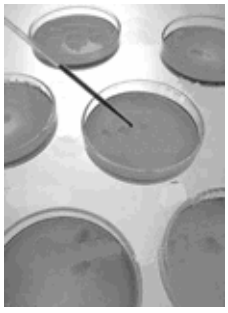
(*g*) (*i*) Name a ***plant*** that can reproduce ***asexually***.

Name _____

(*ii*) Describe ***the way the plant*** that you have named ***reproduces asexually***.

Describe _____

(*h*) The photograph shows petri dishes containing agar being exposed to the air for 5 to10 minutes before being covered. One petri dish containing agar was left covered. All of the dishes were kept warm for some days and inspected daily.



(*i*) What is the ***function*** of the agar?

What? _____

(*ii*) Why was ***one petri dish left covered***?

Why? _____

(*iii*) Describe and explain the ***appearance of the agar*** in the ***exposed dishes*** after some time passed.

Describe _____

Explain _____

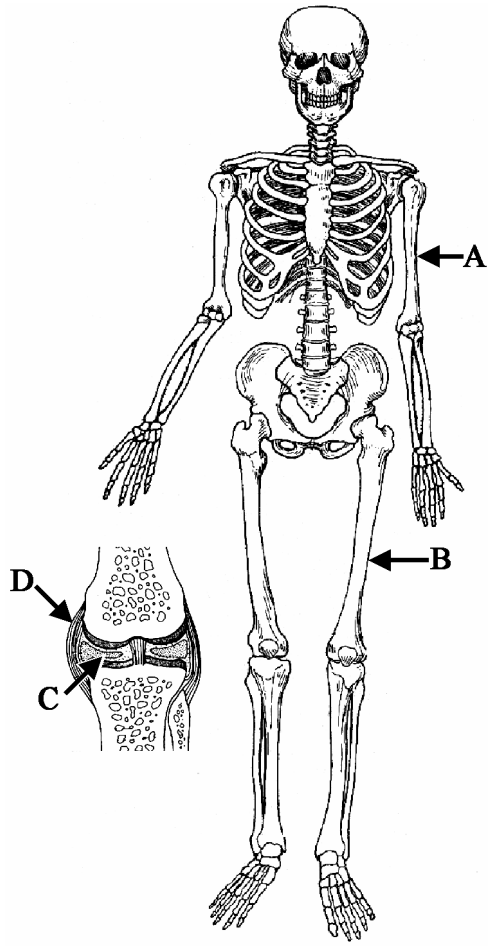
(7 × 6 + 1 × 10)

Question 2 (39)

For Examiner use only

(1) (2)

(*a*) The diagram shows a human skeleton with a detailed drawing of the structure of the knee joint. The kneecap is not shown.



(*i*) Name the ***bones*** labelled **A** and **B**. (6)

Bone **A** _____

Bone **B** _____

(*ii*) What ***type of joint*** is the knee? (3)

Type _____

C is synovial fluid. **D** is a ligament.

(*iii*) Give the ***functions*** of the parts labelled **C** and **D** in the knee. (6)

C _____

_____

D _____

(*iv*) Explain the ***action of antagonistic pairs of muscles*** in causing the ***movement*** of limbs. You may use a labelled diagram in your answer if you wish. (6)

_____

_____

_____

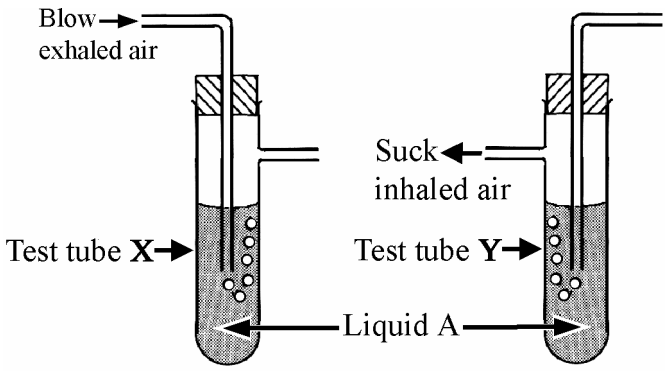
_____

_____

For Examiner use only

(1) | (2)

(*b*) The diagram shows the apparatus used by a pupil when performing an experiment in a school laboratory.



