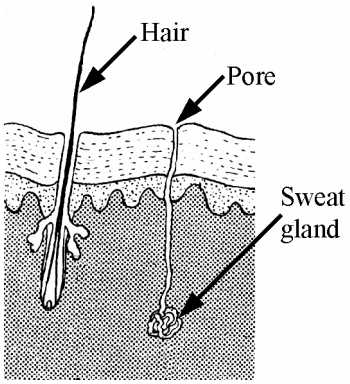
Biology

For Examiner use only

Question 1 (52)

(1) (2)

(*a*) The diagram shows some of the structures in human skin. The skin has many functions. One of them is excretion. Skin excretes sweat. Name **two *substances*** excreted in sweat.



Substance 1 _____

Substance 2 _____

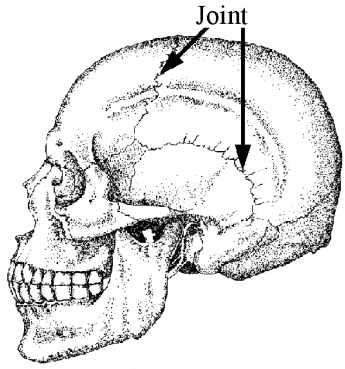
(*b*) Nerves carry electrical messages around our bodies. Nerves have motor functions and sensory functions. Explain the ***underlined terms***.

Motor function _____

_____

Sensory function _____

_____

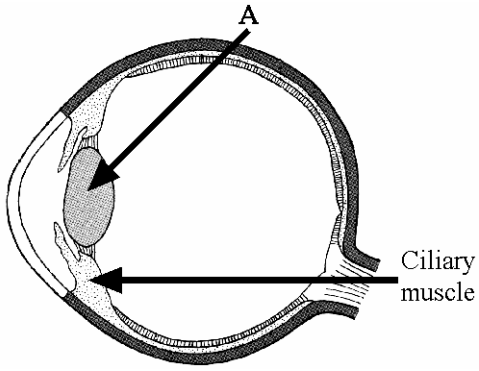


(*c*) Different types of joints hold together the bones of our skeleton. Name the ***type of joint*** labelled in the diagram of the human skull.

Name _____

How does this type of joint ***differ*** from other types of joints found in our bodies?

Difference _____



(*d*) The diagram is of the human eye. Name the ***part*** labelled **A**.

A _____

What ***function*** has the ciliary muscle?

Function _____

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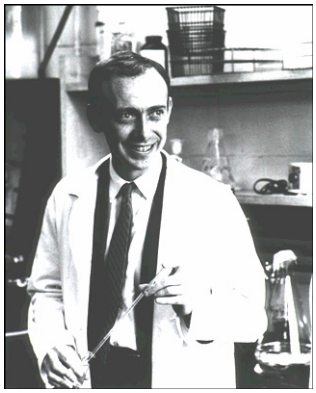
(1) (2)

(*e*) The photograph is of James Dewey Watson who together with Francis Crick published the molecular structure of DNA in 1953.
Where is DNA ***located*** in cells?

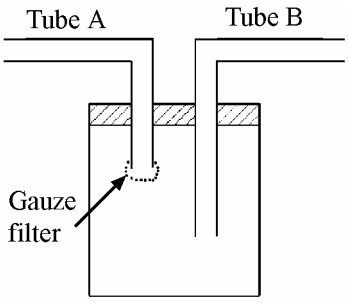


Location _____

Name a second ***substance*** associated with DNA.

Second substance _____

(*f*) The diagram shows a pooter. It is used, when studying a habitat to collect small animals e.g. insects, for identification. Describe ***how to use a pooter***. _____



_____

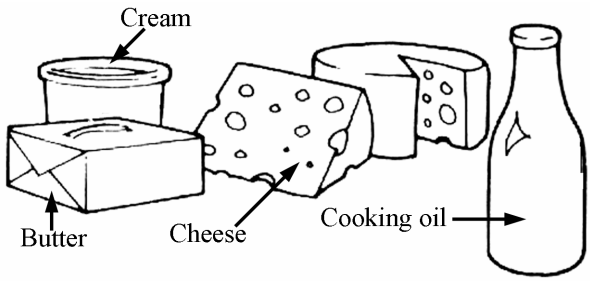
_____

(*g*) The photograph shows a stage in the industrial production of cheese. This is an example of the use of biotechnology in industry.
Give **two** other ***examples*** of the use of biotechnology in industry or medicine.

