



# Coimisiún na Scrúduithe Stáit State Examinations Commission

---

**JUNIOR CERTIFICATE EXAMINATION, 2016**

---

**SCIENCE – ORDINARY LEVEL**

**THURSDAY, 16 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.

<p><b>Centre Number</b></p>
-----------------------------

<p><b>Examination Number</b></p> <hr style="width: 20%; margin: 10px auto;"/>
---

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

# Biology

For  
examiner  
use only

## Question 1

(52)

(1) (2)

- (a) (i) In the table write the letter **B** beside the type of animal that has a backbone.

	<b>Vertebrate</b>
	<b>Invertebrate</b>

(ii) Name an animal that has a backbone. \_\_\_\_\_

- (b) Underline two cell structures in the list below that are found in both plant cells and animal cells.

**Nucleus**

**Cell Wall**

**Cytoplasm**

**Cell membrane**

- (c) This is a food chain from a woodland habitat.



(i) Name the producer in this food chain. \_\_\_\_\_

(ii) Name a consumer in this food chain. \_\_\_\_\_

- (d) Starch is a type of carbohydrate found in food.

(i) Name one food that contains a lot of starch.

\_\_\_\_\_

(ii) Iodine solution is used to test food for the presence of starch.

Iodine solution has a red-brown colour.

What colour does iodine turn when added to starch?

\_\_\_\_\_



- (e) Both of the pieces of equipment shown are used to capture animals in a habitat.  
Select from the list below the name of each and write it in the space provided.

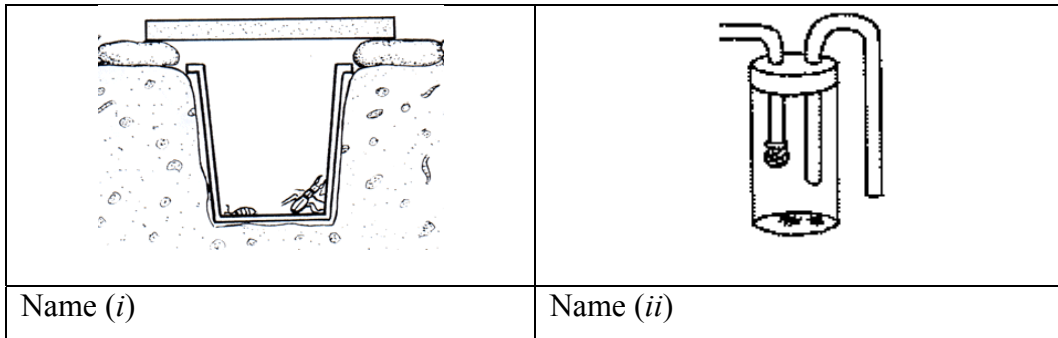
quadrat

pooter

pit-fall trap

beating tray

(1) (2)

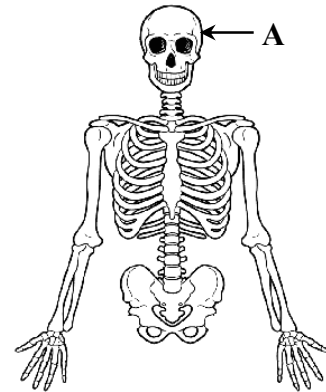


- (f) The diagram shows the upper part of the human skeleton.

- (i) State one function of the human skeleton.

\_\_\_\_\_

- (ii) Name the part labelled A. \_\_\_\_\_



- (g) The eye is one of the five sense organs in humans.

Name two other sense organs.

1. \_\_\_\_\_

2. \_\_\_\_\_



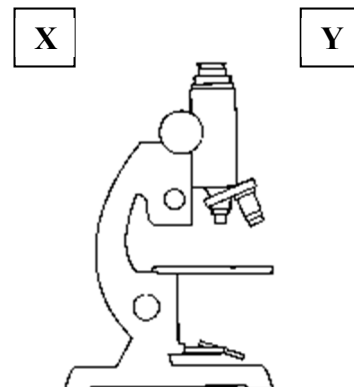
- (h) The diagram shows a microscope that can be used in the laboratory.

- (i) Draw a line from the letter X to the eyepiece.

- (ii) Draw a line from the letter Y to the stage.

- (iii) What is the function of a microscope?

\_\_\_\_\_  
\_\_\_\_\_



(7 × 6 + 1 × 10)

**Question 2**

(39)

For  
examiner  
use only

(a) The diagram shows the human digestive system.

