



Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2013

SCIENCE – ORDINARY LEVEL

THURSDAY, 13 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, there is a blank page provided at the back of this booklet.
4. The use of the *Formulae and Tables* booklet approved for use in the State Examinations is permitted. A copy may be obtained from the examination superintendent.

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 A (60)	
Coursework B (150)	
Grand Total (600)	

Biology

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(1) (2)

Question 1

(52)

- (a) All plants and animals are composed of cells.

In the table write the letter **B** beside **two cell parts** that are found in **both** animal and plant cells.

	Cell wall
	Nucleus
	Cell membrane
	Chloroplast

- (b) Micro-organisms such as bacteria and viruses cause infection and disease.

In the table write the letter **B** beside the **name** of the illness caused by **bacteria**.

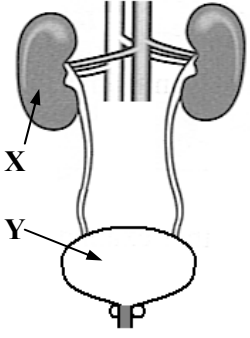
Write the letter **V** beside the **name** of the illness caused by a **virus**.

	Common cold
	Appendicitis

- (c) The diagram shows the urinary system.

In the table write the letter **X** beside the **name** of the part labelled **X**.

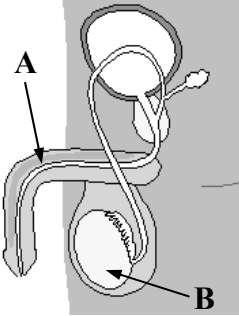
Write the letter **W** beside the name of the **waste stored** by **Y**.

	Ureter	
	Bladder	
	Kidney	
	Urine	
	Faeces	

- (d) The diagram shows the **male reproductive system**.

In the table write the letter **A** beside the **name** of the part labelled **A**.

Write the letter **F** beside the **function** of the part labelled **B**.

	Penis	
	Ovary	
	Produces Sperm	
	Produces Eggs	

- (e) The diagram shows the **central nervous system**.

Sense organs gather information about our surroundings and communicate with the part labelled **X** in the diagram.

Name the part labelled **X**.

- (f) Flowers are **pollinated** in different ways.

Name the part of the flower that produces pollen. _____

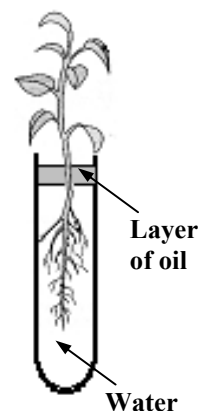
Write the letter **W** below the example on the right whose flowers are pollinated by **wind**.

	
Buttercup	Grass

- (g) A plant was set up as shown to investigate the transport of water.

Which part of the plant takes in water?

What would you notice about the level of water in the test tube after a few days?



- (h) Flour is a good source of carbohydrate. Answer the questions below using words from the list on the right.

Name one **other** food rich in carbohydrate.

Name one food rich in **protein**.

Name one food rich in **fat**.

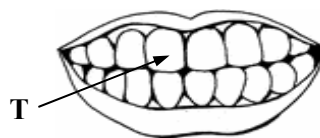
Bread
Rice
Butter
Chicken
Fish
Water

(7 × 6 + 1 × 10)

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(1) (2)

Question 2



(39)

- (a) A tooth is labelled **T** in the diagram.

Write the letter **T** beside the **type of tooth** labelled **T**.

Write the letter **M** beside the **mineral** needed for healthy bones and teeth.