1 _____

2 _____

(*h*) Name the principal ***food type (nutrient)***, which is present in all of the foods shown.



Name _____

Describe a ***test*** to show the ***presence of the food type*** that you have named in food samples.

Test _____

_____

_____

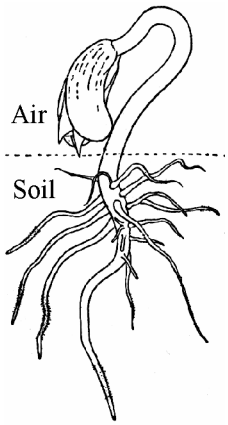
(7 × 6 + 1 × 10)

Question 2 (39)

For Examiner use only

(1) (2)

(*a*) The diagram shows a young seedling grown from a germinated seed.



(*i*) List **three** ***conditions necessary*** for seeds to germinate. (9)

Condition 1 _____

Condition 2 _____

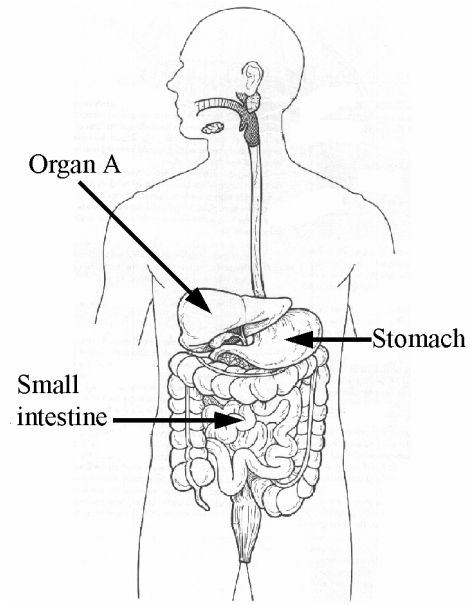
Condition 3 _____

(*ii*) Describe, using labelled diagrams in the box provided, an investigation to show that any **two** of the ***conditions*** that you have given are required for seeds to germinate. The investigation must have a ***suitable control***. (12)

For Examiner use only

(1) (2)

(*b*) The diagram shows the human digestive system.



(*i*) Give a ***digestive function*** of organ **A**. (3)

Function _____

_____

(*ii*) In the small intestine **starch** is broken down to **maltose** by **amylase**.

Identify the ***enzyme***, and the ***substrate*** named in the reaction above. (6)

Enzyme _____

Substrate _____

(*iii*) Give a ***function*** of the small intestine other than digestion. (3)

Function _____

(*iv*) Describe a simple laboratory experiment to show the ***release*** of ***chemical energy*** from food as ***heat***. (6)

_____

_____

_____

_____

_____

Question 3 (39)

For Examiner use only

(1) | (2)

Plants, animals and human activity all have important roles in conserving the living environment on the planet.

(*a*) (*i*) Complete the following ***word equation*** for aerobic respiration. (6)

Glucose (Food) + _____ ⟶

Energy + _____ + **Water**

(*ii*) State how you would show the presence of **one** of the ***products*** of aerobic respiration by means of a ***chemical test***. (9)

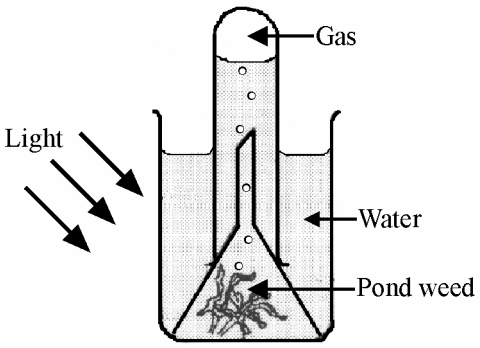
_____

_____

_____

_____

(*b*) Pondweed is a green plant that lives in water. In the presence of light pondweed undergoes photosynthesis and a gas is produced as one of the products. Name the ***gas*** produced. (3)