The pupil blew (exhaled) air into test tube **X**.

The pupil sucked (inhaled) air from test tube **Y**.

The pupil continued, alternately, blowing and sucking air, as above, until ***liquid* A** in ***one*** of the test tubes ***turned milky***.

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

Name _____

(*ii*) In ***which test tube***, **X** or **Y**, did the ***liquid turn milky***? (3)

Which? _____

(*iii*) Why did ***liquid* A *turn milky*** in ***one*** of the test tubes? (3)

Why? _____

(*iv*) What ***conclusion*** can be made from the ***result of this experiment*** regarding the ***difference in composition between exhaled and inhaled air***? (3)

Conclusion? _____

(*v*) Complete the ***word equation***, below, for ***aerobic respiration***. (6)

Food + _____ ⟶ _____ + energy + water

Question 3 (39)

For Examiner use only

(1) | (2)

(*a*) The study of a habitat requires the use of sampling instruments, as it is not possible to count every individual organism living there.

The photograph shows a pupil and teacher using a quadrat. The quadrat is placed randomly in a number of sites in the habitat being studied.

(*i*) How is ***random sampling*** achieved when using a quadrat? (3)

How? _____

_____

_____

(*ii*) Give ***two different types of data collected*** (***two different tasks performed***) at each site in the habitat when using the quadrat. (6)

One _____

_____

Two _____

_____

(*b*) Line transects are also used to sample habitats.

(*i*) What is a ***line transect***? (3)

What? _____

_____

(*ii*) Describe how to ***sample a habitat*** using a ***line transect***. (6)

_____

_____

_____

For Examiner use only
(1) (2)

(*c*) The photograph shows a pupil with a sweep net. The sweep net is used to collect small animals e.g. insects from vegetation in a habitat so that they can be identified.

(*i*) Name a ***second item*** of equipment ***used to collect small animals*** for identification. (3)

Name _____

(*ii*) Draw a ***labelled diagram***, in the box provided, ***of the item*** that you have named in (*i*) above. (6)

(*iii*) Describe how to ***use the item*** that you have named and drawn. (6)

_____

_____

_____

(*d*) Give ***two reasons*** why the ***groups of organisms*** living together ***can vary*** greatly ***from one part of a habitat to another.*** (6)

One _____

_____

Two _____

_____

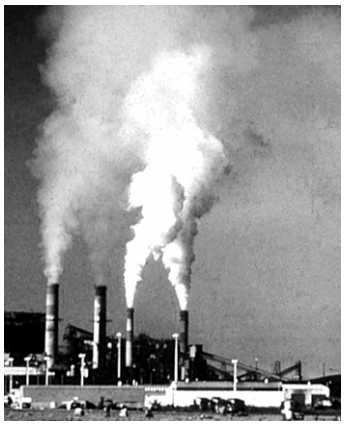
Chemistry

For Examiner use only

Question 4 (52)

(1) | (2)

(*a*) The photograph shows the emissions from a coal burning electricity generating station.
Name a ***pollutant*** present in the emissions and describe its ***effect*** on the environment.



Name _____

Effect _____

_____

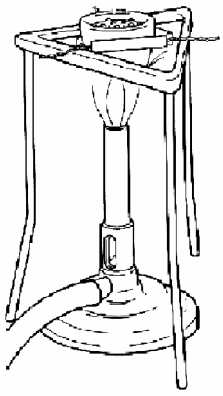
(*b*) There are three states of matter: solid, liquid and gas.

(*i*) Give ***one property*** that liquids and gases ***have in common***.

Give _____

(*ii*) Give ***one property*** in which liquids and gases ***differ***.

Give _____



(*c*) Name any ***two items of laboratory equipment*** shown in the diagram.