(6)

	Incisor
	Molar
	Calcium
	Iron

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

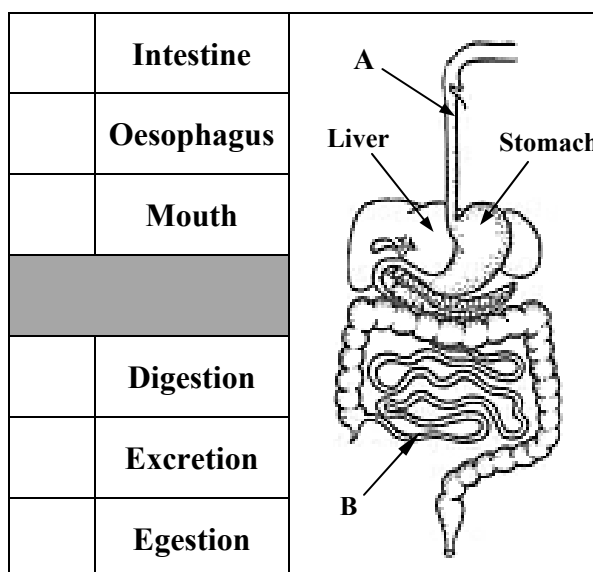
Examine the diagram and answer the questions below.

(9)

In the table write the letter **A** beside the **name** of the part labelled **A**.

Write the letter **B** beside the **name** of the part labelled **B**.

Write the letter **F** beside the **function** of the part labelled **B**.



- (c) A student carried out a number of food tests on two different food samples, **Food A** and **Food B**.

Answer the following questions about food tests.

(12)

- (i) **Food A**, when tested, formed a **translucent spot** on brown paper.
Which food type, **protein**, **fat** or **(reducing) sugar**, is mainly found in **Food A**? _____

- (ii) **Food B**, when tested with Benedict's (Fehling's) solution, produced a **brick red** colour.
What **colour** was Benedict's (Fehling's) solution at the beginning of the test? _____

Is **heat** required for this food test? _____

Which food type, **protein**, **fat** or **(reducing) sugar**, is mainly found in **Food B**? _____

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(1) (2)

(1)

(2)

- Equipment: _____

Procedure:

Result:

Labelled diagram

Question 3

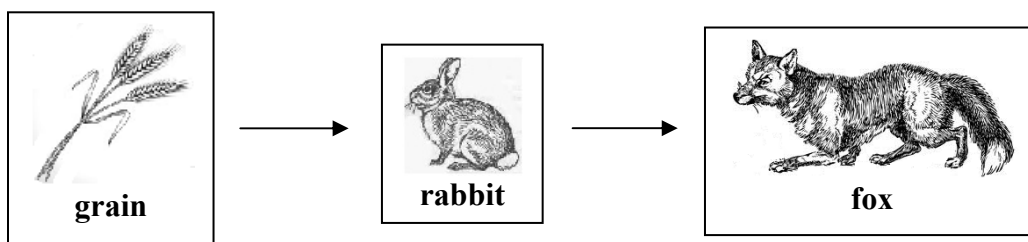
(39)

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(a) The following diagram shows a food chain from a meadow habitat.

(9)

(1) (2)



Name the **producer** in the food chain above.

Name the **herbivore** in the food chain above.

Write the letter **E** beside the effect that removing all of the foxes would have on the number of rabbits in the habitat.

	Increase
	Decrease

(b)(i) The diagrams show two pieces of equipment that can be used in an investigation to study a habitat.

Study the diagrams and answer the questions which follow.

(12)

Name the piece labelled **A**.

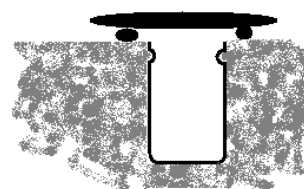
Give one **use** for piece **A**.

Name the piece labelled **B**.

Give one **use** for piece **B**.



Piece A



Piece B

(ii) Conservation is very important if we wish to protect the environment for future generations. Name **two** ways that humans can help protect our natural resources.