Name of gas_____

The pondweed, and all green plants, take in and use another gas, from their environment during photosynthesis. (3)

Name of gas used _____

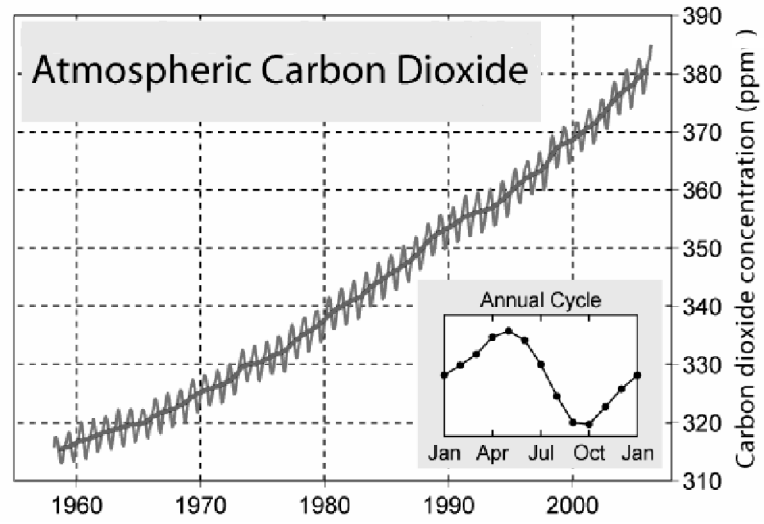
How might the ***rate of production*** of bubbles, by the pondweed, be increased? (3)

How? _____

(*c*) The increase in carbon dioxide concentration in the Earth's atmosphere is currently causing concern. The ***use of fossil fuels*** and ***deforestation*** have been identified as major contributors to this increase in carbon dioxide concentration. The graph shows a continual increase in the carbon dioxide concentration for the last fifty years. The data was collected at a site in Europe.

For Examiner use only

(1) (2)



(*i*) Explain how ***either*** the **use of fossil fuels** *or* **deforestation** could have contributed to the increase in atmospheric carbon dioxide. (3)

Explain _____

_____

(*ii*) Suggest **one** possible ***effect*** of continued increase in carbon dioxide concentration in the Earth's atmosphere. (3)

Effect _____

Though there is an overall increase in carbon dioxide concentration there is an annual ***rise and fall*** in carbon dioxide concentration as shown in the box in the diagram.

(*iii*) Suggest **one** ***reason*** why the carbon dioxide concentration decreases between April and October each year. (3)

Reason _____

(*iv*) How could the reason that you have given in (*iii*) be used in a ***practical way*** to slow down and even reverse the overall increase in carbon dioxide levels in the atmosphere? (6)

How? _____

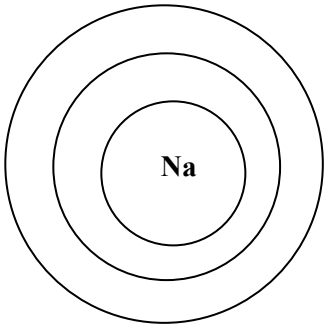
Chemistry

For Examiner use only

(1) (2)

Question 4 (52)

(*a*) The diagram represents a sodium atom. The circles are electron orbits and the 'Na' represents the nucleus. The atomic number of sodium is 11.
Using **dots** or **X**s to represent electrons in the orbits give the ***electronic structure*** of sodium.



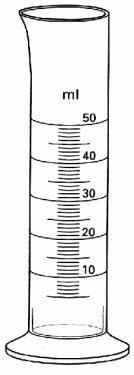
(*b*) Name a ***raw material*** used to make plastics.

Raw material _____

Some plastics are <u>non-biodegradable</u>. Explain the underlined term.

Explain _____

(*c*) Name the ***item*** of laboratory equipment shown in the diagram and name a ***second item*** of laboratory equipment which enables more accurate measurements of volume to be made.



