



Coimisiún na Scrúduithe Stáit State Examinations Commission

Junior Certificate Examinations, Year

Science – Higher Level

Sample Paper

Day – Date – Time (2 hrs)

INSTRUCTIONS

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

<p>Centre Stamp</p> <p>_____</p>

<p>Examination Number</p> <p>_____</p>

For examiner use only	
Examination paper	Mark
Biology	
1 (52)	
2 (39)	
3 (39)	
Chemistry	
4 (52)	
5 (39)	
6 (39)	
Physics	
7 (52)	
8 (39)	
9 (39)	
Coursework	
Coursework A (60)	
Coursework B (150)	
Total	
Grade	

Biology

Question 1

(52)

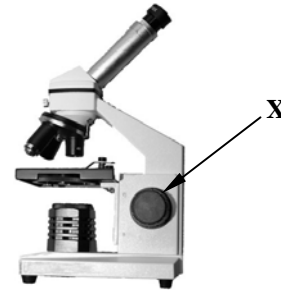
For
examiner
use only

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

What is the function of the part labelled **X**?

Name _____

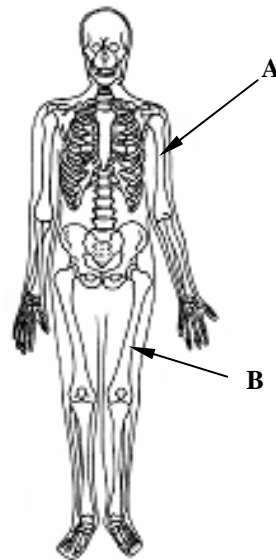
Function of X _____



- (b) **Name** the bones of the human skeleton labelled **A** and **B** in the diagram on the right.

Name A _____

Name B _____



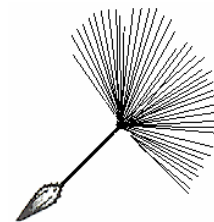
- (c) The diagram shows the fruit and seed of the dandelion.

How are dandelion seeds dispersed?

Why is seed dispersal important?

How? _____

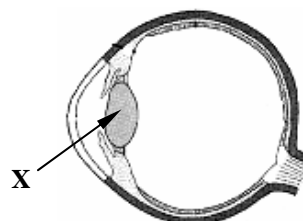
Why? _____



- (d) **Name** the part of the eye labelled **X** and state its function.

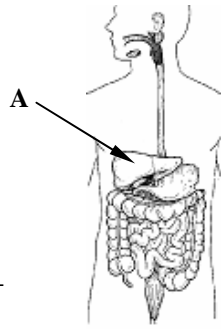
Name _____

Function _____



(1) (2)

(e) Name the part of the digestive system labelled A and state its function.



Name _____

Function _____

(1) (2)

(f) Distinguish between *sensory* and *motor* functions of nerves.

Sensory function of nerves _____

Motor function of nerves _____

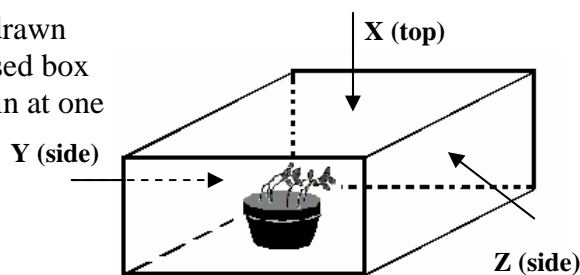
(g) A menu at a restaurant offers lean meat, fish, cheese and vegetables.



Which of these foods is the **best source of starch**? _____

How would you **test** a food sample for starch?

(h) The seedlings in the flower pot drawn on the right were grown in a closed box which had a window to let light in at one of the points X, Y or Z.



Was the window at X, Y or Z?

Location of window _____

What is the correct name of the **growth response** of the seedlings observed in this investigation? _____

Explain why this growth response is helpful to plants. _____

(7 × 6 + 1 × 10)

Question 2

(39)

For
examiner
use only

(a) Blood consists of white blood cells, red blood cells and platelets in a liquid called plasma. Blood is carried around the body in arteries, veins and capillaries.

(1) | (2)

(i) Give **one function** of blood.