Item one _____

Item two _____

(*d*) Draw a ***labelled diagram***, in the box provided, of an ***apparatus*** that could be used to ***separate an insoluble solid from a liquid***.

For Examiner use only

(1) (2)

(*e*) Approximately 98.89% of carbon on the surface of the earth and in the atmosphere is carbon-12 the remaining approximately 1.11% is carbon-13. The numbers 12 and 13 are mass numbers. The atomic number of carbon is 6.

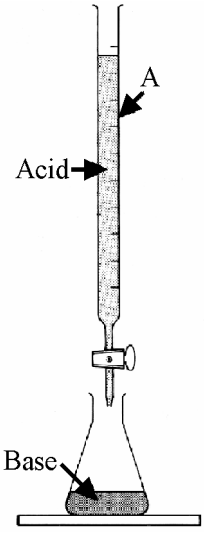
(*i*) ***How many neutrons*** are in the nucleus of a carbon-13 atom?

How? _____

(*ii*) Enter the ***missing word*** in the following sentence.

Carbon-12 and carbon-13 are _____ of carbon.

(*f*) (*i*) What is ***item* A *used for*** in the titration of an acid with a base?



What? _____

_____

(*ii*) What ***happens when an acid reacts with a base***?

What? _____

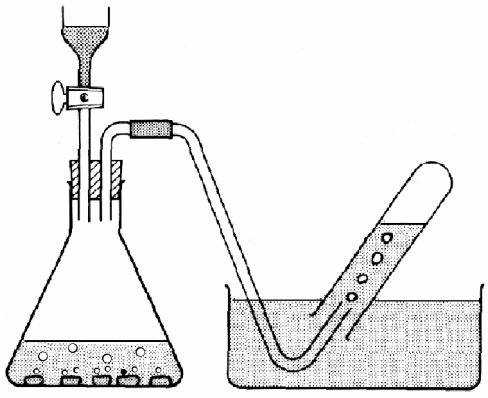
_____

(*g*) Give ***two uses*** of carbon dioxide.

Use one _____

Use two _____

(*h*) The apparatus shown in the diagram was used to investigate the reaction of zinc with hydrochloric acid. Hydrogen gas is produced.



(*i*) Describe a ***test for hydrogen***.

_____

_____

(*ii*) Write a ***chemical equation*** for the reaction of zinc with hydrochloric acid.

_____

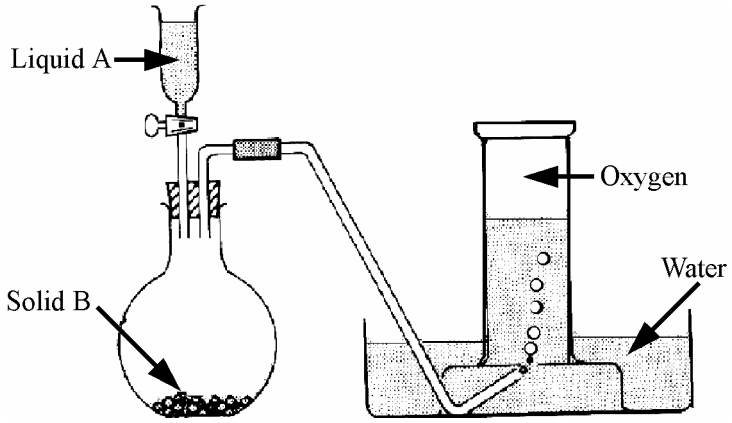
(7 × 6 + 1 × 10)

Question 5 (39)

For Examiner use only

(1) (2)

(*a*) Oxygen can be prepared by decomposing liquid **A** using solid **B** as a catalyst. This preparation is shown in the diagram.



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

Name _____

(*ii*) Name ***solid* B**. (3)

Name _____

(*iii*) What is a ***catalyst***? (3)

What? _____

Carbon was burned in oxygen and the products tested with pieces of moist red and blue litmus paper.