Item shown _____

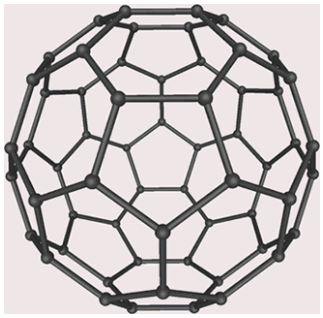
Second item _____

(*d*) Give **two** properties of alkali metals.

Property 1 _____

Property 2 _____

(*e*) The diagram shows a molecule of C_{60}. It has 60 carbon atoms <u>covalently bonded</u> together. This molecule is nick-named the 'Buckey Ball'. Explain the underlined term.



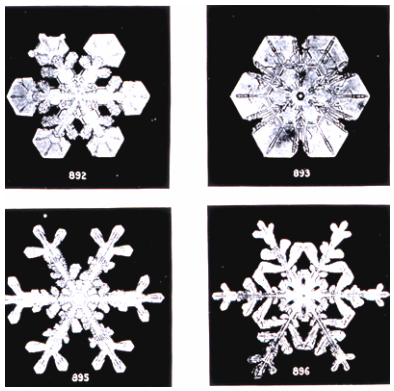
_____

_____

For Examiner use only

(1) (2)

(*f*) The photographs are of four snowflakes. The photographs were taken by Wilson Bently (1865-1931). He photographed 5000 snowflakes and never found two that were identical.
Snowflakes are crystals of water.



Name a ***substance***, other than water, that ***forms crystals***.

Name _____

Give **one** ***difference*** between crystalline and non-crystalline solids.

Difference _____

_____

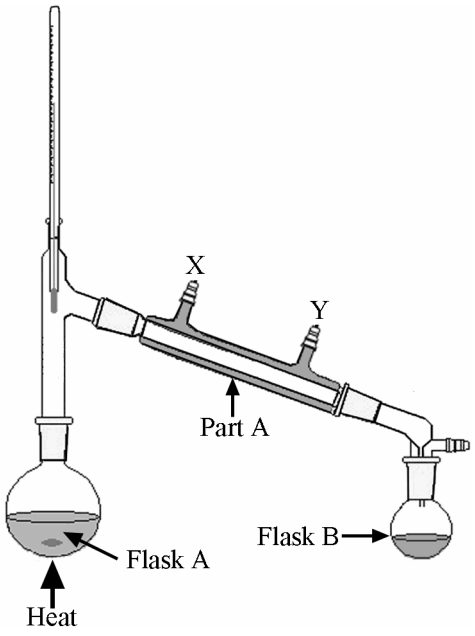
(*g*) Give the ***formula*** of a common base.

Formula _____

Alkalis are water-soluble bases. Name a substance, which is ***alkaline***.

Name _____

(*h*) The apparatus shown in the diagram can be used to separate mixtures.



Name ***part* A**.

Part A _____

Which connection, **X *or* Y**, is attached to the cold tap?

X *or* Y? _____

Flask **A** contains seawater. Name the ***liquid*** that collects in flask **B**.

Liquid _____

Name a ***constituent*** of seawater that does not move from flask **A** to flask **B**.

Name _____

(7 × 6 + 1 × 10)

Question 5 (39)

For Examiner use only	
(1)	(2)

(*a*) Distinguish between a ***concentrated*** and a ***dilute*** solution? (3)

