Coimisiún na Scrúduithe Stáit  
State Examinations Commission  

JUNIOR CERTIFICATE EXAMINATION, 2006  

SCIENCE (REVISED SYLLABUS) – ORDINARY LEVEL  

THURSDAY, 15 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.  

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<th>Examination Number</th>
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Biology

Question 1

(a) The piece of equipment drawn on the right is used in ecology.
Name the piece of equipment.
Name _______________________________

Give one use of this piece of equipment.
Use ________________________________

(b) Name the bone of the human skeleton labelled A in the diagram on the right.

Name A ______________________________

Name an organ that is protected by the skull.
Organ ______________________________

(c) Name the part of the flower labelled A in the diagram.

Name of A __________________________

Give one reason why insects are attracted to flowers.
Reason ______________________________

(d) Name the chambers of the heart labelled X and Y in the diagram.

Name of X ____________________________
Name of Y ____________________________
(e) **Name** the parts of the female reproductive system labelled **A** and **B** in the diagram on the right.

**Name A** __________________________

**Name B** __________________________

(f) Identify the **type of tooth** labelled **X** in the diagram on the right.

____________________________________

**Name the mineral** needed for healthy growth of teeth.

____________________________________

(g) The diagram shows a food pyramid.

**Name** one item of food that could be found at **X** in the pyramid.

____________________________________

**Why** should only a small amount of the foods at the top of the pyramid be eaten?

____________________________________

(h) The plant in the test tube drawn on the right was allowed to stand in the laboratory for a few days to investigate the transport of water in the plant.

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?

____________________________________

**Why** is it necessary to put **oil** on the surface of the water in the test tube?

____________________________________

(7 × 6 + 1 × 10)
Question 2

(a) Blood helps transport food and other materials around the body. It also helps fight infection.

Name the liquid part of blood that helps transport materials. (3)
Name ________________________________________________________________________

Name the blood cells that help fight infection. (3)
Name ________________________________________________________________________

(b) The heart pumps blood to the lungs and around the body. The diagram shows part of the breathing system.

(i) Name the parts of the breathing system labelled X and Y in the diagram. (6)

Name of X
________________________________________

Name of Y
________________________________________

(ii) Complete the sentence below using a word from the list on the right. (3)

There is more ________________ in exhaled air than in inhaled air.

OXYGEN
CARBON DIOXIDE
HYDROGEN

(iii) A balance of exercise and rest promotes good health. Name one activity which has a harmful effect on the breathing system. (3)

Harmful activity __________________________________________________________________________
(c) Digestion of food is important so that we can obtain energy from our food.

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

   Name of A  
   Name of B  
   Name of C  

(ii) Give **one** function of the part of the digestive system labelled B. (3)

   Function of B  

(iii) **Salivary amylase** found in the mouth acts on starch in the food we eat. This action can be investigated in the laboratory.

   Name the chemical used to test for the presence of starch at the beginning of the experiment.  

   When the salivary amylase is added to starch solution and the mixture placed in a water bath at 37 °C for 5 minutes, a new product is formed. **Name the product formed.** (3)

   Name of product  

   Another **chemical** is used to test for the presence of this **new product**. This chemical reacts with the new product to produce a brick-red colour when they are heated together in a hot water bath for 5 minutes. **Name this chemical.** (3)

   Name  

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(1) | (2)
Question 3

(a) Plants produce a wide variety of seed types which need to be dispersed (scattered) in order to avoid competition.

Identify how the seeds A and B in the diagram are dispersed.  

Seed A ____________________________
Seed B ____________________________

Name one resource that seeds must compete for with the parent plant.  

Resource ____________________________

(b) A number of cress seeds were set up as shown in the diagram and left for a few days to investigate the conditions necessary for germination. Test tubes A, B and D were kept in the laboratory at room temperature. Test tube C was placed in the fridge at 4 °C.

(i) Why do only the seeds in test tubes B germinate?  

Why? __________________________________________

(ii) Why is the water in test tube D boiled before use?  

_________________________________________________

(iii) Explain why the seeds in test tube C failed to germinate.  

_________________________________________________

(iv) Why is this investigation considered to be a “fair test”?  

_________________________________________________
(c)  

(i) In ecology micro-organisms play a major role in recycling nutrients. **Name** one decomposer from a habitat you have studied.  

**Name of decomposer** _____________________________  

(ii) Micro-organisms are used widely in **biotechnology**. Give one **use** of biotechnology in industry.  

