Coimisiún na Scrúduithe Stáit  
State Examinations Commission  

JUNIOR CERTIFICATE EXAMINATION, 2012  

SCIENCE – ORDINARY LEVEL  

Thursday, 14 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.  
4. The use of Formulae and Tables booklet approved for use in the State Examinations is permitted. A copy may be obtained from the examination superintendent.  

<table>
<thead>
<tr>
<th>Centre Number</th>
<th>Examination Number</th>
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</thead>
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<thead>
<tr>
<th>For examiner use only</th>
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<tr>
<td>Section/Question</td>
<td>Mark</td>
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<tr>
<td>Biology</td>
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<td>Q.8 (39)</td>
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<td>Bonus for Irish</td>
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<td>Coursework A (60)</td>
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<td>Coursework B (150)</td>
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<td>Grand Total (600)</td>
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Biology

Question 1

(a) The diagram shows a flowering plant. Name the parts of the plant labelled A and B.
   
   Name A ______________________________
   Name B ______________________________

(b) Animals can be classified as **vertebrates** or **invertebrates**. 

   **Vertebrates** are animals with a ____________________.

   In the table write the letter V below the example of a **vertebrate**.

<table>
<thead>
<tr>
<th>snail</th>
<th>mouse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) All living organisms have common **characteristics** e.g. respiration.

   Give two **other characteristics** of living organisms.
   
   1 ___________________________  2 ___________________________

(d) The diagram shows part of the human skeleton.

   Name the bones labelled A in the diagram.

   ___________________________

   Give one **function** of the skeleton in the human body.

   ___________________________
(e) Human characteristics can be **inheritable** or **non-inheritable**.

Choose a word or words from the table to complete the following statements.

**Inheritable** characteristics are controlled by ____________________________

An example of an **inheritable** characteristic is ____________________________.

(f) **Blood** is part of the circulatory system.

Complete the following statements using the correct word(s) from the list on the right.

The **liquid part** of blood is known as ____________________________.

**Oxygen gas** is carried around the body by the ____________________________.

(g) **Respiration** is the release of energy from digested food e.g. glucose.

Complete the word equation given below using words from the list on the right.

Glucose + _____________ → Energy + Carbon dioxide + ____________.

(h) Answer the following questions on **human reproduction**.

The **fusion** (joining) of the egg with the sperm is called ____________________________.

There are many **methods of contraception**. Name one method.

**Name** ____________________________

The **menstrual cycle** lasts about ____________ days.

\[
(7 \times 6 + 1 \times 10)
\]
Question 2

(a) The diagram shows a microscope. Examine the diagram and answer the questions below.

<table>
<thead>
<tr>
<th>Lamp</th>
<th>Arm</th>
<th>Eyepiece</th>
<th>Focus wheel</th>
<th>Base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To magnify</td>
<td>To focus</td>
<td>To hold sample</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(i) 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 C beside the name of the part labelled C.

Write the letter F beside the function of the part labelled D.

(ii) Name the part of the microscope that you would place the slide on for viewing.

Name ________________________

For examiner use only

(1) (2)
(b) The diagram shows a plant cell.

(i) Name the part of the cell labelled A in the diagram.
   Name __________________________

(ii) Name the part of the cell labelled B in the diagram.
   Name __________________________

(iii) Name one part found in a plant cell which you would not expect to see in an animal cell.
   Name __________________________

(iv) Iodine stain is sometimes added to a piece of onion skin when preparing a slide of plant cells.
   Why is the iodine used?
   ______________________________________________________
   ______________________________________________________

(c) Cabbage → Caterpillar → Robin

   Name the **producer** in the food chain shown above. ________________  (3)

   Give **one** example of competition between animals in the habitat that you have studied.
   _________________________________________________________________  (3)
Question 3 (39)

(a) Humans have five **sense organs**. Complete the table below using the correct word from the list on the right, in each case, so that senses and organs are matched.

One pair has been completed as an example (sight and eyes).

<table>
<thead>
<tr>
<th>Sense</th>
<th>Sight</th>
<th>Hearing</th>
<th>Touch</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organ</strong></td>
<td>Eyes</td>
<td>Nose</td>
<td>Tongue</td>
<td></td>
</tr>
</tbody>
</table>

(b) The diagram shows the **human eye**.

Answer the following questions about the eye.

Name the parts labelled A and B in the diagram.

A _______________________

B _______________________

What is the **function** of the part labelled C in the diagram?

_____________________________________________________________________

Name the **coloured part** of the eye which controls the amount of light entering the eye.

Name ______________________
Exercise and rest are good for the health of a person. Exercise has an effect on pulse rates.

Answer the following questions about exercise and pulse rates. (6)

What is the average pulse rate for an adult at rest?