_____

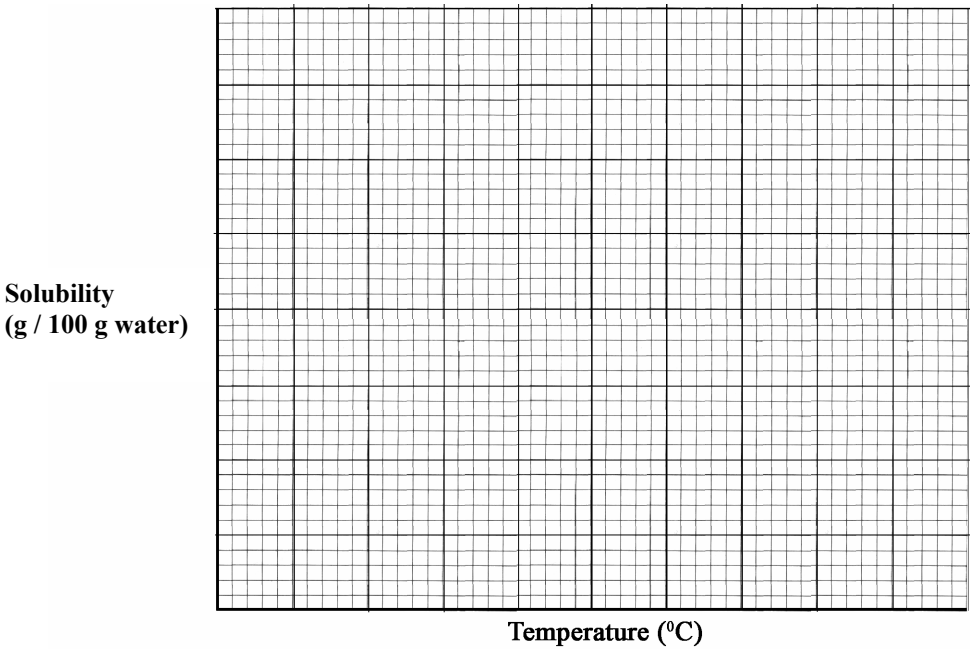
_____

_____

A pupil investigated the ***effect of temperature on the solubility*** of the salt ammonium chloride in water. She determined the maximum mass, in grams, of the salt that would dissolve in 100 g of water at various temperatures. The data from this experiment are given in the table.

Solubility (g / 100 g water)	29	37	46	55	66	77
Temperature ($^{\circ}$C)	0	20	40	60	80	100

Plot a graph of solubility against temperature in the grid below. (9)



Use the graph to ***estimate the solubility*** of ammonium chloride at 70 ^{o}C. (3)

Solubility _____

What ***conclusion*** about the solubility of ammonium chloride can be drawn from analysis of the graph? (3)

Conclusion _____

For Examiner use only

(1) (2)

(*b*) The photograph is of Maire Curie (1867-1934). She showed the existence of the element radium and she produced 0.1 g of the compound radium chloride in 1902 by processing tons of pitchblende ore obtained from mines in Bohemia.

Explain the underlined terms. (12)

Element _____

_____

_____

_____

Compound _____

_____

_____

(*c*) Describe how to ***investigate the pH*** of everyday substances e.g. antacid (indigestion powder), lemon juice, oven cleaner, vinegar etc. (6)

Description _____

_____

_____

_____

_____

_____

Name an everyday substance with a ***pH of less than 7***. (3)

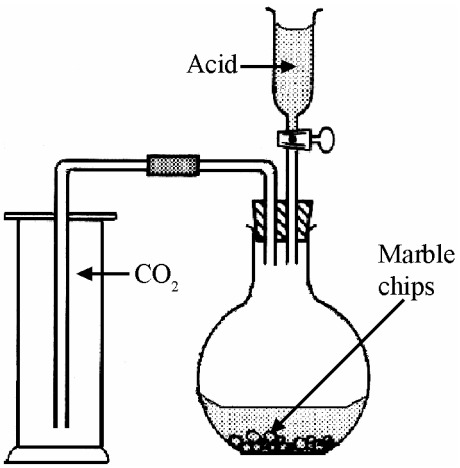
Name _____

Question 6 (39)

For Examiner use only

(1) | (2)

(*a*) The diagram shows an apparatus that can be used for the preparation and collection of carbon dioxide.



Give the ***formula*** of a ***suitable acid***. (3)

Formula _____

Give the ***chemical name*** for marble. (3)

Name _____

(Note If you used some substance other than marble to react with the acid to give carbon dioxide, then give the ***chemical name*** of that substance.)