(3)

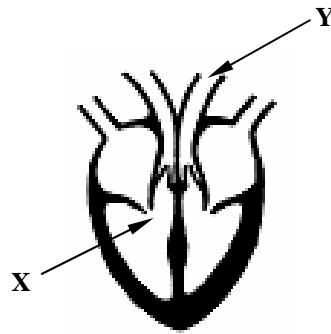
(ii) Give **one difference** between veins and arteries.

(3)

(b) The heart pumps blood around the body.

(i) Name the organ at which the blood arrives after it leaves the chamber marked **X**. (3)

Name the blood vessel labelled **Y** in the diagram. (3)



(ii) The diagram shows one of the tiny air-sacs in the lungs where gaseous exchange occurs.

What **name** is given to these tiny air-sacs? (3)



Identify the **gaseous exchange** that occurs in these air-sacs. (3)

Give **one activity** which can damage the efficiency of this gaseous exchange. (3)

(c) Excretion is important for the removal of cellular wastes from the body.

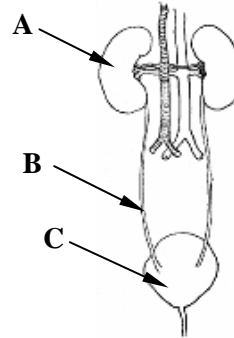
The urinary system has an important role in excretion from the body.

(i) **Name** the parts of the urinary system labelled **A**, **B** and **C** in the diagram on the right. (9)

Name of A _____

Name of B _____

Name of C _____



(ii) Give **one** function of the part of the urinary system labelled **A**? (3)

Function of A _____

(iii) **Name** two human organs of excretion other than an organ of the urinary system. (6)

Name 1 _____

Name 2 _____

For
examiner
use only

(1) | (2)

(ii) Give **two** reasons why the growth of the planted trees may have been influenced by the big tree. (6)

Reason 1 _____

Reason 2 _____

(c) (i) In ecology what is meant by *conservation*? (3)

Certain animal and plant species are described as “threatened”.

(ii) Give an example of an Irish animal or plant species that is on the threatened list. (3)

(iii) Many species of plant are protected in National Parks. The manager of one of these parks is asked to measure the frequency with which a protected species occurs in a habitat within the park. Describe how this might be carried out. Include a diagram of any equipment that might be used. (12)

Labelled diagram

For examiner use only	
(1)	(2)

Chemistry

For
examiner
use only

Question 4

(52)

(1) (2)

(a) **Name** the piece of equipment drawn on the right.

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

Name _____

Use _____



(b) Why is sodium metal stored under oil? _____

Complete the word equation for the reaction of sodium with water.

Sodium + Water \longrightarrow _____ + _____

(c) Sulfur dioxide, **SO₂**, emissions are environmentally harmful.
Identify a problem caused to the environment by **SO₂** emissions.
Identify a **specific activity** which gives rise to **SO₂** emissions.

Problem _____

Activity _____

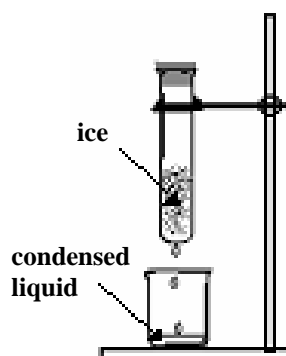
(d) The diagram shows a test tube filled with ice.
A liquid condenses from the air onto the walls of the test tube.

Identify the liquid.

Liquid _____

What **test** could you carry out on the liquid to identify it?

Test _____



(e) Carbon-12 and carbon-13 are isotopes of carbon.

What does this mean?

(f) The treatment of water for domestic use is important.
There are several stages involved.

Why is **fluoride** added to domestic water supplies in Ireland? _____

How can a domestic water supply be treated to kill pathogenic (disease causing) bacteria? _____

(g) Give **one** negative impact on the environment of the use of non-biodegradable plastics for packaging.

Negative impact _____



(h) A gas jar of oxygen was prepared by decomposing hydrogen peroxide using a suitable catalyst. This preparation may be described as follows:

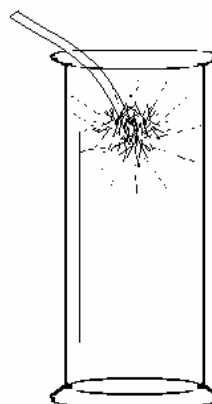


Balance the above equation.

A piece of magnesium burns very brightly in a gas jar of oxygen and produces a white powder.

What is observed when this white powder is added to water and litmus paper added?

What **conclusion** can be drawn from this observation?



