



Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2008

SCIENCE – HIGHER LEVEL
(N.B. Not for *Science – Local Studies* candidates)

THURSDAY, 12 JUNE – MORNING, 09.30 to 12.00

Section A is on a separate sheet, which provides spaces for your answers.
The completed sheet should be enclosed in your answer-book.

SECTIONS B, C, D, E

These sections should be answered in your answer-book.

Answer **ONE** question from each of the Sections **B, C and D**.

All questions carry equal marks.

Answer **TWO** questions from **Section E**. All questions carry equal marks.

SECTION B - PHYSICS (48 marks)

Answer **either** question 4 **or** question 5.

4. (a) (i) Explain what is meant by the *centre of gravity* of an object. (6)

Describe an experiment to locate the *centre of gravity* of the shape shown, in the diagram, which was cut from a thin sheet of card. Use a labelled diagram in your answer.

(9)



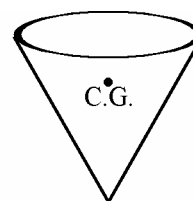
- (ii) The solid cones shown in the diagram are made of the same material and are standing on a flat surface. The dots show their centres of gravity.

Which cone is in *stable equilibrium*?

Give **two reasons** why the other cone is in *unstable equilibrium*. (9)



Cone A



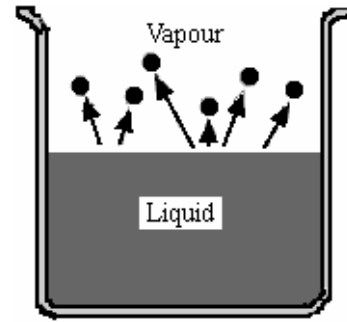
Cone B

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(b) (i) The diagram shows a liquid evaporating. Describe a simple experiment to show that *evaporation absorbs heat*. (6)

(ii) What is meant by *sublimation*? Name a *substance* that sublimates. (9)

(iii) What effect has *pressure* on the boiling point of water? Give an *application* of this effect. (9)

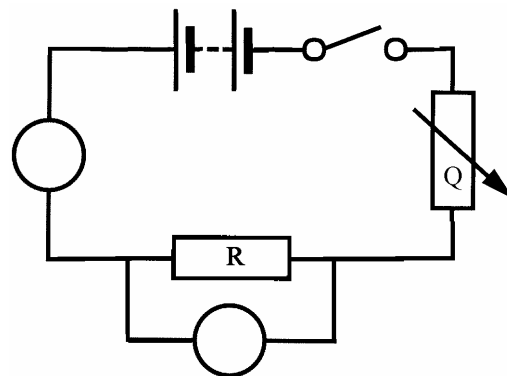


5. (a) A pupil investigated the relationship between the voltage applied to the resistor **R** and the current produced in it using the circuit shown.

(i) Name *component Q* and give the *reason* why it is in the circuit. (6)

(ii) Copy the circuit into your answer-book and *label* the ammeter and voltmeter. (6)

(iii) The data collected by the pupil is given in the table. Draw a *graph*, using this data, on graph paper with voltage on the *y-axis*. (9)



Voltage (volts)	0.0	2.0	4.0	6.0	8.0	10.0	12.0
Current (amperes)	0.0	0.1	0.2	0.3	0.4	0.5	0.6

(iv) State the *relationship* shown by the graph. (6)

(b) The photograph shows ‘rays’ of light from the sun, which is obscured by clouds.

(i) Describe, using a labelled diagram, how to show in a laboratory experiment that *light travels in straight lines*. (12)

(ii) Name the *primary colours* of light. (9)



SECTION C - CHEMISTRY (48 marks)

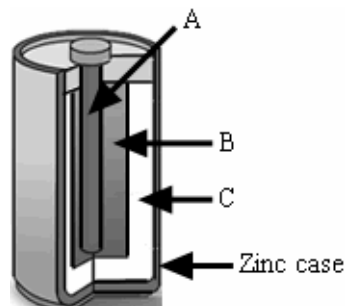
Answer **either** question 6 **or** question 7.

6. (a) (i) Chemical change can produce electricity.
The diagram shows the structure of a dry cell.

What is *part A*? (3)

Name a *substance* found in **B** and a *substance* found in **C**. (6)

Name the *part* of the cell which is negative. (3)

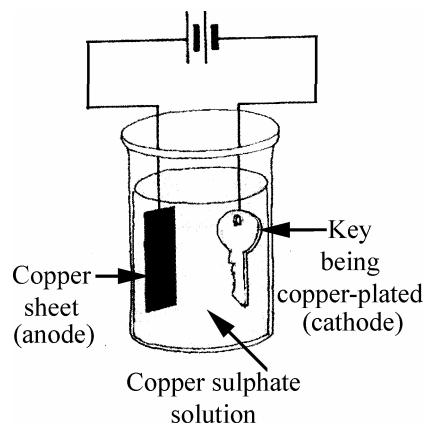


- (ii) Electricity can produce chemical change.
The diagram shows a key being copper-plated.

