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.

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<th>Examination Number</th>
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<table>
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<td>Coursework A (60)</td>
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Biology

Question 1

(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.

<table>
<thead>
<tr>
<th>Cell wall</th>
<th>Nucleus</th>
<th>Cell membrane</th>
<th>Chloroplast</th>
</tr>
</thead>
</table>

(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.

<table>
<thead>
<tr>
<th>Common cold</th>
<th>Appendicitis</th>
</tr>
</thead>
</table>

(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.

<table>
<thead>
<tr>
<th>Ureter</th>
<th>Bladder</th>
<th>Kidney</th>
<th>Urine</th>
<th>Faeces</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Penis</th>
<th>Ovary</th>
<th>Produces Sperm</th>
<th>Produces Eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(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.

(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**.

______________________________

(1) Water
(2) Layer of oil

(7 × 6 + 1 × 10)
Question 2

(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.

(b) The diagram shows the human digestive system. Examine the diagram and answer the questions below.

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.

(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? ______________________
Food (e.g. crisps) is a store of chemical energy. Describe, with the help of a labelled diagram, an investigation to show the conversion of chemical energy in a food to heat energy. The headings below may be helpful.

Equipment: _____________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Procedure:  ______________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Result:   ________________________________________________________
_______________________________________________________________
_______________________________________________________________
_______________________________________________________________

Labelled diagram
Question 3

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

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.

<table>
<thead>
<tr>
<th></th>
<th>Increase</th>
<th>Decrease</th>
</tr>
</thead>
</table>

(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.

**Name** the piece labelled A.

_______________________

Give one use for piece A.

_______________________

**Name** the piece labelled B.

_______________________

Give one use for 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.

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.  

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.
Question 4

(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 __________________________

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

Alloy _____________________________

Give one use for the alloy you have chosen.

Use ______________________________

(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.

(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**’.

<table>
<thead>
<tr>
<th>Particle</th>
<th>Relative mass</th>
<th>Relative charge</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUTRON</td>
<td>1</td>
<td>0</td>
<td>Inside the nucleus</td>
</tr>
<tr>
<td>ELECTRON</td>
<td>$\frac{1}{1840}$</td>
<td>Negative ($-1$)</td>
<td></td>
</tr>
<tr>
<td>PROTON</td>
<td>1</td>
<td>Positive ($+1$)</td>
<td></td>
</tr>
</tbody>
</table>

(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 __________________________

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(1)    (2)

Steel
Copper
Bronze
Silver
Brass

Compounds
Mixtures

\[(7 \times 6 + 1 \times 10)\]
Question 5

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

(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.

(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.

(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.

(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
Question 6

(a) Separation techniques are widely used in industry.

(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.

(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.

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solubility (g / 100 cm³ of water)</td>
<td>10</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>90</td>
</tr>
</tbody>
</table>

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

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

Solubility at 50 °C ____________________
Question 7

(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 cm³ 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 ________ cm³

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

Water boils at _____________ °C

Water freezes at _____________ °C

(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 _________________.

(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?

____________________________

Conduction
Convection
Radiation

Incoming ray

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

<table>
<thead>
<tr>
<th>kW</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**.

<table>
<thead>
<tr>
<th></th>
<th>€2.00</th>
<th>€20.00</th>
</tr>
</thead>
</table>

(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?

**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.

<table>
<thead>
<tr>
<th>30 cm³</th>
<th>10 cm³</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>2 g/cm³</th>
<th>20 g/cm³</th>
</tr>
</thead>
</table>

\[ (7 \times 6 + 1 \times 10) \]
Question 8

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

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.

(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. ______________________
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.

(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.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Question 9

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

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.

(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.

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 ____________.
EXTRA WORK SPACE

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

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________