(6)

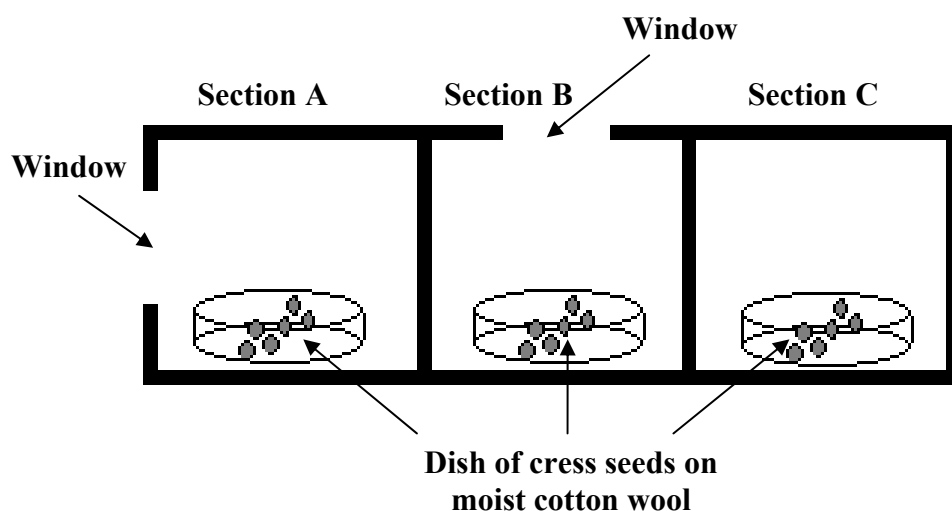
1 _____

2 _____

- (c) The diagram shows the apparatus used to **investigate the growth response of cress seedlings to light**. The cress seeds were left to germinate in the segmented box for one week.

Study the diagram and answer the questions below.

(12)



In what direction will the seedlings in **Section A** grow?

In what direction will the seedlings in **Section B** grow?

Write the letter **G** beside the word which describes this **growth response** of the seedlings.

	Photosynthesis
	Phototropism
	Respiration

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(1) (2)

Chemistry

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Question 4

(52)

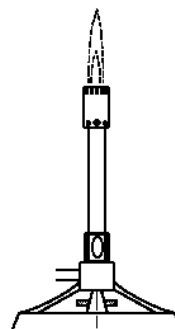
(1) (2)

- (a) Name the piece of equipment shown on the right.

Name _____

Give **one use** for this piece of equipment.

Use _____



- (b) Litmus is an indicator which is used to test whether a substance is an acid or a base.

What **colour** is litmus in an **acid**? _____

Choose one common base from the list on the right.

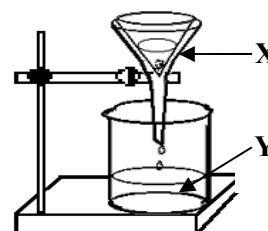
Base _____


Litmus indicator
Vinegar
Distilled water
Oven cleaner

- (c) The diagram shows an arrangement of apparatus suitable for the separation of **sand and water**.

Name this method of separation.

Name _____



Would you expect to find most of the water in **X** or **Y** at the end of the separation? _____

- (d) Water must be purified before we can drink it safely.

In the table write the letter **R** beside the word which describes the **removal of large floating debris** from water.

Write the letter **A** beside the treatment used to **kill bacteria**.

	Screening
	Fluoridation
	Settling
	Chlorination

- (e) Choose an alloy from the list on the right.

Alloy _____

Give one use for the alloy you have chosen.

Use _____

Steel
Copper
Bronze
Silver
Brass

- (f) The known elements are listed in the Periodic Table. Use words from the list on the right to correctly complete the sentences below.

When elements **chemically combine** _____
are formed.

When elements **physically combine** _____
are formed.

Compounds
Mixtures

- (g) Complete the table below. Insert the correct phrase for the location of the electron and the proton, 'outside the nucleus' or 'inside the nucleus'.

Particle	Relative mass	Relative charge	Location
NEUTRON	1	0	Inside the nucleus
ELECTRON	$\frac{1}{1840}$	Negative (-1)	
PROTON	1	Positive (+1)	

- (h) The pieces of equipment drawn on the right are used when reacting **sodium hydroxide (NaOH)** with **hydrochloric acid (HCl)** in a titration.