(7 × 6 + 1 × 10)

Question 5

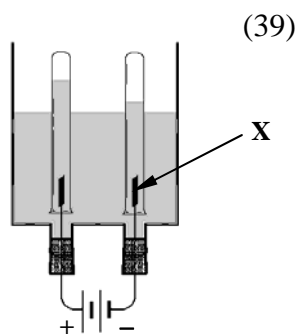
(a) The diagram shows an arrangement of apparatus suitable for the electrolysis of acidified water.

Name the gas produced at the electrode **X** when the switch is closed and state a test for this gas.

(6)

Gas produced at **X** _____

Test for this gas _____

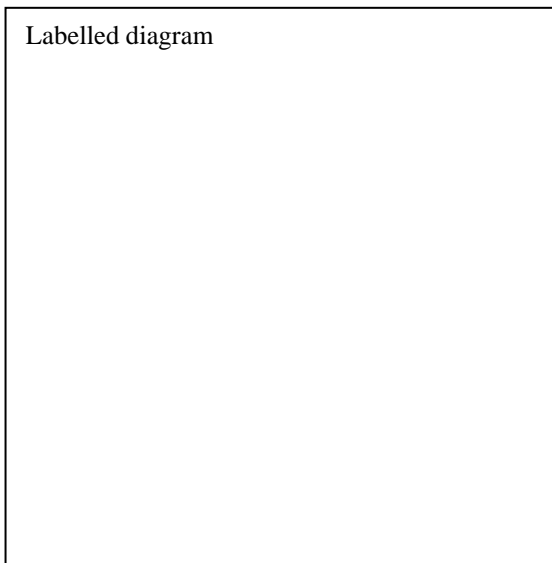


For
examiner
use only

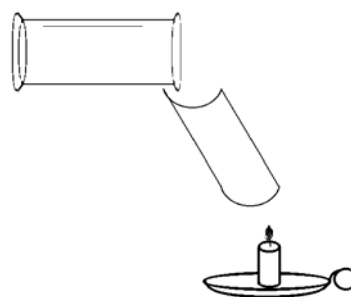
(1) (2)

(b) Carbon dioxide gas may be prepared in a school laboratory.

(i) Illustrate using a labelled diagram, in the space provided, how a sample of carbon dioxide gas could be prepared and collected in the school laboratory. (12)



(ii) A gas jar full of carbon dioxide is poured onto a chute which is held over a lighting candle as shown in the diagram.



What **observation** would you expect to make? (3)

What **two** properties of carbon dioxide does this test demonstrate? (6)

Observation _____

Property 1 _____

Property 2 _____

Question 6

(39)

For
examiner
use only

(a) Sodium chloride, **NaCl**, is common salt.



- (i) In the space provided draw Bohr structure diagrams showing the arrangement of electrons in a sodium and in a chlorine atom. (6)

sodium

chlorine

- (ii) Describe how a sodium atom and a chlorine atom combine to produce sodium chloride. You may use a diagram if it helps. (6)

Description _____

- (iii) What word is used to describe the **type of bond** formed between sodium and chlorine in sodium chloride?

Type of bond _____

(3)

(c) The solubility of a salt, potassium bromide (KBr) was investigated. The data in the table on the right was collected.

Temperature (°C)	Solubility grams per 100 cm ³ of water
20	58
40	68
60	80
80	90

(i) Plot a graph in the space provided of solubility (y-axis) against temperature (x-axis). (9)

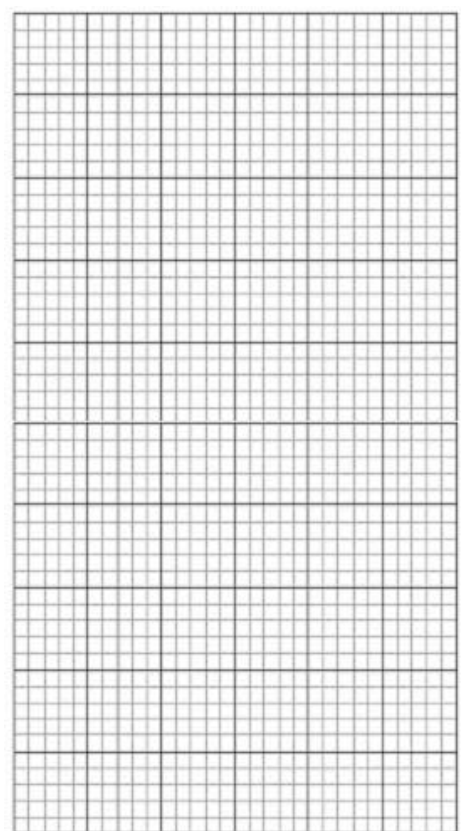
(ii) What can you conclude about the solubility of the salt from the graph? (3)

(iii) Use the graph to estimate the solubility at 50 °C.