Copper sulphate solution contains copper ions, Cu^{2+} .

Copper ions take part in the chemical reactions that happen at the anode and at the cathode.

Describe the *reaction* that occurs at the *anode* and the *reaction* that occurs at the *cathode*. (12)

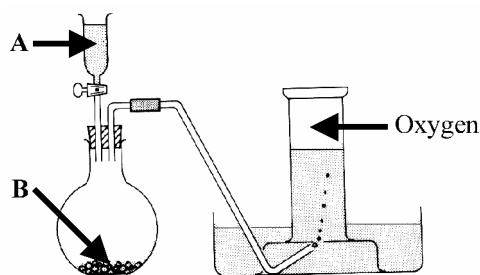


- (b) (i) Distinguish, clearly, between *compounds* and *mixtures*. (12)

- (ii) Describe an experiment, using labelled diagrams, to *show how* a mixture of salt (sodium chloride) and sand could be *separated*. (12)

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7. (a) The diagram shows an apparatus used in a school laboratory to prepare oxygen.



(i) Name a *liquid A* and a *solid B* that will react together to produce oxygen. (6)

(ii) How could the gas produced be *tested* to show that it is oxygen? (6)

(iii) Magnesium was burned in a jar of oxygen. Answer the following regarding this combustion.

Give the *colour* of the flame. (3)

Give the *colour* of the product. (3)

Name the *substance* oxidised and give a *reason* for your answer. (6)

(b) Part of the periodic table is shown in the diagram.

1	2		3	4	5	6	7	8/0
^1H								^2He
^3Li	^4Be		^5B	^6C	^7N	^8O	^9F	^{10}Ne
^{11}Na	^{12}Mg		^{13}Al	^{14}Si	^{15}P	^{16}S	^{17}Cl	^{18}Ar
^{19}K	^{20}Ca							

(i) List the *alkali metals* shown using their atomic symbols. (3)

(ii) Give **two** *properties* that all alkali metals have in common. (6)

(iii) List the *halogens* shown using their atomic symbols. (3)

(iv) List the *noble gases* shown using their atomic symbols. (3)

(v) Apart from being gases, give **one** *property* that all noble gases have in common. (3)

(vi) How many *electrons* have all *group four* atoms got in their *outer orbit*? (3)

(vii) Give the formula of a compound formed between an alkali metal and a halogen. (3)

SECTION D - BIOLOGY (48 marks)

Answer **either** question 8 **or** question 9.

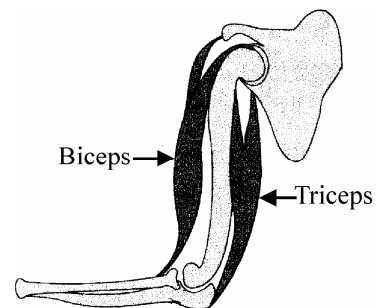
8. (a) The skeleton has a number of functions. One function is *protection*. The photograph shows a human skull. Name **two different organs** that the skull protects. (6)



A second function of the skeleton is *movement*. Movement involves muscles, nerves and bones. Muscles can only *cause movement by contraction* i.e. getting shorter. This why *muscles always occur in pairs to allow two way movement* e.g. the biceps and triceps.

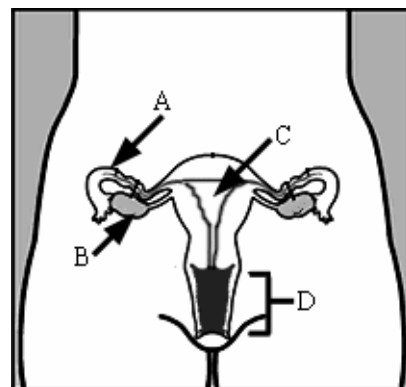
The diagram shows the bones of the arm and a pair of muscles, the biceps and the triceps.