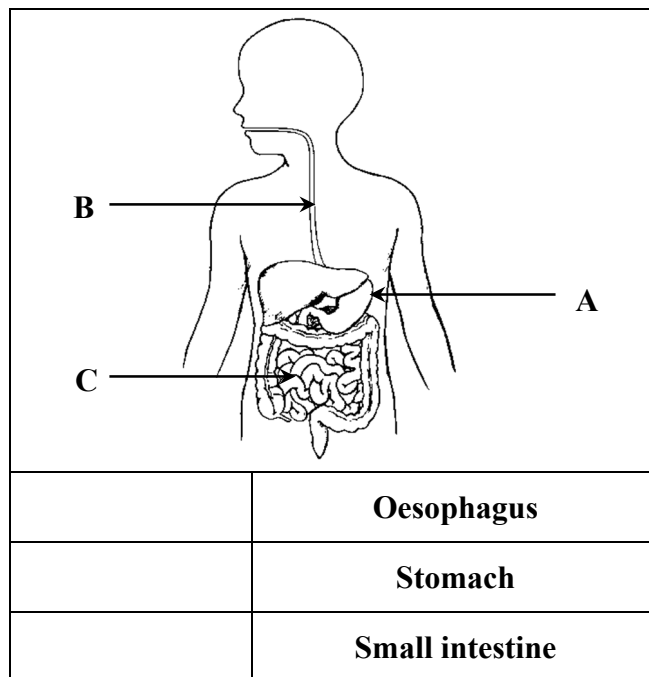
(21)

(1) (2)

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

(ii) Write the letter **B** beside the name of the part labelled B.

(iii) Write the letter **C** beside the name of the part labelled C.

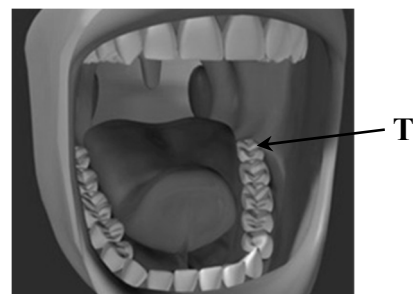


(iv) State one function of the stomach.

\_\_\_\_\_

(v) Name the type of tooth labelled T in the diagram.

\_\_\_\_\_

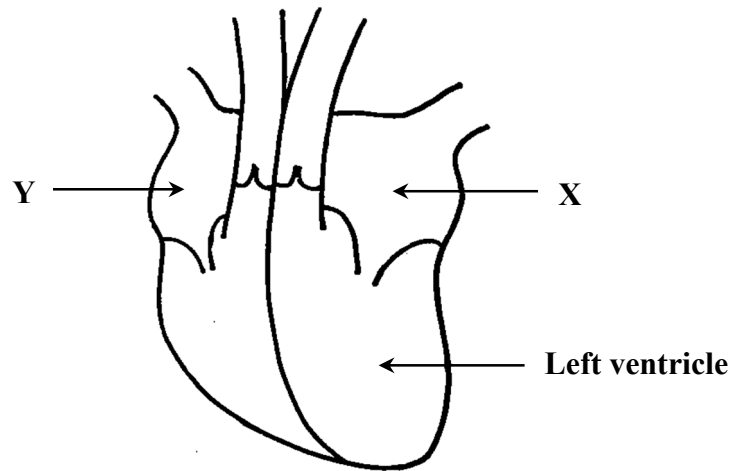


(vi) State the function of this type of tooth.

\_\_\_\_\_

(b) The diagram shows the four chambers of the human heart.

(18)



For  
examiner  
use only

(1) (2)

(i) What is the function of the human heart?

\_\_\_\_\_

(ii) Write the letter **X** beside the name of the chamber labelled **X**.

Write the letter **Y** beside the name of the chamber labelled **Y**.

	<b>Right ventricle</b>
	<b>Right atrium</b>
	<b>Left atrium</b>

(iii) Describe one way to help keep your heart healthy.

\_\_\_\_\_  
\_\_\_\_\_

(iv) Choose the correct words from the list in the box to complete the sentences below.

Oxygen is carried by \_\_\_\_\_.

Blood clots are formed by \_\_\_\_\_.