(*iv*) Give the ***result of the litmus test*** described above and make a ***conclusion*** based on this result. (6)

Result and conclusion _____

_____

(*b*) (*i*) State how to ***test*** water to ***confirm the presence of hardness***? (6)

Test _____

(*ii*) Name a ***metallic element*** some of whose compounds ***cause hardness*** in water. (3)

Name _____

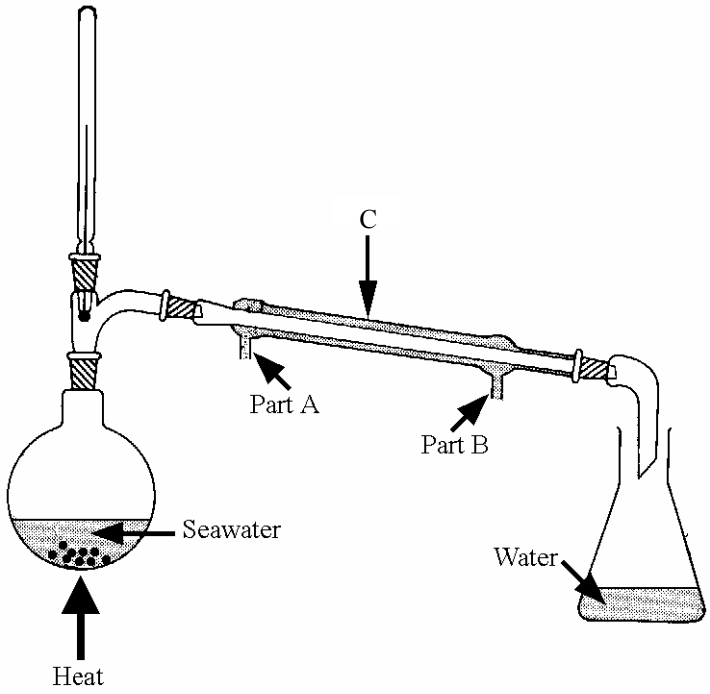
(*iii*) Give one ***effect*** of hard water. (3)

Give _____

For Examiner use only

(1) (2)

(*c*)



(*i*) Name the ***separation process*** shown in the diagram. (3)

Name _____

(*ii*) Name the ***item labelled*** **C** in the diagram. (3)

Name _____

(*iii*) Identify the ***part*** **A** ***or*** **B** ***of item*** **C** which is connected to the cold tap. (3)

Identify _____

(*iv*) How could you show that the water collected contains no salt? (3)

How? _____

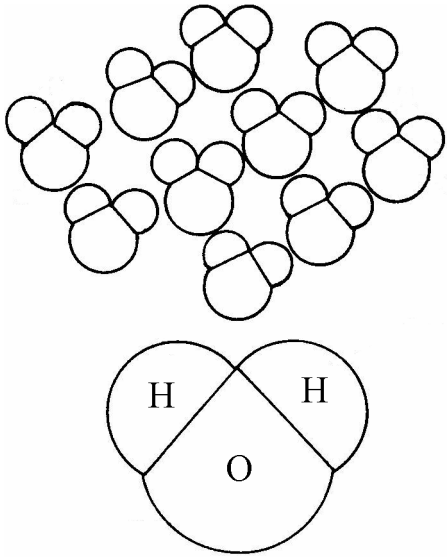
Question 6 (39)

For Examiner use only

(1) (2)

Atoms of elements can combine to form compounds using chemical bonds between their atoms. There are different types of chemical bonds.

(*a*) The diagram shows a group of water molecules with one enlarged below with its constituent atoms identified by their atomic symbols. Water molecules are very tiny, one teaspoon of water contains approximately 2×10^{23} molecules.