What ***physical property*** of carbon dioxide allows the gas to be collected in the manner shown in the diagram? (3)

Physical property _____

_____

If a strip of moist blue litmus paper and a strip of moist red litmus paper are put into a jar of carbon dioxide what ***effect***, if any, does the gas have on them? (3)

Effect _____

_____

Give ***two uses*** of carbon dioxide. (6)

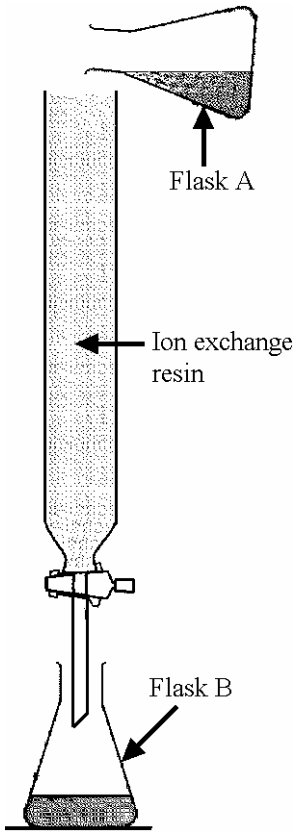
Use 1 _____

Use 2 _____

For Examiner use only

(1) (2)

(*b*) Flask **A** contains hard water. Some of this water was poured into the tube containing an ion exchange resin. The water that passed through the ion exchange resin was collected in flask **B**.



(*i*) Describe a ***test*** that you could perform on water samples from flask **A** and from flask **B** to compare their hardness?
What result would you expect from this test? (12)

Test _____

_____

_____

Result _____

_____

(*ii*) What ***causes*** hardness in water? (3)

Cause _____

(*c*) Water supplied to domestic consumers has undergone five or more different processes in a water treatment plant.

(*i*) Name **one** of the ***processes*** carried out on water in a treatment plant. (3)

Process _____

(*ii*) Give a ***reason*** why the treatment that you have named is carried out. (3)

Reason _____

_____

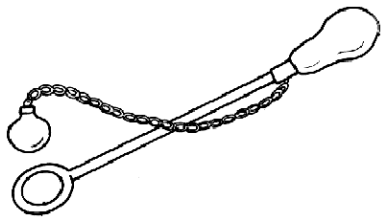
Physics

Question 7 (52)

For Examiner use only

(1) (2)

(*a*) The diagram shows a "ball and ring" apparatus. When the ball and ring are both cold the ball just passes through the ring.



How would you use this apparatus to show
(*i*) the ***expansion*** of a solid on heating
(*ii*) the ***contraction*** of a solid on cooling?

(*i*) _____

_____

(*ii*) _____

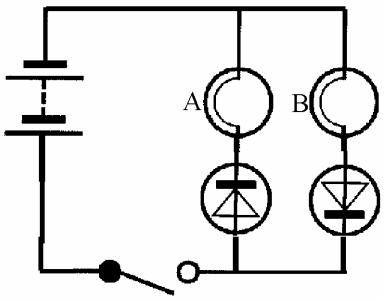
_____

(*b*) Ice floats on water but ice sinks in ethanol (an alcohol). Use this information to compare the ***density*** of ***ice*** with (*i*) the ***density*** of ***water***; (*ii*) the ***density*** of ***ethanol***.

(*i*) _____

(*ii*) _____

(*c*) Look carefully at the circuit diagram and then state ***which bulb/s***, ***if any***, ***light*** when the switch is closed.
Give a ***reason*** for your answer.



Which? _____

Reason _____

_____

(*d*) Give **one *application*** of the ***magnetic effect*** and **one *application*** of the ***chemical effect*** of electric current.

Magnetic effect _____

Chemical effect _____

For Examiner use only

(1) | (2)

(*e*) Thunder and lightning occur during electric storms. Explain why we ***see*** the lightning ***before*** we ***hear*** the thunder.

Why? _____

_____

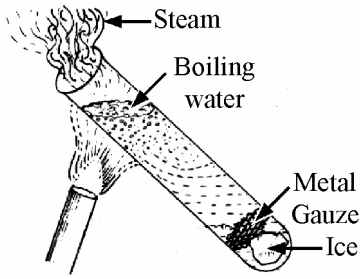
_____

(*f*) Give **one** ***advantage*** and **one** ***disadvantage*** of using nuclear energy to generate electricity.

Advantage _____

Disadvantage _____

(*g*) What does the experiment shown in the diagram tell us about the ***transfer of heat*** energy in water?