Name the pieces of equipment labelled **A** and **B**.

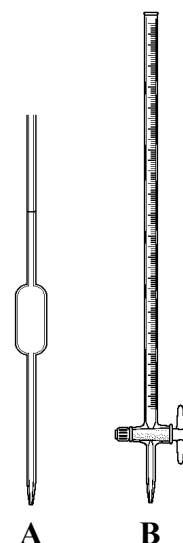
A _____

B _____

When sodium hydroxide and hydrochloric acid react, water and another product are formed.

Name the other product.

Product _____



A

B

(7 × 6 + 1 × 10)

Question 5

(39)

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- (a) Safety (hazard) symbols are very important in Chemistry.

(6)

(1) (2)

In the table below write the letter **C** under the symbol for **corrosive**.

Write the letter **H** below the symbol which represents **harmful or irritant**.

- (b) Air is a mixture of gases. Some of the gases present in air are given in the table on the right.

Answer the following questions about gases in air.

(15)

Nitrogen
Oxygen
Carbon dioxide
Water vapour

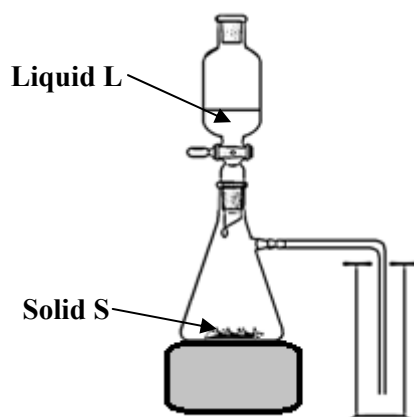
- (i) Which gas is used by plants to **make food**?

- (ii) Which gas makes up **most** of the air?

- (iii) Which gas is needed for **burning** to occur?

- (iv) Which gas can be tested for using **anhydrous copper sulfate or cobalt chloride paper**?

- (c) The diagram shows the apparatus used to **prepare and collect carbon dioxide gas** in the laboratory. (18)



- (i) Write the letter **L** beside the name of the **liquid L** used to prepare carbon dioxide.
- (ii) Write the letter **S** beside the name of the **solid S** used to prepare carbon dioxide.

	Hydrogen peroxide
	Hydrochloric acid
	Marble chips
	Manganese dioxide

- (iii) What would a student observe when **liquid L** is allowed drop onto **solid B**?

Observation _____

- (iv) **Name the liquid** which turns milky white when carbon dioxide is bubbled through it.

Name _____

- (v) State **one use** for carbon dioxide in everyday life.

Use _____

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(1) (2)

Question 6

(39)

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(a) Separation techniques are widely used in industry.

(6)

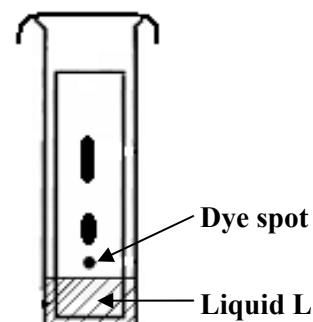
- (i) A solution of dye can be separated into its constituent colours using the method shown in the diagram.

Name this separation technique.

Name _____

- (ii) Suggest a **liquid L** that could be used to separate the dye.

Liquid L _____



(b) The following diagram shows a separation technique that can be used to separate two substances.

(18)

- (i) Name this separation technique.

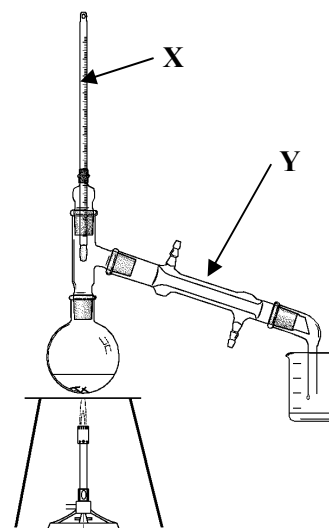
Name _____

- (ii) Name the piece of equipment labelled **X** in the diagram.