(*i*) Name the ***type of bonding*** in the water molecule. (3)

Name _____

(*ii*) ***Describe*** this ***type of bond***. (6)

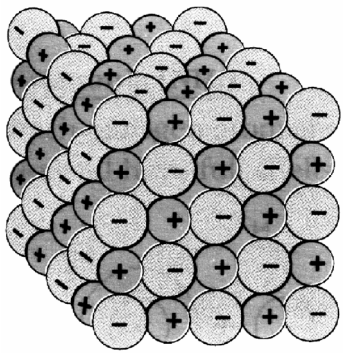
Describe _____

_____

(*iii*) Name ***one other*** compound with this ***type of bonding***. (3)

Name _____

(*b*) The diagram shows sodium ions (+) and chloride ions (-) in part of a crystal of table salt, sodium chloride.



(*i*) How are ***sodium ions*** and ***chloride ions formed*** from their atoms? (6)

How? _____

_____

(*ii*) What ***force*** holds the ions together in sodium chloride? (3)

_____

(*iii*) Name ***one other*** compound that is ***composed of ions***. (3)

_____

For Examiner use only

(1) (2)

(*c*) The photograph shows a statue that was cast in the alloy bronze.

(*i*) What is an ***alloy***? (3)

What? _____

_____

(*ii*) Name an ***alloy***, other than bronze, and give ***one use*** for it. (6)

Name _____

Use _____

(*iii*) Metals are <u>malleable</u> and <u>ductile</u>. Explain the underlined terms. (6)

Malleable _____

Ductile _____

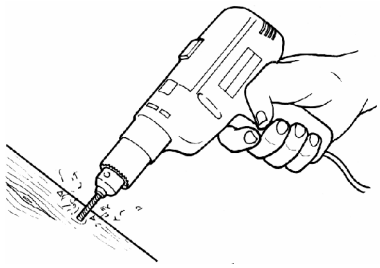
Physics

For Examiner use only

(1) | (2)

Question 7 (52)

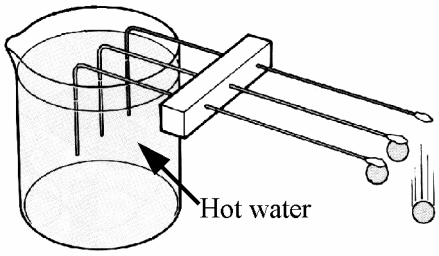
(*a*) Give ***two <u>useful</u> energy conversions*** that occur when the drill shown in the diagram is being used.



(*i*) _____

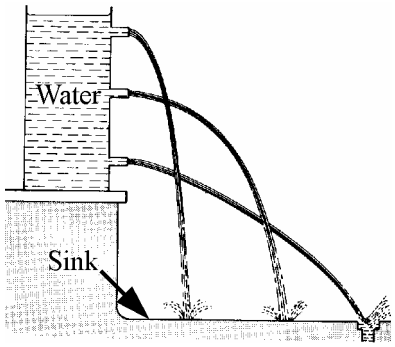
(*ii*) _____

(*b*) Copper, aluminium and iron rods are set-up as shown in the diagram. A metal ball is attached by wax to the end of each rod. Hot water is poured into the beaker. The ball falls from the copper rod first. What ***conclusion*** can be drawn from this observation?



Conclusion _____

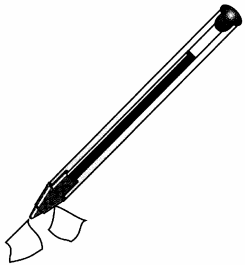
(*c*) The diagram shows a container with three spouts. The container is filled with water. Jets of water pour out of the spouts. Why does the ***jet of water from the bottom spout travel the furthest out from the container***?



Why? _____

_____

(*d*) A plastic pen when rubbed with a dry cloth can ***attract small pieces of paper*** which 'stick' to it.



(*i*) Why does this happen?

Why? _____

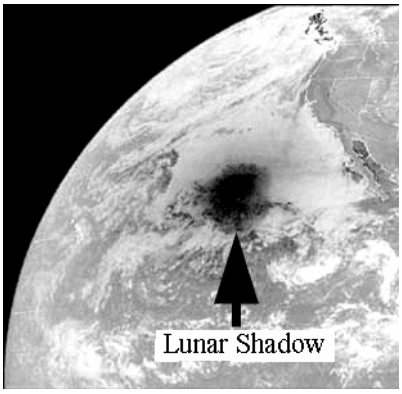
(*ii*) Explain why the ***pieces of paper fall*** from the pen after some time.