**Use** __________________________________________  

(iii) Micro-organisms can be found growing in a variety of locations. 

Describe how the presence of micro-organisms in a sample of soil might be investigated. Include a diagram of any equipment that might be used.  

___________________________________________________  

___________________________________________________  

___________________________________________________  

___________________________________________________  

___________________________________________________  

___________________________________________________  

**Labelled diagram**
Chemistry

Question 4

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

Give one use of this piece of equipment.

Name ________________

Use ________________

(b) Natural gas is mainly methane (\( \text{CH}_4 \)).

Name one of the two elements found in methane. ________________

Name one gas produced when methane is burned in air. ________________

(c) Complete the table below identifying one mixture and one compound from the list on the right.

<table>
<thead>
<tr>
<th>MIXTURE</th>
<th>COMPOUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE SALT</td>
<td>CARBON</td>
</tr>
<tr>
<td>AIR</td>
<td></td>
</tr>
</tbody>
</table>

(d) The diagram shows three experiments which were set up to investigate rusting. Study the diagram and answer the questions below.

In which test tube A, B, or C will the nail rust?

Which? ________________

What is the function of the calcium chloride in test tube C?

Function ________________
(e) **Complete** the statements below using one of the words from the list on the right in each case.

- **Protons** are ________________ charged particles.
- **Electrons** are ________________ charged particles.

(f) **Water** is essential for life and is composed of two elements.

- **Name** one of the elements that make up water. ________________

- Name a chemical that can be used to test for the presence of water.

(g) The picture shows a plastic crate.

- **Name** the raw material used in the making of plastics. ________________

- Most plastics are **non-biodegradable**.
- **Explain** what is meant by the term non-biodegradable.

(h) The diagram shows a gas jar of **carbon dioxide** gas being poured onto a lighting candle.

- **What** happens to the **lighting candle** when the carbon dioxide gas is poured over it?

- **What** does this tell us about carbon dioxide gas?

- **Name** the chemical that turns milky white if carbon dioxide is bubbled through it.

(7 × 6 + 1 × 10)
Question 5

(a) Separation techniques are very important in chemistry.

(i) What is the name given to the separation technique shown in the diagram? (3)

**Technique** __________________

(ii) Name two substances which could be separated using this technique? (3)

**Substances** __________________

(iii) Name the part of the apparatus labelled X in the diagram. (3)

_________________________________

(iv) What is the name given to the separation technique shown in diagram on the right? (3)

**Name** __________________

(b) The bond in a molecule of hydrogen gas is formed by a shared pair of electrons.

**Name** the type of bond found in hydrogen gas. __________________ (3)

The bonds in sodium chloride are formed by sodium atoms **losing electrons** and chlorine atoms **gaining electrons**.

**Name** the type of bond found in a sodium chloride crystal. (3)

**Type of bonding** in sodium chloride __________________
(c) The diagram shows an arrangement of apparatus suitable for the electrolysis of acidified water.

Name the gas produced at the electrode X and state a test for this gas. (9)

Gas produced at X________________________

Test for this gas ________________________________________________

(d) When hydrochloric acid reacts with sodium hydroxide to neutralise each other, a salt and water are formed. Some of the pieces of equipment used in this experiment are shown in the diagram.

(i) Name the piece of equipment labelled A. (3)

Name __________________________

(ii) Name the salt formed when sodium hydroxide is neutralised by hydrochloric acid? (3)

Name __________________________

(iii) Which piece of equipment A or B is usually used to measure the hydrochloric acid during this experiment? (3)

_________________________________

(iv) How can you tell by using an indicator that enough hydrochloric acid has been added to neutralise the sodium hydroxide? (3)

__________________________________
Question 6

(a) Many substances found in the home are acids or bases.

Complete the table below identifying one acid and one base from the list on the right. (6)

<table>
<thead>
<tr>
<th>Acid</th>
<th>Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>VINEGAR</td>
<td>WATER</td>
</tr>
<tr>
<td>OVEN CLEANER</td>
<td></td>
</tr>
</tbody>
</table>

(b) Oxygen gas can be prepared in a school laboratory using the apparatus drawn on the right. (6)

(i) Identify a liquid X and a solid Y that can be used in this preparation.