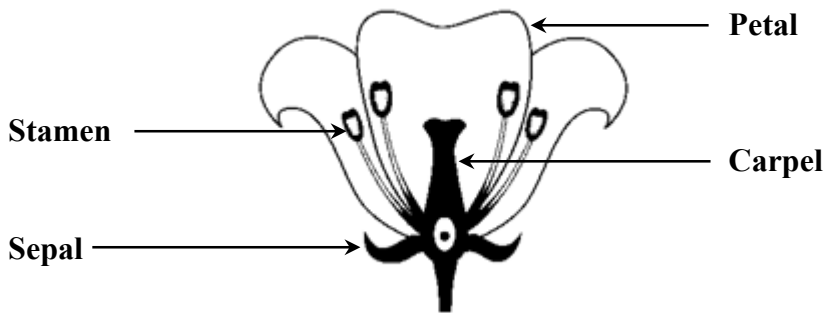
<b>Red blood cells</b>
<b>White blood cells</b>
<b>Platelets</b>

**Question 3**

(39)

(a) The diagram shows the parts of a flower.

(21)



For  
examiner  
use only

(1) (2)

(i) Is the flower used for sexual *or* asexual reproduction?

\_\_\_\_\_

(ii) Choose the correct label from the diagram above to complete the sentences below.

The \_\_\_\_\_ makes the pollen.

The \_\_\_\_\_ makes the egg cell.

(iii) Describe one way that pollen can be transferred from one flower to another.

\_\_\_\_\_  
\_\_\_\_\_

(iv) Seeds were placed on dry cotton wool in a container and then left in a warm room.

Do you think the seeds in the container germinated?

\_\_\_\_\_

Give a reason for your answer.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



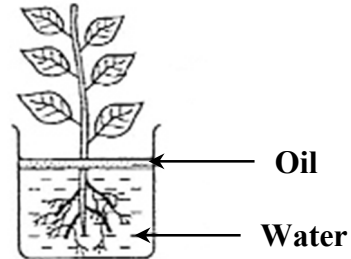
**Seeds on dry cotton wool**

(b) Two experiments were set up to investigate the movement of water in plants. (18)

(1) (2)

(i) Name the part of a plant that absorbs water from the soil. \_\_\_\_\_

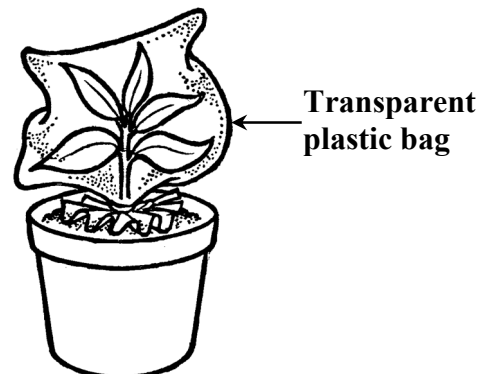
In the first experiment a seedling was placed into a beaker as shown in the diagram and left for a few days.



(ii) What happened to the level of the water in the beaker after a few days?  
\_\_\_\_\_

(iii) What is the purpose of the layer of oil on the surface of the water?  
\_\_\_\_\_

In the second experiment a well-watered plant was wrapped in a transparent plastic bag as shown in the diagram and left for 24 hours.



(iv) Is the loss of water from a plant called transpiration *or* fertilisation?  
\_\_\_\_\_

(v) From which part of a plant is most water lost? \_\_\_\_\_

(vi) What would you expect to see on the inside of the bag after 24 hours?  
\_\_\_\_\_

# Chemistry

For  
examiner  
use only

## Question 4

(52)

(1) (2)

(a) (i) In the table write the letter **B** beside the type of bond formed when atoms share pairs of electrons.

	<b>Ionic</b>
	<b>Covalent</b>
	<b>Positive</b>
	<b>Negative</b>

(ii) Write the letter **C** beside the charge of an electron.

(b) The picture shows a student working in a science laboratory.

Write down two safety precautions that should be taken when working in a laboratory.

1. \_\_\_\_\_

2. \_\_\_\_\_



(c) A student is given a dish containing a mixture of sulfur powder and iron filings. The iron filings are grey.

(i) What colour is the sulfur powder? \_\_\_\_\_

(ii) Describe how the student could separate the iron filings from the sulfur powder.

\_\_\_\_\_  
\_\_\_\_\_

(d) Select the correct words from the box on the right to complete the sentences below.

(i) A wet towel dries as water \_\_\_\_\_  
from it.

(ii) Water vapour \_\_\_\_\_ into water droplets  
when it hits a cold mirror.

<b>Melts</b>
<b>Evaporates</b>
<b>Condenses</b>
<b>Freezes</b>



- (e) The presence of water can be shown using either cobalt chloride *or* anhydrous copper sulfate. Chose **one** of these chemicals and state its colour when dry and its colour when wet.

Chemical	Colour when dry	Colour when wet

- (f) (i) Name the separation technique shown in the diagram.