Explain _____

For Examiner use only

(1) (2)

(*e*) The photograph, taken from a satellite above the earth, shows the shadow of the moon on the earths surface.



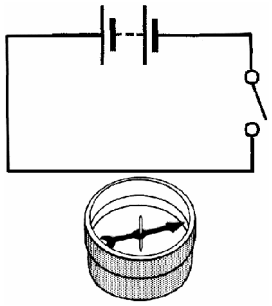
(*i*) Where does the ***light*** falling on the earths surface come from?

Where? _____

(*ii*) What ***property of light*** enables the formation of shadows?

What? _____

(*f*) The diagram shows a circuit with a wire over a compass.



(*i*) What ***happens to the compass needle*** when the switch is closed?

What? _____

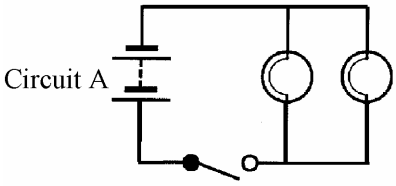
(*ii*) Which ***effect of electric current*** is demonstrated by this experiment?

Which? _____

(*g*) What causes an ***echo***?

What? _____

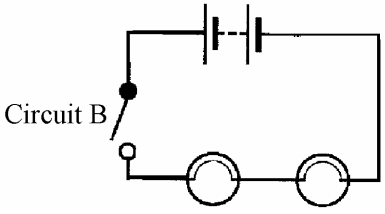
(*h*) (*i*) If a ***bulb 'blows'*** (fails) in ***circuit*** **A** does the ***second bulb stay on*** (glowing)? Give a ***reason*** for your answer.



Does? _____

Reason _____

(*ii*) If a ***bulb 'blows'*** (fails) in ***circuit*** **B** does the ***second bulb stay on*** (glowing)? Give a ***reason*** for your answer.



Does? _____

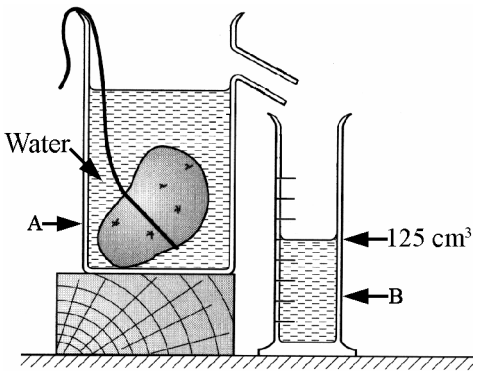
Reason _____

(7 × 6 + 1 × 10)

Question 8 (39)

For Examiner use only (1) (2)

(*a*) A pupil measured the volume of a potato using the items of laboratory equipment, labelled **A** and **B** as shown in the diagram. (6)



(*i*) Name ***the items labelled* A *and* B**.

A _____

B _____

(*ii*) The potato had mass 175 g and volume 125 cm^3.
Calculate the ***density*** of the potato.
Give the ***units of density*** with your answer. (6)

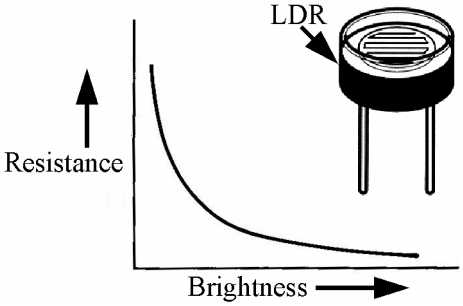
_____

_____

(*iii*) Why did the potato ***sink*** in the water? (3)

_____

(*b*) The diagram shows a light dependent resistor (LDR) and a graph of the resistance of the LDR against the brightness of light falling on it.