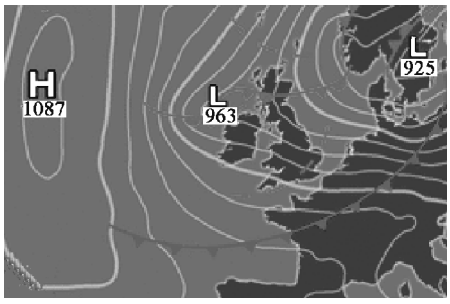
What? _____

_____

If you wanted to warm all of the water why would the ***bottom*** of the test tube be the ***best place to heat*** with the Bunsen flame?

Why? _____

(*h*) The diagram is an Atlantic weather chart. Use the chart to predict **two** ***weather conditions*** that you might expect for Ireland.



Condition 1 _____

Condition 2 _____

Explain why low atmospheric pressure ***causes*** **one** of the weather conditions that you have given.

Explanation _____

_____

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

Question 8 (39)

For Examiner use only

(1) (2)

(*a*) The diagram shows the outline of a bar magnet.
Draw **two *magnetic field lines*** one on each side of the bar magnet. (6)

What are the ***parts*** labelled **N** and **S** in the diagram called? (3)

What? _____

(*b*) The driver of a moving car applied the brakes. The brakes produced an average stopping force of 8 kN (8000 N) and the car stopped having travelled 20 m after the brakes were applied. Calculate the ***work done*** in stopping the car. (6)

_____

_____

_____

When work is done energy is converted from one form to another.
Identify one ***energy conversion*** that occurred when the car braked. (6)

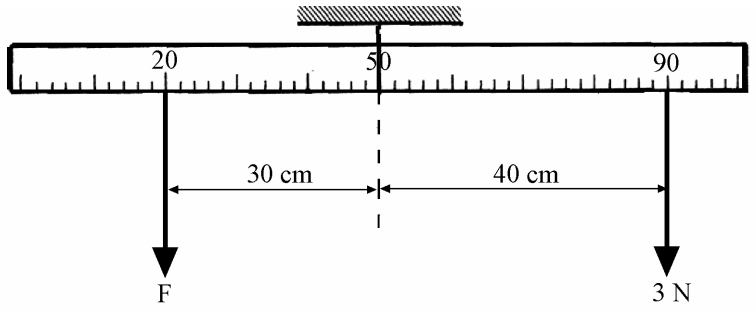
_____

_____

For Examiner use only

(1) (2)

(*c*) Define ***moment of a force***. (6)



The diagram shows a metre stick suspended from its centre of gravity.
A force of 3 N acts on the stick at the 90 cm mark and a force of **F** N acts on the stick at the 20 cm mark. The metre stick is balanced horizontally.
Calculate ***force F***. (6)

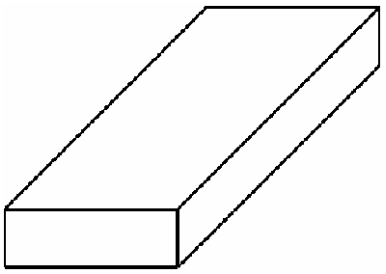
Give an ***everyday example of an application of the lever***, using a labelled diagram, showing the ***fulcrum*** and at least ***one force*** acting on the lever.
Use the box provided for your labelled diagram. (6)

Question 9 (39)

For Examiner use only

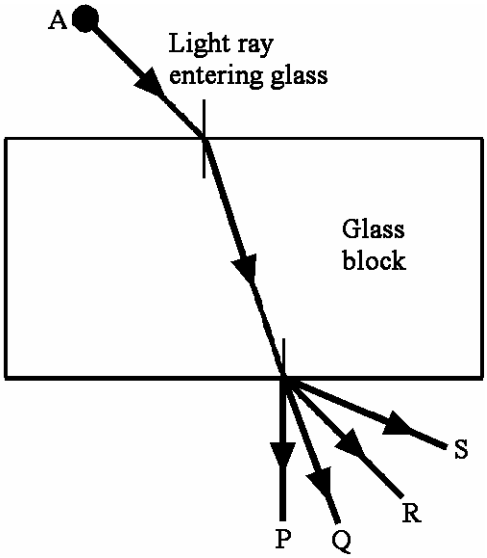
(1) (2)

(*a*) A glass block like the one shown in the diagram was used in an experiment in which a narrow beam (ray) of light was shone through it. The light passed from air to glass, on entry, and glass to air, on exit.