Name _____

- (iii) Name the piece of equipment labelled **Y** in the diagram.

Name _____



- (iv) Name **two substances** that can be separated using this technique.

1 _____

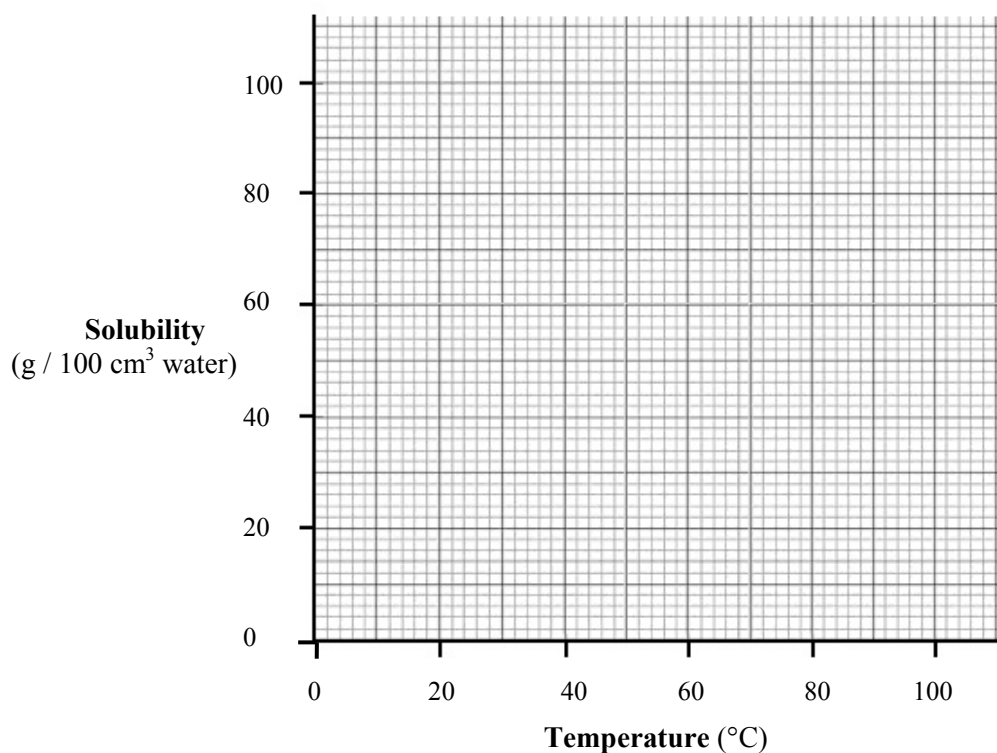
2 _____

- (c) A student investigated the solubility of a salt in water in the school laboratory. The mass of the salt that dissolved at different temperatures was measured. The data collected are presented in the table below.

Temperature ($^{\circ}\text{C}$)	20	40	60	80	100
Solubility (g / 100 cm^3 of water)	10	30	50	70	90

- (i) Use this data to draw a graph of **solubility (y-axis)** against **temperature (x-axis)** using the grid provided below.

(12)



- (ii) Use the graph to estimate the solubility at 50 $^{\circ}\text{C}$.

(3)

Solubility at 50 $^{\circ}\text{C}$ _____

Physics

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(1) (2)

Question 7

(52)

- (a) A student set up the equipment shown to **measure the volume of an irregular shaped object** e.g. a stone.

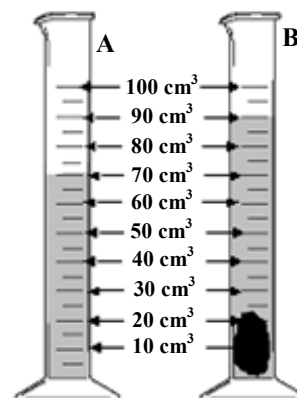
Container **A** was filled with 70 cm^3 of water.