(*i*) Give an everyday use for an LDR. (3)

_____

(*ii*) Describe an experiment to ***measure the resistance of an LDR under varying degrees of brightness of light***. Draw the ***circuit diagram*** in the box provided. Explain how you would vary the brightness of the light. You do not have to state how the brightness of the light was measured. (9)

_____

_____

_____

_____

_____

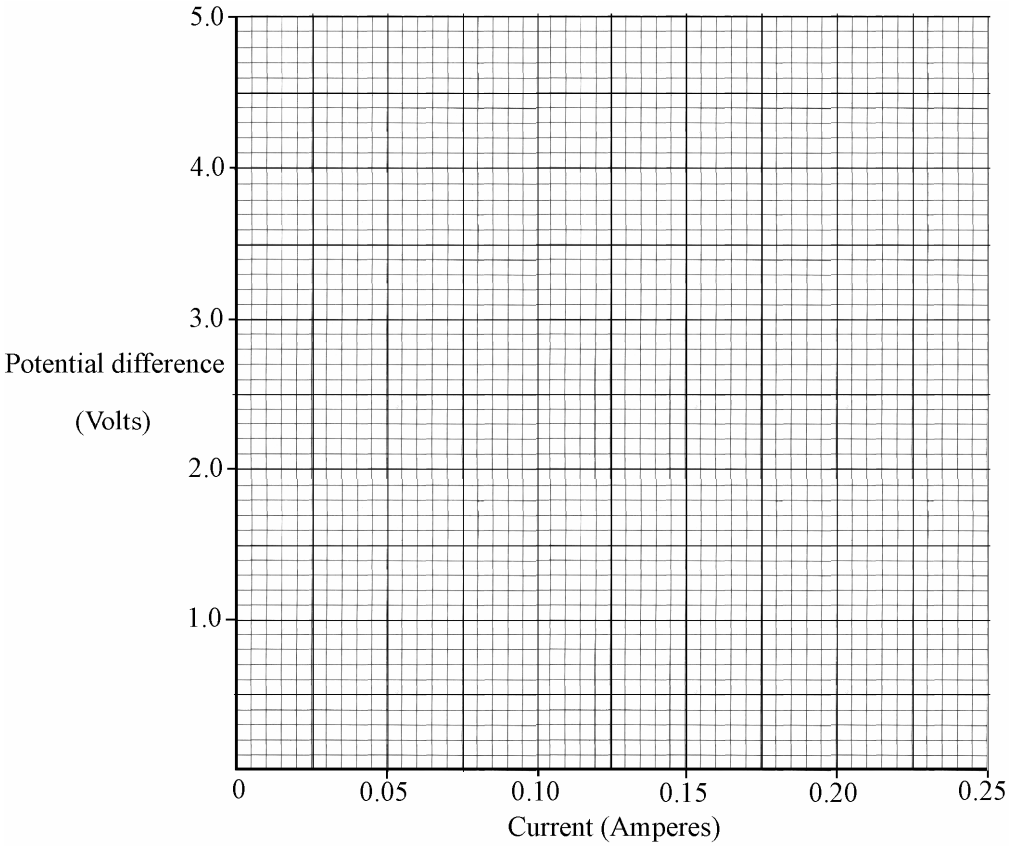
For Examiner use only

(1) | (2)

(*c*) A pupil performed an experiment on a resistor to ***investigate the relationship between potential difference*** (voltage) applied to the resistor and the ***current*** flowing through the resistor. The data from this experiment is in the table.