\_\_\_\_\_

- (ii) Give an example of a mixture that could be separated using this technique.

\_\_\_\_\_

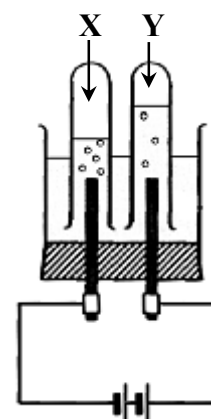


- (g) The diagram shows the decomposition of water (H<sub>2</sub>O) by electrolysis.

- (i) In the table write the letter **X** beside the gas collected at X.

- (ii) Write the letter **Y** beside the gas collected at Y.

	<b>Oxygen</b>
	<b>Hydrogen</b>
	<b>Nitrogen</b>



- (h) An investigation was carried out to examine the solubility of sugar in water. The graph shows the solubility of sugar in water as temperature rises.

- (i) Does the solubility of sugar increase *or* decrease as temperature rises?

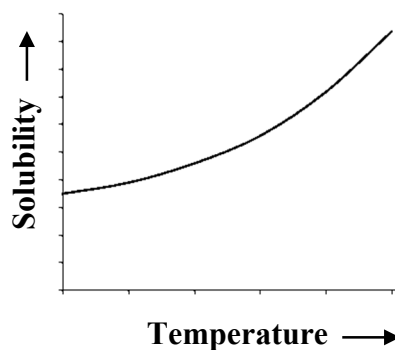
\_\_\_\_\_

- (ii) Is water the solvent *or* the solute in the solution?

\_\_\_\_\_

- (iii) Name a substance, other than sugar, that dissolves in water.

\_\_\_\_\_



(7 × 6 + 1 × 10)

**Question 5**

(39)

For  
examiner  
use only

(a) Water is treated to make it safe to drink.

(12)

(1) (2)



Four of the main processes involved in water treatment are:

**Filtration      Sedimentation (Settling)      Chlorination      Screening**

Match the correct word from the list above with its description in the table below.

<b>Process</b>	<b>Description</b>
	<b>Wire meshes remove floating objects from the water</b>
	<b>Water is left in large tanks and heavy particles sink to the bottom</b>
	<b>Sand and gravel beds are used to remove small particles</b>
	<b>Chlorine is added to the water</b>

(b) When zinc is placed in hydrochloric acid a chemical reaction releases a gas.

(6)

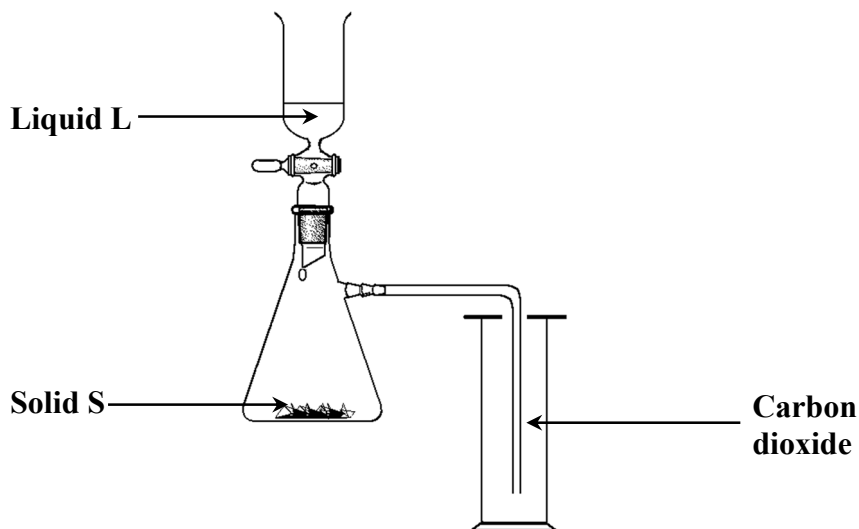


(i) What is the chemical symbol for zinc? \_\_\_\_\_

(ii) Name the gas released when zinc reacts with hydrochloric acid.

\_\_\_\_\_

(c) Carbon dioxide is made in the laboratory as shown in the diagram. (21)



(1) (2)

(i) In the table write the letter **L** beside the liquid **L** that is used to make carbon dioxide.

	<b>Hydrochloric acid</b>
	<b>Water</b>
	<b>Sodium chloride</b>
	<b>Calcium carbonate</b>

(ii) Write the letter **S** beside the solid **S** that is used to make carbon dioxide.