- (i) What are *pairs of muscles* which allow movement in opposite directions *called*? (3)
- (ii) Explain, using the biceps and the triceps as an example, how pairs of muscles can produce *movement first in one direction and then in the opposite direction*. (12)
- (iii) What *type of nerve* gives a signal to a muscle to contract? (3)



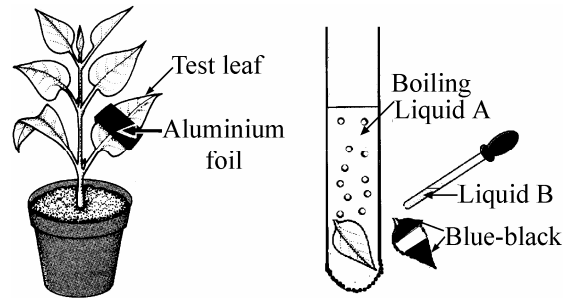
- (b) The diagram shows the female reproductive system.

- (i) Name *parts A and B*. (6)
- (ii) Give the *function* of part **C** and the *function* of part **D**. (6)
- (iii) Explain the term '*fertilisation*'. (6)
- (iv) Where does fertilisation take place? (3)
- (iv) Where does *implantation* take place? (3)



9. (a) Explain the term '*photosynthesis*'. (3)

The diagram shows three steps from an experiment to investigate photosynthesis.



(i) The green plant used first had its leaves *destarched*. How is this done? (6)

(ii) The plant was then left, for a day as shown, in sunlight. The test leaf was removed from the plant, the foil taken off, and the leaf was boiled in water. Why was the leaf *boiled in water*? (3)

(iii) The leaf was then boiled in liquid A to *remove chlorophyll*. Name liquid A. (3)

(iv) Liquid A is *flammable*. Describe, using a labelled diagram, how liquid A can be *boiled safely* in a school laboratory. (6)

(v) Liquid B was dropped onto the leaf and the parts which were not covered by the foil turned blue-black as shown. Name liquid B and say why the *uncovered parts of the leaf turned blue-black*. (6)

(vi) Why did the *part of the leaf covered with foil not go blue-black*? (3)

(b) The diagram shows a food chain from a garden habitat.

Name (i) a producer

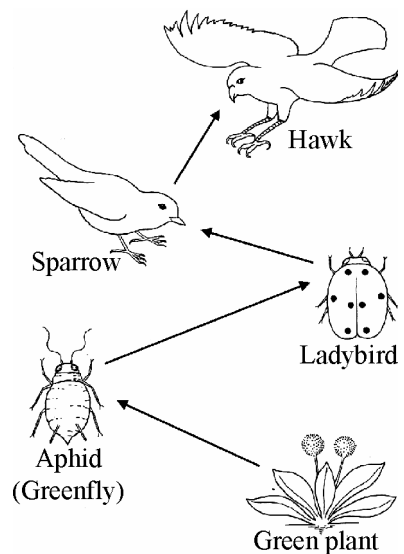
(ii) a herbivore

(iii) a carnivore

from the food chain shown. (9)

Give **two** ways in which sparrows might *compete* with each other. (6)

Give **one** way in which a food chain *differs* from a food web. (3)

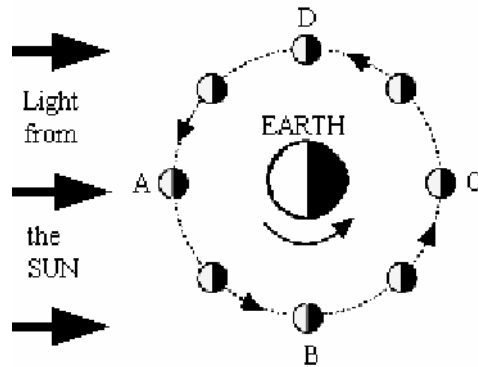


SECTION E - APPLIED SCIENCE (72 marks)

Answer TWO questions from this section.

10. EARTH SCIENCE. Answer any **two** of the following, (a), (b), (c).

(a) The diagram shows the moon's orbit around the earth and the direction of light from the sun. It also shows the spin of the earth on its axis and the direction of the lunar orbit.



(i) How long does it take the earth to rotate once on its own axis? (3)

(ii) How long does it take the moon to orbit the earth once? (3)

(iii) Describe the appearance of the moon, viewed from earth, when it is in position C. (3)

(iv) Explain, using a labelled diagram, how a lunar eclipse occurs. (9)

(b) Name the type of cloud shown in the photograph. (3)

How are clouds formed? (9)

Why do clouds sometimes disappear on hot days? (6)



(c) The photograph is of a meter that measures the pressure of gases. Read the pressure in kPa or psi, from the meter, and write it in your answer-book. (3)

Name an instrument used to measure the pressure of the atmosphere. (3)

Describe an experiment, using a labelled diagram, to investigate the way the volume of a gas changes with its pressure. (12)



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11. HORTICULTURE. Answer any **two** of the following, (a), (b), (c).