Potential difference (Volts)	0	1	2	3	4	5
Current (Amperes)	0.00	0.05	0.10	0.15	0.20	0.25

(*i*) Draw a ***graph*** of potential difference (voltage) on the y-axis against current on the x-axis in the grid below. (6)



(*ii*) Calculate the ***resistance*** of the resistor used in this experiment. (3)

Calculate _____

(*iii*) What is the evidence from the graph that potential difference (voltage) is ***directly proportional*** to current in this case? (3)

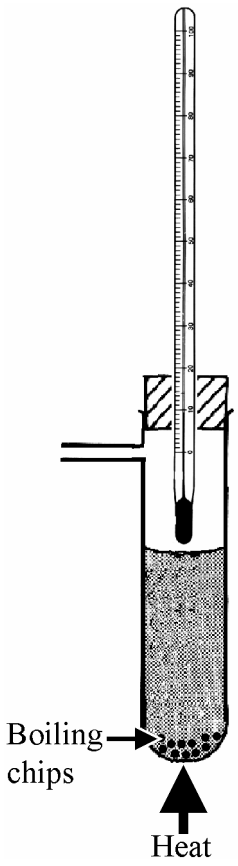
What? _____

Question 9 (39)

For Examiner use only

(1) (2)

(*a*) The ***boiling point of water*** can be determined using the apparatus shown in the diagram.



(*i*) Why are ***boiling (anti-bumping) chips*** added to the water? (3)

Why? _____

(*ii*) At what ***temperature*** does ***water boil***, at ***standard*** (normal) ***atmospheric pressure***? (3)

What? _____

(*iii*) What ***effect*** does the ***raising of pressure*** have on the ***boiling point*** of water? (3)

Effect of raising pressure _____

(*iv*) What ***effect*** does the ***lowering of pressure*** have on the ***boiling point*** of water? (3)

Effect of lowering pressure _____

(*b*) The photograph shows a solar panel being installed. Water passing through the panel is heated by the sun.

(*i*) How does ***heat*** from the ***sun travel***, through the ***vacuum of space***, to the earth? (3)

How? _____

(*ii*) Give ***one advantage <u>or</u> one disadvantage*** of fitting solar panels to your home? (3)

Advantage _____

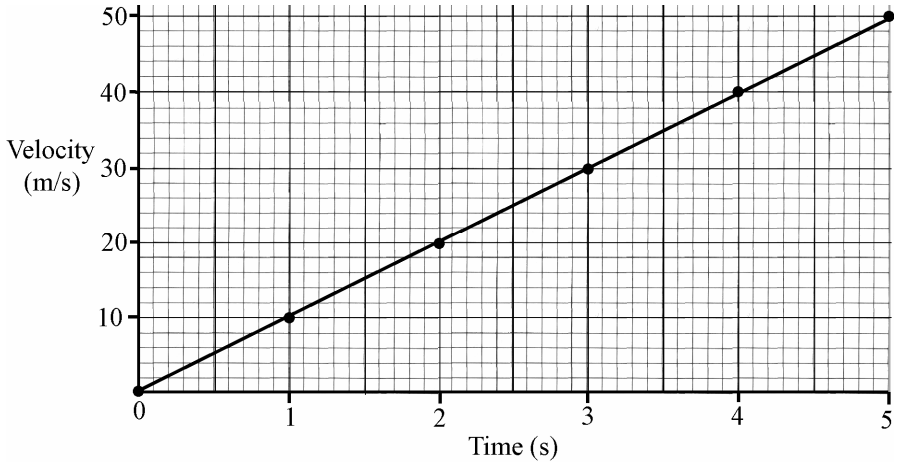
<u>Or</u>

Disadvantage _____

For Examiner use only

(1) (2)

(*c*) A stone was dropped from the top of a tall cliff. The stones approximate velocity was measured each second as it fell. The data collected during this experiment is given in the graph.



(*i*) Define ***velocity***. (6)

_____

_____

_____

(*ii*) Use data from the graph to ***estimate the acceleration of the stone*** as it fell. Give the ***units of acceleration*** with your answer. (6)

_____

_____

(*iii*) Name the ***force*** that caused the stone to fall. (3)

Name _____

(*iv*) The stone had a mass of 2 kg.
What was the ***weight*** of the stone on earth? Give the unit. (6)

_____

EXTRA WORK SPACE

Indicate clearly the ***number*** and ***part*** of the ***question(s)*** that you are answering.

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(1)	(2)