The path of this light ray is shown in the second diagram.

The light ray from **A** bends both on entering and on leaving the glass block.



(*i*) What is this ***bending of light*** called? (3)

What? _____

(*ii*) Pick, from '***rays***' **P**, **Q**, **R** or **S** the path taken by the light ray leaving the glass. (3)

Ray _____

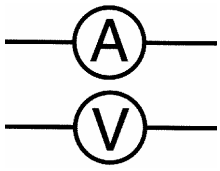
(*iii*) Give an ***application*** of this bending of light. (3)

Application _____

(*iv*) Name ***another way*** in which the direction of a light ray can be changed. (3)

Name _____

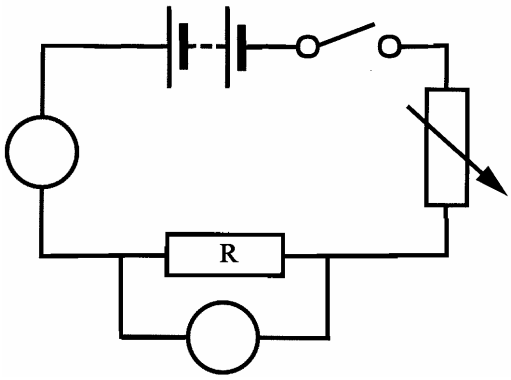
(*b*) The symbols for two electrical meters are given in the diagram. The symbol  is for a meter that measures potential difference, often called 'voltage'.



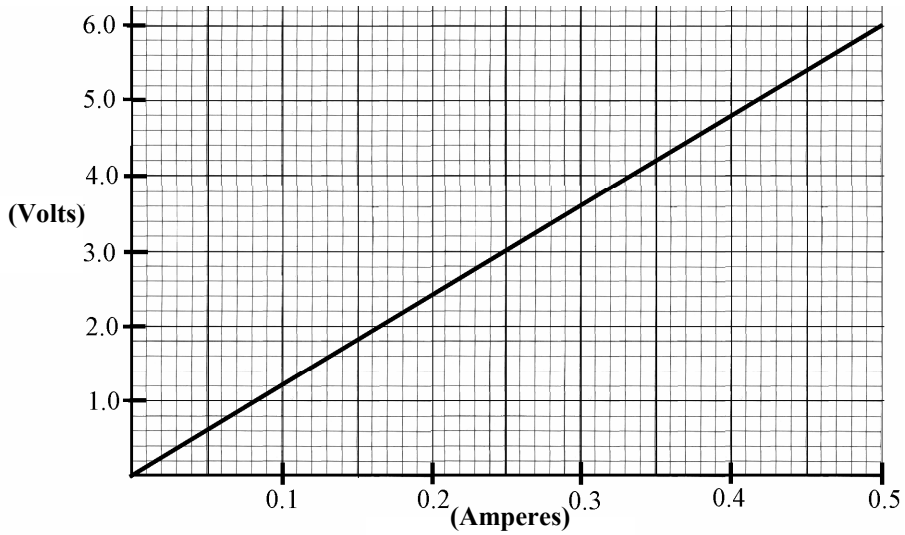
What ***electrical quantity*** can be measured using the meter with the symbol  ? (3)

What? _____

Meters Ⓐ and Ⓥ are used in the circuit shown.
Enter '**A**' into the ***appropriate circle of one of the meter symbols*** in the circuit diagram so as to clearly identify its correct position. (3)



A pupil used this circuit to get a set of readings from both meters for different values and then plotted this data in the graph shown.



Use this graph to ***calculate the resistance*** of resistor **R** shown in the diagram. Give the unit of resistance with your answer. (9)

_____

(*c*) Describe, using a labelled diagram in the box, an investigation you could carry out to show that ***sound requires a medium*** in which to travel. (12)

_____

_____

_____

_____

_____

_____

For Examiner use only
(1) (2)