Solubility _____ (3)

(iv) In this investigation the solubility of the salt was measured at several temperatures. Describe, using a labelled diagram, how one of these measurements could have been made. (9)

Labelled diagram



For
examiner
use only

(1) | (2)

Physics

Question 7

(52)

- (a) During a thunder storm the lightning is usually seen before you hear the thunder.

Why is this the case?

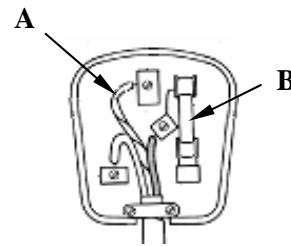
Why? _____



- (b) The diagram shows a three-pin plug with the back removed. What is the colour of the insulation on the wire labelled A? What is the function of the part labelled B?

Colour of A _____

Function of B _____



- (c) Name an instrument used to measure pressure.

Instrument _____

Atmospheric pressure at the top of Mount Everest is less than atmospheric pressure at sea level. Why is this the case?

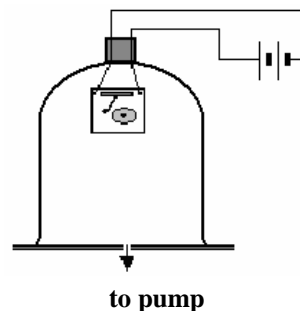
Why? _____



- (d) The diagram shows a bell ringing inside a bell-jar. A pump can be used to remove the air from inside the bell-jar.

What change, if any, would you expect to notice in the sound coming from the bell when the air is removed from inside the bell-jar?

What conclusion could you draw from the observation made in this experiment?



For
examiner
use only

(1) | (2)

- (e) The photo shows an electric kettle.
Why is the heating element normally at the bottom of an electric kettle?
What name is given to the way in which heat usually travels in water?



Why? _____

Name _____

(1) | (2)

- (f) The garden light shown has an *on / off* switch and a solar cell on the top. The solar cell re-charges two batteries during the day. When darkness falls, a light-emitting diode (LED) comes on automatically and gives a bright yellow glow for a few hours.



- (i) What energy conversion is taking place in the garden light during the day?

Day-time energy conversion _____

- (ii) Give **one factor** that should be considered when choosing a location for such garden lights to ensure their best operation.

Factor _____

- (g) A cyclist moves along a track in a straight line. The speed of the cyclist increases uniformly from 5 m s^{-1} to 15 m s^{-1} in 5 seconds. Calculate the acceleration of the cyclist. In what units is the acceleration measured?



Acceleration _____ **Units** _____

- (h) In dry weather you can sometimes get an electric shock from a supermarket trolley. This is caused by the build-up of static electricity on the trolley.



Explain clearly what causes the build-up of static electricity on a supermarket trolley.

Why does this only happen in dry weather?

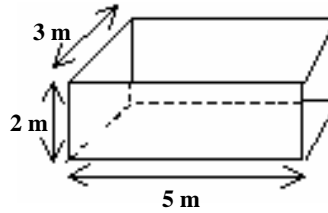
(7 × 6 + 1 × 10)

Question 8

(39)

For
examiner
use only

- (a) A block of stone rests on a floor as shown in the diagram. The mass of the stone is 180 kg. The dimensions of the block are given.



(1) (2)

- (i) What is the density of the stone in kg m^{-3} ? (6)

Density of stone _____

- (ii) Calculate the weight of the stone. In what units is weight measured? [Assume the acceleration due to gravity is 10 m s^{-2}] (6)

Weight _____ **Units** _____

- (iii) Calculate, in pascals, the pressure exerted by the stone on the floor (3)

Pressure _____

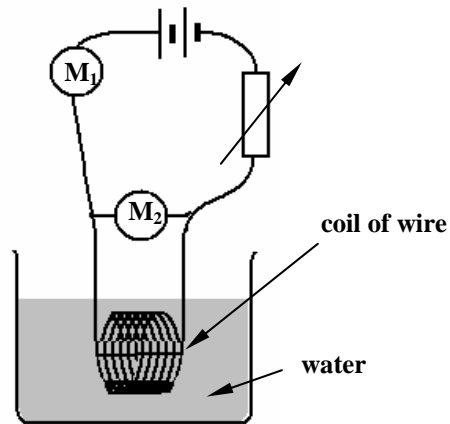
- (b) You are given a bar magnet and asked to investigate the pattern of the magnetic field around the bar magnet. Describe, with the aid of a labelled diagram, how you could carry out this investigation. (9)

Labelled diagram

(c) Georg Ohm published his law in 1827.