(iii) Is carbon dioxide a mixture *or* a compound? \_\_\_\_\_

(iv) Limewater is used to show that the gas made is carbon dioxide.

Describe the change seen in limewater when carbon dioxide is added to it.

\_\_\_\_\_

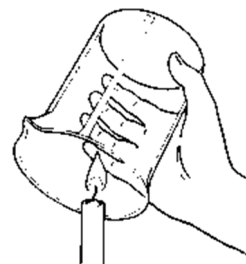
\_\_\_\_\_

(v) A beaker of carbon dioxide is held over a lighted candle. Describe what happens to the flame.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



(vi) State one use of carbon dioxide.

\_\_\_\_\_

**Question 6**

(39)

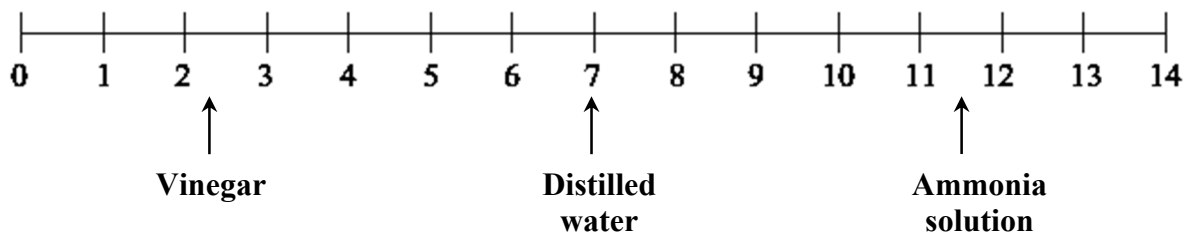
For  
examiner  
use only

(a) A number of solutions were tested in the laboratory to find their pH values.

(1) (2)

The chart below shows the data collected.

(15)



(i) Name an indicator *or* an instrument used in the laboratory to measure pH.

\_\_\_\_\_

(ii) Describe how the indicator *or* the instrument is used to find the pH of a solution.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(iii) Use the correct words from the box on the right to complete the sentences below.

The distilled water is \_\_\_\_\_.

The vinegar is \_\_\_\_\_.

The ammonia solution is \_\_\_\_\_.

<b>Acidic</b>
<b>Basic</b>
<b>Neutral</b>

(b) Fossil fuels are sources of hydrocarbons.

(9)

(i) In the table write the letter **F** beside the **two** elements that are found in hydrocarbons.

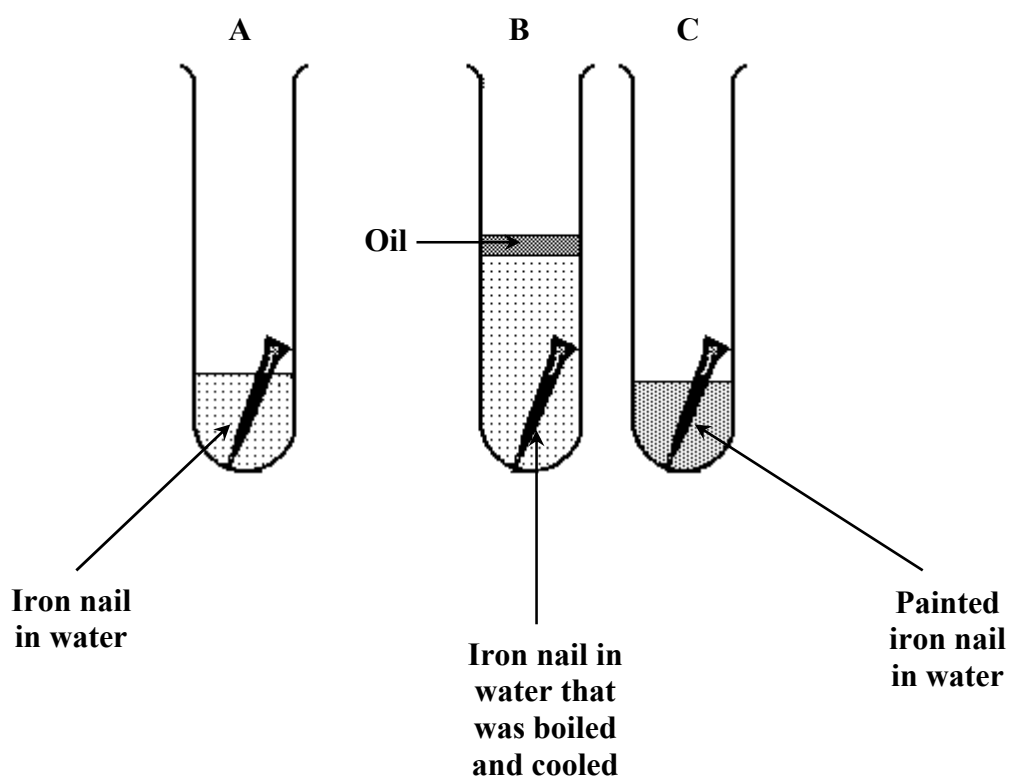
	<b>Hydrogen</b>
	<b>Lithium</b>
	<b>Nitrogen</b>
	<b>Carbon</b>

(ii) Name one fossil fuel.