______________ beats per minute (bpm).

Choose a word from the list on the right to correctly complete the statement below.

Exercise causes a person’s pulse rate to ____________________________.

The diagram shows a human heart. Study the diagram and answer the questions below. (9)

Choose from the list on the right, the name of the chamber labelled A in the diagram.

Name ____________________________

Why is the wall of the left side of the heart thicker than the right side?

____________________________________________________________

In Ireland today, heart disease is a major problem. State one way in which heart disease can be prevented.

____________________________________________________________
Chemistry

Question 4

(a) Some elements are non-metals.

In the table write the letter N beside the names of two non-metals.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Nitrogen</td>
</tr>
<tr>
<td>Sulfur</td>
<td>Magnesium</td>
</tr>
</tbody>
</table>

(b) Water is a compound composed of two elements.

Name these two elements.

1 __________________________ 2 __________________________

(c) Choose an element from the list on the right whose compounds dissolve in water to cause hardness in water.

Element __________________________

How can hardness be removed from water?

__________________________________________

(d) When hydrochloric acid (HCl) and sodium hydroxide (NaOH) react in a neutralisation reaction, a salt and one other substance are formed.

Name the salt formed.

Salt __________________________

Name the other substance formed.

Substance __________________________
(e) A student recorded that 30 g of a salt dissolved in 100 cm³ of water at 40 °C.
Complete the following statement about solubility using a word from the list on the right.

At 80 °C the solubility of the salt would _____________________.

(f) Air is a mixture of gases.

In the table write the letter G beside the names of two gases which are present in unpolluted air.

<table>
<thead>
<tr>
<th></th>
<th>Oxygen</th>
<th>Carbon monoxide</th>
<th>Carbon dioxide</th>
<th>Sulfur dioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter</td>
<td>G</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(g) Choose the correct words from the list on the right, in each case, to complete the statements below about bonding.

**Ionic** bonding involves an attraction between positive and negative _____________.

**Covalent** bonding involves the sharing of pairs of ________________.

(h) The diagram shows an arrangement of apparatus suitable for the preparation of carbon dioxide gas in a school laboratory.

Name a suitable substance for **liquid X** and **solid Y** from which carbon dioxide can be made.

**Liquid X** ____________________________

**Solid Y** ____________________________

**Limewater** is used to test for the presence of carbon dioxide gas. What happens to limewater when carbon dioxide gas is bubbled through it?

(7 × 6 + 1 × 10)
Question 5

(a) Substances can be classified as **elements**, **compounds** and **mixtures**.

In the table write the letter **C** beside the name of a **compound**.

Write the letter **M** beside the name of a **mixture**.

Write the letter **E** beside the name of an **element**.

<table>
<thead>
<tr>
<th></th>
<th>Ink</th>
<th>Carbon dioxide</th>
<th>Iron</th>
</tr>
</thead>
</table>

(b) The diagram shows a separation technique used in the laboratory to separate a mixture of **water and a dissolved dye**.

Examine the diagram. Complete the table correctly matching the labels A – D in the diagram with the words in the table.

Name the separation technique shown in the diagram.

Name __________________________________________

In which labelled part would you expect to find **most of the dye** at the end of the experiment?

________________________________________________
(c) Describe, with the aid of a labelled diagram, how you would separate a mixture of sand and water. (12)

The headings below may be helpful.

Equipment: _____________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Procedure: ______________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Result: _________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Labelled diagram
Question 6

(a) **Fossil fuels** are sources of hydrocarbons and can be burned in air.

List two examples of fossil fuels.

1 __________________________ 2 __________________________

Name the two products formed when fossil fuels are burned.

1 __________________________ 2 __________________________

(b) **Plastics** have many uses in today’s world.

Complete the statement below about plastics using the correct word(s) from the list on the right.

Most plastics are made from ____________________

Most plastics are **non-biodegradable**. What is meant by non-biodegradable?

**Non-biodegradable** __________________________________________________________

(c) **Calcium** is a member of the **Group II** elements in the Periodic Table.

(i) What **name** is given to the Group II elements? (3)

______________________________ metals

(ii) The diagram shows **zinc metal reacting with hydrochloric acid, HCl**.

Bubbles of gas are given off. Answer the following questions about this reaction.

Name the gas given off. __________________________

Give the **test** for this gas. __________________________

______________________________
The diagram shows an apparatus set up by a student to investigate the rusting of iron nails. Nails were placed in the test tubes as shown.

After a number of days the nails in test tube A only, had a coating of rust.

Answer the following questions about rusting.

Name two conditions necessary for rusting of iron to occur.

1 __________________________ 2 __________________________

Name one method that can be used to prevent the rusting of iron.