When the stone was carefully dropped into the water arrangement **B** resulted.

Name container **A**. _____

Calculate the volume of the stone from the information shown.

Volume of stone _____ cm^3



- (b) Choose the correct temperature from the list to complete the statements below.

Water boils at _____ $^{\circ}\text{C}$

Water freezes at _____ $^{\circ}\text{C}$

37
0
87
100

- (c) In each case choose the method of **heat transfer** from the list on the right to correctly complete the statements below.

Earth is heated by the Sun when heat is transferred by _____.

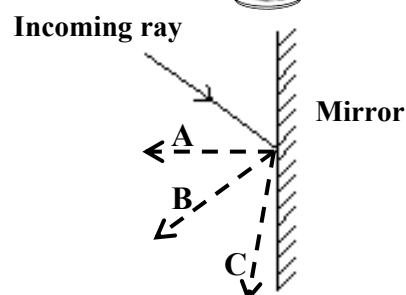
The end of a spoon sitting in a cup of boiling water becomes hot. The heat is transferred along the spoon by _____.

Conduction
Convection
Radiation



- (d) On which of the paths **A**, **B** or **C** will the incoming ray of light travel after striking the mirror?

Which of the words on the right describes what happened to the ray of light after it hit the mirror?



Convection
Reflection

- (e) In the table write the letter **U** beside the **unit** used when calculating the usage of electrical energy.

Write the letter **C** beside the **cost** of operating a **5 kW** electric heater for **2 hours**, if one unit of electricity costs **20 cent**.

	kW
	kWh
	€2.00
	€20.00

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(1) (2)

- (f) The diagram shows a wind turbine which can be used to generate electricity.

Is wind energy **renewable** or **non-renewable**?

Answer _____

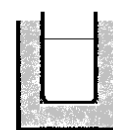
Give **one disadvantage** of this form of electricity generation.

Disadvantage _____



- (g) The diagram shows two metal cans of equal size. They contain equal volumes of water at 100 °C. Can **A** is wrapped in cotton wool and can **B** has no wrapping.

After 20 minutes, which can, **A** or **B**, would have the higher temperature?



Can A



Can B

Answer _____

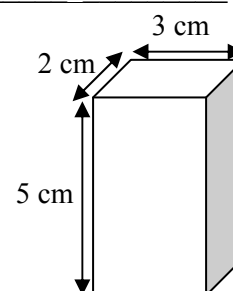
Give a reason for your answer.

Reason _____

- (h) A metal block as shown has a mass of 60 grams.

Name the instrument you would use in the laboratory to find the mass of the block.

Instrument _____



In the table write the letter **V** beside the **volume** of the block.

Write the letter **D** beside the **density** of the block.

	30 cm³
	10 cm³
	2 g/cm³
	20 g/cm³

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

Question 8

(39)

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- (a) The diagram shows a three-pin plug with the back removed. (9)

Which of the labels **A**, **B** or **C** marks the **neutral** wire?

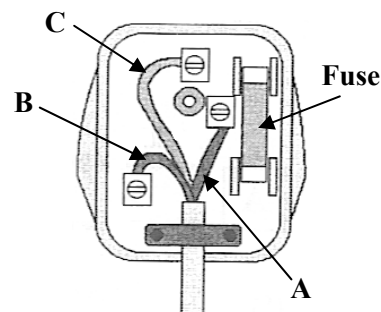
Which? _____

Name the wire **A** to which the fuse is connected.

Name _____

What is the function of a **fuse** in a three-pin plug?