Liquid X __________________________
Solid Y __________________________

(ii) Solid Y speeds up the breakdown of liquid X. What name is given to this type of chemical? (6)

_________________________________

(b) What happens when a “glowing splint” (very hot piece of wood) is placed in a gas jar of oxygen? (6)

What? __________________________

Give one property of oxygen that this demonstrates. (3)

Property _________________________
Describe how you could carry out an experiment to **grow crystals using** **alum or copper sulphate**. Include a diagram of any equipment used. (12)

Labelled diagram
Physics

Question 7

(a) Find the area of the rectangle drawn on the right using the measurements given.
Area __________________________
In what unit is the area measured?
Unit __________________________

(b) The diagram shows a piece of equipment, labelled A, containing water. Name A.
Name A __________________________
A stone was then added and a new volume was recorded as shown in B.
What was the volume of the stone in cm³?
__________________________________

(c) Heat may be transferred from hot to cold places by the three methods listed on the right.
Choose the method of heat transfer that occurs in each of the following.
The boiling of water in a kettle. __________________________
The heating of the Earth by the Sun. __________________________

(d) The picture shows a flash of lightning.
What type of energy generates lightning?
__________________________________
The flash of lightning is seen before the thunder is heard. What does this tell us about the speed of light?
__________________________________
__________________________________
(e) The diagrams on the right show the arrangement of particles in a solid, a liquid and a gas.

Which diagram A, B or C shows a gas?

____________________________

Name the physical change that takes place when A changes into B.

Physical change _________________________________

(f) Complete the equation in the box below using the words on the right.

\[
\text{Pressure} = \frac{\text{AREA}}{\text{FORCE}}
\]

Name the piece of equipment used to measure pressure?

____________________________________________

(g) The equipment shown in the diagram was set up and used in an experiment on light.

What would the eye on the right see if the middle card was moved slightly?

_____________________________________

What does this experiment tell us about light?

_____________________________________

(h) The diagram shows a bar magnet.

Draw the pattern made if iron filings or plotting compasses were placed around the bar magnet.

Give one use of a magnet?

_____________________________________

(7 × 6 + 1 × 10)
Question 8

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

(i) What is the correct names for the cables labelled X and Y.

Name of X ________________ (3)
Name of Y ________________ (3)

(ii) Give one reason why the back covering (casing) of a plug is made from plastic. (3)

Reason ____________________________________________
_______________________________________________________

(b) Appliances vary in the amount of electricity they use depending on their power rating.

A tumble drier has a high power rating of 2.5 kW.

(i) Name another appliance found in the home that has a high power rating.

Name ____________________ (3)

(ii) Name an appliance found in the home that has a low power rating.

Name ____________________ (3)

(iii) The ESB charges for electricity at a rate of 12 cent per kW h. A tumble drier of power rating 2.5 kW is used for 2 hours each week for 4 weeks.

How many units of electricity are used?

Number of units ____________ kW h (3)

What is the cost, in cent, of using the tumble drier? (3)

Cost _______________ cent
(c) A student set up the circuit drawn on the right to investigate different materials to see which were electrical conductors and which were electrical insulators.

(i) What would you expect to observe when an electrical conductor is connected between the contact points A and B? (3)

Give a reason for your answer. (3)

Observation __________________________________________

Reason ______________________________________________

(i) What would you expect to observe when an electrical insulator is connected between the contact points A and B? (3)

Give a reason for your answer. (3)

Observation __________________________________________

Reason ______________________________________________

(d) The diagram shows the symbol of a LED.

Complete the circuit on the right by drawing in the LED so that the LED will light when the switch is closed. (3)

Why is there a resistor connected in series with the LED? (3)

Why? ________________________________________________
Question 9

(a) Friction is an example of a force.
   
   (i) Give another example of a force. (3)

   (ii) Give one way to reduce friction. (3)

   (iii) After what scientist is the unit of force named?

   Name ________________________________ (3)

(b) A student carried out an investigation to examine the relationship between the extension (increase in length) of a spring and the force applied to it.

The diagram shows the apparatus used.

The table shows the data collected by the student.

<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) Describe how the student could have taken any one of these measurements. (6)

(ii) Draw a graph of the extension (y-axis) against the force in the grid provided on the right. (9)

(iii) What force results in a 6 cm extension of the spring? (3)
(c) Energy cannot be created or destroyed but it can be changed from one form to another e.g. **chemical energy** can be converted into **heat energy**.

(i) Describe an experiment you could carry out to show the conversion of **chemical energy** to **heat energy**.
Draw a labelled diagram of any equipment used.  

(ii) Give an example from everyday life where **electrical** energy is converted to **kinetic** energy.

**Everyday example**

[Labelled diagram]
### EXTRA WORK SPACE

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

<table>
<thead>
<tr>
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<th>(2)</th>
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