\_\_\_\_\_

(c) A student set up the test tubes as shown below to investigate rusting.

(15)



For  
examiner  
use only

(1) (2)

(i) Nitrogen and oxygen are the gases that make up most of the air.  
Which of these gases is needed for rusting to take place?

\_\_\_\_\_

(ii) What is the purpose of the layer of oil in test tube B?

\_\_\_\_\_  
\_\_\_\_\_

(iii) Will the nail in test tube C rust?

\_\_\_\_\_

Explain your answer.

\_\_\_\_\_  
\_\_\_\_\_

# Physics

For  
examiner  
use only

## Question 7

(52)

(1) (2)

- (a) A plastic spoon and a metal spoon were placed in a mug of hot water.



- (i) Which spoon will feel hottest after two minutes?  
\_\_\_\_\_

- (ii) Explain your answer.  
\_\_\_\_\_

- (b) Biomass is a renewable source of energy.

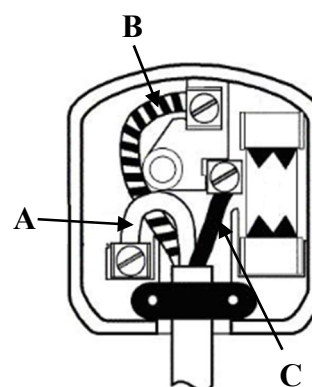
Name two other renewable sources of energy.

1. \_\_\_\_\_ 2. \_\_\_\_\_

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

- (i) Which wire **A**, **B** or **C** is the live wire? \_\_\_\_\_

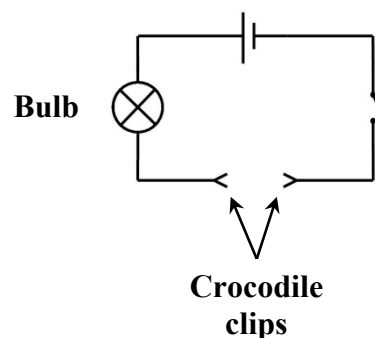
- (ii) Describe one safety feature of a plug.  
\_\_\_\_\_  
\_\_\_\_\_



- (d) The diagram shows an electrical circuit.

- (i) Name a material which will allow the bulb to light when that material is placed between the crocodile clips and the switch is closed.  
\_\_\_\_\_  
\_\_\_\_\_

- (ii) Explain your answer.  
\_\_\_\_\_  
\_\_\_\_\_



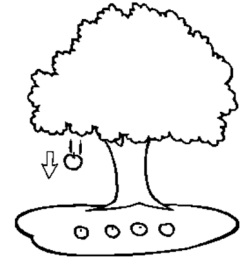
(1) | (2)

(e) (i) Name the force that pulls objects towards Earth.

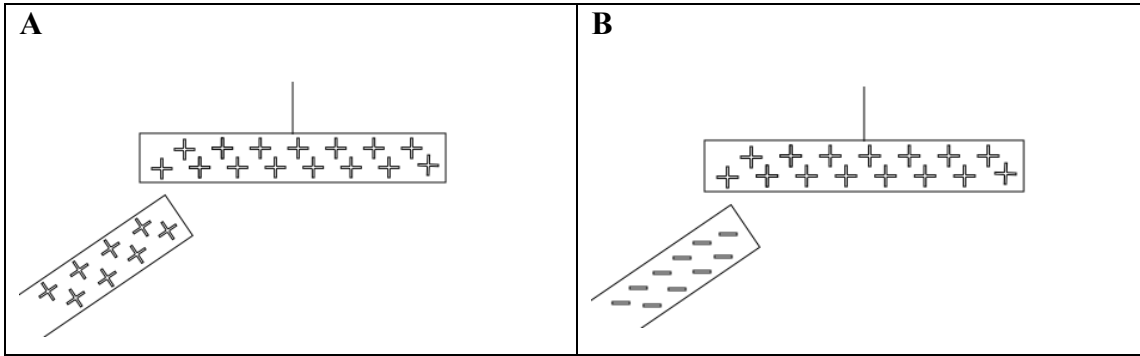
\_\_\_\_\_

(ii) Is the unit of force the newton *or* the watt?