A student set up the circuit drawn on the right to investigate the relationship between the potential difference (voltage) across a metal conductor and the current flowing through it. Two meters, M_1 and M_2 , were inserted in the circuit. The data collected in this investigation was used to plot a graph of current against potential difference.



For
examiner
use only

(1) (2)

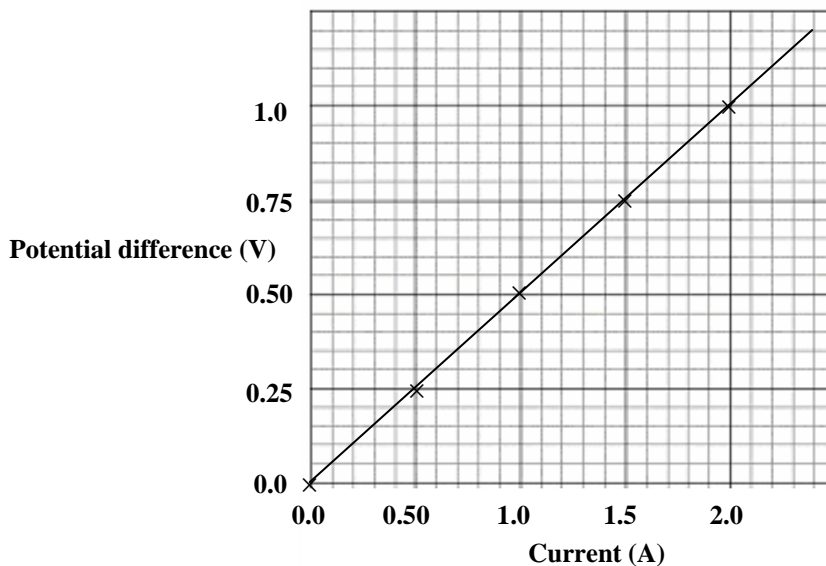
(i) Identify the meters labelled M_1 and M_2 in the circuit. (6)

M_1 _____ M_2 _____

(ii) Why is it desirable to have the metal conductor immersed in a liquid such as water? (3)

Why? _____

The graph of the data produced in this investigation is shown below.



(iii) Use the information in the graph to calculate the resistance of the conductor. What are the units of resistance? (6)

Resistance _____ Units _____

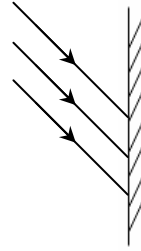
Question 9

(39)

For
examiner
use only

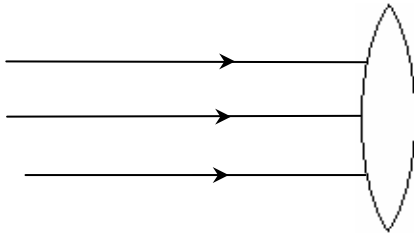
(a) The properties of light include reflection and refraction.

- (i) The diagram shows three parallel rays of light striking a plane mirror. Complete the diagram showing the effect of the mirror on each of the rays of light.



(3)

- (ii) The diagram shows three parallel rays of light entering a glass lens. Complete the diagram showing the effect of the lens on the rays of light.



(3)

- (iii) Describe, with the aid of diagrams, how you could investigate the refraction of light as it passes from air into a rectangular block of glass and exits the other side?

(12)

Diagram

(1) (2)

- (iv) You have been told that red light is refracted less than blue light when it passes from air to glass.

Describe, with the aid of a labelled diagram, how you could investigate this in the laboratory. (12)

Labelled diagram

- (b) In general solids, liquids and gases contract when cooled.

- (i) Describe with the aid of a labelled diagram an experiment to demonstrate that gases contract when cooled. (9)

Labelled diagram

For
examiner
use only

(1) | (2)