Function _____



- (b) The diagram shows a bar magnet. (18)



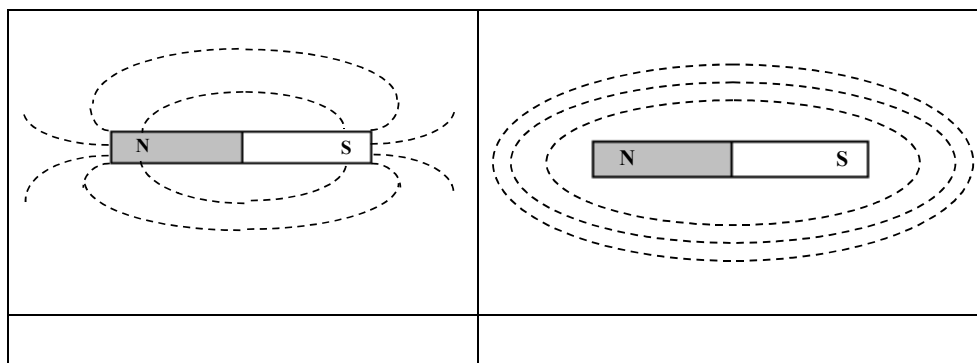
- (i) What does the letter **N** on the magnet mean? _____

If a student moved the **N** of one magnet close to the **S** of a second magnet what would the student notice?

- (ii) A student wanted to show the pattern of the magnetic field around a bar magnet.

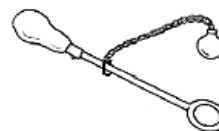
Name a substance or a piece of equipment used in the laboratory to show the **pattern** of the magnetic field around a magnet.

Write the letter **P** below the pattern you would expect to get if you did this experiment.



- (iii) Name a **metal** that is attracted by a magnet. _____

- (c) The diagram shows a **ball and ring apparatus**.



This piece of equipment was used to examine the effect of heat on a metal.

When the ring and the ball were cold, the ball passed through the ring.
When the ball was heated it no longer passed through the ring.

Answer the following questions about this experiment. (12)

- (i) What does this experiment tell you about the effect of heat on the metal?

- (ii) If the hot metal ball was cooled down again, would you expect it to pass through the ring?

Give a reason for your answer.

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(1) (2)

Question 9

(39)

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- (a) Match the correct form of energy from the list on the right with each of the statements below. (12)

Stored energy in a **battery** is called _____ energy.

Energy released from **burning coal** is called _____ energy.

The energy in a **stretched elastic band** is called _____ energy.

Energy in a **moving object** is called _____ energy.

Kinetic
Potential
Heat
Chemical

- (b) The simple circuit shown was set up to investigate the **heating effect** of an electric current. When the switch is closed a current flows. (18)

Name the component labelled **X**.

What happens to the **thin wire** when a current flows?

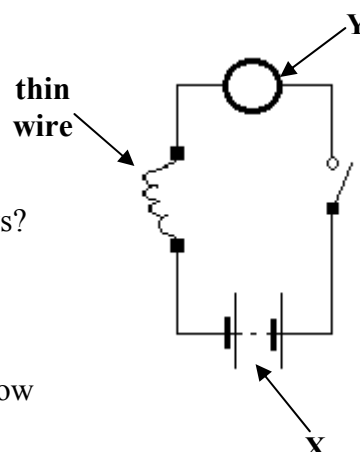
Name a device that the student could put at **Y** to show that a current is flowing through the circuit.

Device _____

Name **two** household appliances that use the heating effect of an electric current.

1 _____

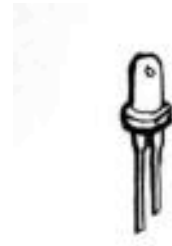
2 _____



- (c) A **diode**, as shown in the diagram, is an example of an electrical component with many everyday applications.

Choose the correct word from the list given to complete each of the statements below.

(9)



A light-emitting diode (LED) requires _____

current than a regular (filament) bulb.

A resistor is placed in a circuit to protect the diode.

The **unit of resistance** is the _____.

More
Less
Amp
Ohm

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(1) (2)

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(1)
(2)

[illegible]