\_\_\_\_\_



(f) The diagrams show charged rods placed beside each other.

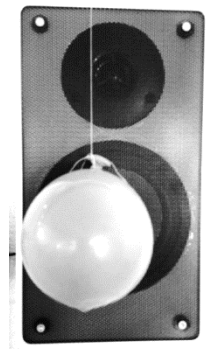


(i) In which diagram, **A** or **B**, will the rods repel each other? \_\_\_\_\_

(ii) In which diagram, **A** or **B**, will the rods attract each other? \_\_\_\_\_

(g)(i) A balloon is hanging near a loudspeaker as shown.  
The balloon moves when the loudspeaker is turned on.  
What does this tell us about sound?

\_\_\_\_\_



(ii) Name one precaution that should be taken when working in a noisy area.

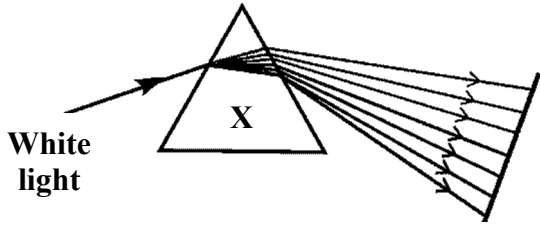
\_\_\_\_\_

(h) The diagram shows how white light is dispersed into a spectrum of colours using a triangular shaped piece of equipment, **X**.

(i) Name **X**. \_\_\_\_\_

(ii) Name a suitable material from which **X** could be made.

\_\_\_\_\_



(iii) Name one colour seen in the spectrum. \_\_\_\_\_

(7 × 6 + 1 × 10)

**Question 8**

(39)

For  
examiner  
use only

(a) To calculate the density of a stone we must know its mass and its volume.

(18)

(1) (2)



(i) Name an instrument used to measure the mass of a stone. \_\_\_\_\_

(ii) Describe how to find the volume of a stone.  
A labelled diagram may help your answer.

---

---

---

---

---

---

---

---

---

---

---

Labelled diagram

(iii) The mass of a stone is 60 g and its volume is 20 cm<sup>3</sup>.

In the table write the letter **D** beside the density of the stone.

Write the letter **X** beside the unit of measurement for density.

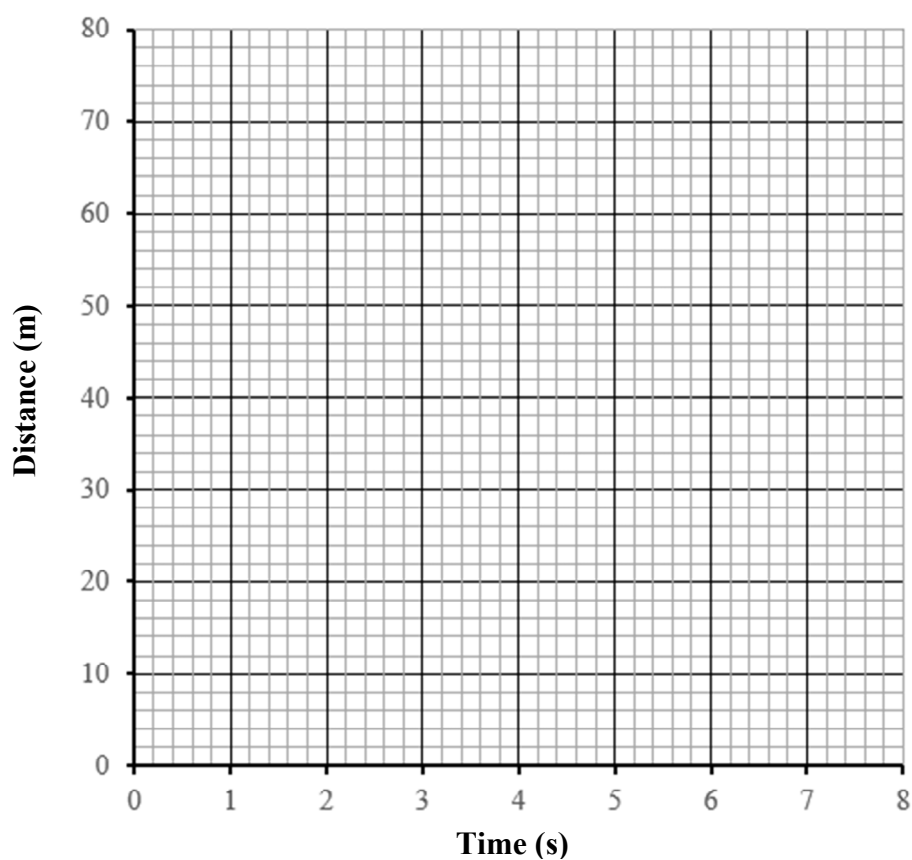
	<b>80</b>
	<b>3</b>
	<b>g/cm<sup>3</sup></b>
	<b>J</b>