____________________________________________________________________

____________________________________________________________________
Physics

Question 7

(a) In the table write the letter F beside the temperature at which water freezes.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>37 °C</td>
<td></td>
</tr>
<tr>
<td>0 °C</td>
<td></td>
</tr>
<tr>
<td>100 °C</td>
<td></td>
</tr>
</tbody>
</table>

In the table write the letter B beside the temperature at which water boils.

(b) The picture shows some fireworks.

When a firework is set off at a distance, which is detected first, the sound of the explosion or the burst of coloured light from the fireworks?

Which?

Give a reason for your answer.

(c) Find the area of the rectangular shape shown.

Area ________________

Give the unit that is used to measure the area.

Unit ________________

(d) Sources of energy are either renewable or non-renewable.

What is meant by renewable energy?

In the table write the letter R below the example of a renewable energy source.
(e) A student brings the **South Pole** of a magnet close to the **South Pole** of a freely suspended magnet.

What happens to the freely suspended magnet?

____________________________________

**Name** a metal which is attracted by a magnet.

**Name** ____________________________

(f) The diagram shows a battery-powered torch.

**Complete** the two main energy conversions which take place when the torch is in use.

1. ___________________ energy to electrical energy.

2. Electrical energy to ___________________ energy.

(g) The picture shows a piece of equipment used in the laboratory for measurement.

**Name** the piece of equipment shown.

**Name** ____________________________

What is it used to **measure**?

____________________________________

(h) Complete the equation in the box below using the words from the list on the right.

\[
\text{Pressure} = \frac{\text{Force}}{\text{Area}}
\]

Is the atmospheric pressure at the top of Mount Everest **higher** or **lower** than the pressure at the bottom?

____________________________________

**Name** the instrument used to measure pressure.

**Instrument** _________________________

(7 \times 6 + 1 \times 10)
**Question 8**

(a) The diagram shows a plug with its cover removed. Study the diagram and answer the questions that follow.

Which labelled wire, A, B or C is the earth wire? _____________________

Why is there a plastic coating covering each of the wires A, B and C?

__________________________________________________________

Name the wire to which the fuse should be connected.

Name of wire _____________________

(b) Complete the following statements using the correct word in each case from the list on the right.

Current which flows from a **battery** is called _____________________ current.

Current from the **mains supply** to homes is called _____________________ current.

(c) A student set up a simple electric circuit as shown.

Name the parts of the circuit labelled A and B.

A _____________________

B _____________________

The student was then given a piece of **wood** and a piece of **copper metal**.

Which piece, copper or wood, should be connected between X and Y so that the bulb will light in the circuit when B is closed? _____________________

Give a reason for your answer.

Reason ______________________________________________________
(d) A student carried out an investigation of the **relationship between current flowing through a wire resistor and the voltage across it**.

The data collected is presented in the table below.

<table>
<thead>
<tr>
<th>Current (A)</th>
<th>0</th>
<th>0.2</th>
<th>0.4</th>
<th>0.6</th>
<th>0.8</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (V)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The student then used this data to draw a graph of voltage (y-axis) against current (x-axis) as shown on the grid below.

(i) Use the graph to estimate the current at 2.5 V. ________________

(ii) Name the instrument used by the student to measure voltage. ________________

Instrument

(iii) What is the relationship between voltage and current in this investigation?

_____________________________________________________

_____________________________________________________
Question 9

(a) A student carried out an investigation to show that white light is composed of different colours. A beam of white light was passed through a prism as shown below.

Name the colours labelled A and B in the band of colours formed.

Colour A ....................
Colour B ....................

(b) A student then carried out another experiment on light as shown in the diagram.

Answer the questions that follow.

What would the student see if the card in the middle is moved sideways?

_________________________________

What does this experiment tell us about light?

_________________________________

(c) A student set up a flask full of coloured water as shown. The student heated the flask gently with a hairdryer.

Answer the questions that follow.

What would you expect to notice if the flask is heated gently?

_________________________________

Why is coloured water used in this investigation?

_________________________________

A measuring instrument used in the laboratory is based on this behaviour of liquids.

Name this instrument. ____________________________
(d) An investigation was carried out on the relationship between the extension of a spring and the force applied to it.

The data collected is presented in the table below.

<table>
<thead>
<tr>
<th>Force (N)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension (cm)</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
</tbody>
</table>

(i) Use the data in the table to draw a graph of Extension (y-axis) against Force (x-axis) using the grid above.

(ii) Use the graph to estimate what force results in a 14 cm extension of the spring.

Force ______________ N

(iii) Name the instrument shown on the right that can be used to measure force.

Name ____________________
EXTRA WORKSPACE

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

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