- (b) A man runs along a track. The total distance he has run since he started is measured every two seconds. The data collected is shown in the table below. (21)

<b>Time (s)</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>
<b>Distance (m)</b>	<b>0</b>	<b>20</b>	<b>40</b>	<b>60</b>	<b>80</b>

- (i) Use the data in the table to draw a graph of distance ( $y$ -axis) against time ( $x$ -axis) using the grid below.



- (ii) Use the graph to estimate the distance the man had run after five seconds.

---

- (iii) Calculate the speed of the man in m/s.

---



---



---

For  
examiner  
use only

(1) (2)

**Question 9**

(39)

For  
examiner  
use only

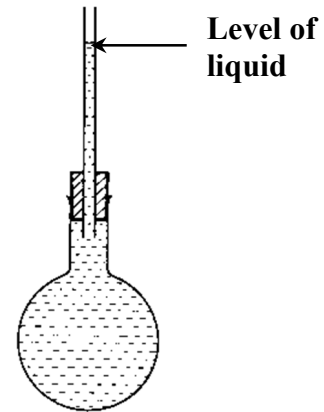
(a) A student carried out two investigations in the laboratory to examine the effect of heating and cooling liquids. (12)

(i) What happens to the level of liquid in the tube when the flask is heated for a few minutes?

\_\_\_\_\_  
\_\_\_\_\_

(ii) What does this tell us about the effect of heat on liquids?

\_\_\_\_\_  
\_\_\_\_\_



(iii) A thermometer is moved from a beaker of warm water into a beaker of cold water. What happens to the level of the liquid in the thermometer?

\_\_\_\_\_  
\_\_\_\_\_



(iv) What does this tell us about the effect of cooling on liquids?

\_\_\_\_\_  
\_\_\_\_\_

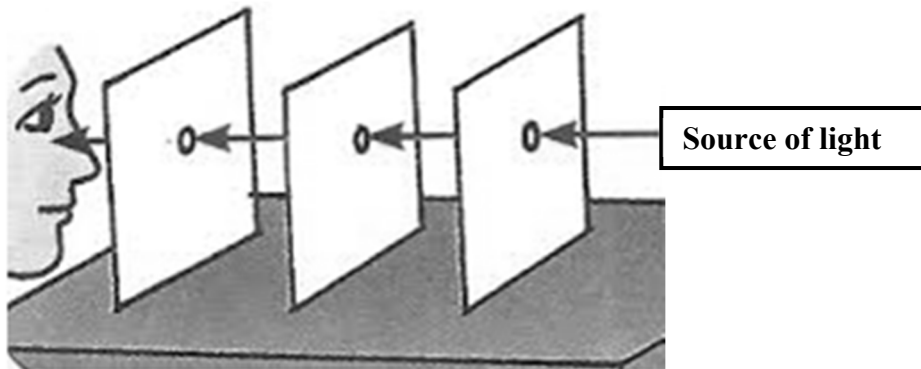
(b) Use the words in the box on the right to complete the statements below about energy conversions. (12)

(i) When a Bunsen burner is in use \_\_\_\_\_ energy is converted into \_\_\_\_\_ energy.

(ii) During the day a solar panel converts \_\_\_\_\_ energy into \_\_\_\_\_ energy.

**Light**  
**Chemical**  
**Heat**  
**Electrical**

- (c) A student carried out an experiment to show that light travels in straight lines. Some of the equipment used in the experiment is shown below. (15)



- (i) What could be used as a source of light?

---

- (ii) Describe how the student could ensure the holes in the three pieces of cardboard are in line with each other.

---

---

---

- (iii) How could the three pieces of cardboard be kept in place?

---

---

---

- (iv) Why should the experiment be carried out in a darkened room?

---

---

---

For  
examiner  
use only

(1) (2)

## **EXTRA WORK SPACE**

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

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

**For  
examiner  
use only**

(1)	(2)