(a) The diagram shows a hardwood cutting in a prepared pot enclosed in a transparent plastic bag.

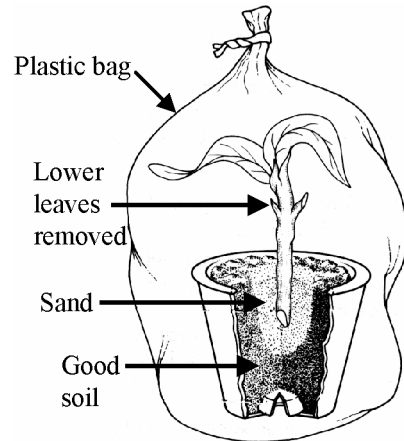
(i) Name a *plant* suitable for propagation in this way. (3)

(ii) The cutting was dipped in a rooting powder prior to being potted. Name **two ingredients** of rooting powder that help the cutting become a healthy new plant. (6)

(iii) Why is the cutting in *sand*? (3)

(iv) Why are the lower leaves *removed*? (3)

(v) Why is the potted cutting in a *transparent plastic bag*? (3)



(b) Describe *soil structure*, which allows for the free movement of gases and water. (6)

Outline an experiment to measure the *air content* **or** the *water content* of soil. (12)

(c) Outline the *life cycles* of an aphid **or** of the cabbage white butterfly. (12)

Describe a *biological* control and *chemical* control for the pest that you selected. (6)

12. MATERIALS SCIENCE. Answer **both** parts, (a) and (b).

- (a) The photograph shows a table lamp. Name **three materials** that could have been used in its manufacture and say what *property* of each material named makes it suitable for its use in the lamp. (18)



- (b) Answer **one** of the following.

(i) PLASTICS

Give the **two** stages of the *production* of plastics from crude oil. (6)

Describe an experiment to show that plastics are *good electrical insulators*. (12)

(ii) METALS

Metals can be extracted from their ores. What is an *ore*? Name a *metal mined* in Ireland. (6)

Describe an experiment to compare the *reactivity* of **two** metals. (12)

(iii) TEXTILES

Name **one** plant and **one** animal that are sources of *textile fibres*. (6)

Describe an experiment to compare the *resistance to wear* of **two** fabrics. (12)

(iv) TIMBER

Give a *difference* between the leaves of most hardwood trees and the leaves of most softwood trees. (6)

Describe an experiment to investigate the *effect* of grain direction on the strength of timber. (12)

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13. FOOD. Answer any **two** of the following, (a), (b), (c).

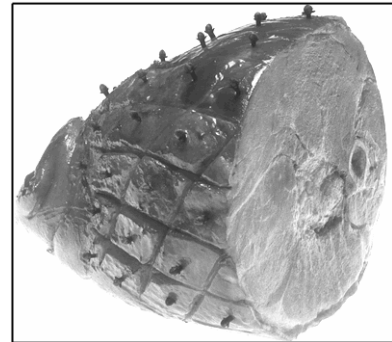
- (a) 100 g of the average apple including the skin, core omitted, contains: sugars 10.4 g, fibre 2.4 g, protein 0.7 g, fat 0.2 g, seven vitamins and six minerals in valuable quantities.

- (i) Give **one** *role* for each of the following in our bodies: *sugars, fibre, protein* and *fat*. (12)
(ii) Name **one** *vitamin* and name **one** *mineral* needed in a healthy diet. (6)



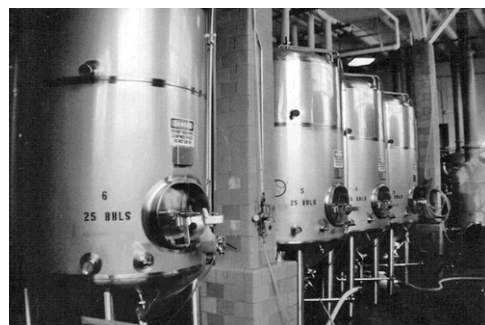
- (b) The photograph shows a *ham*, which has been *cured* and *smoked*. Both add flavour to the meat and both help to *preserve* the meat.

- (i) What is meant by the term '*cured*'?
How does curing *help* to preserve meat? (6)
(ii) Meat and fish (e.g. salmon) can be smoked.
Describe this *process* and say how it *helps* to preserve the food. (9)
(iii) Name **one** *other method* of food preservation. (3)



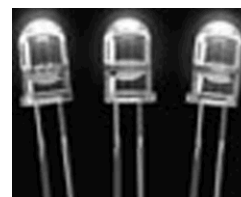
- (c) The photograph shows *fermentation* tanks in a modern brewery.

- (i) What is meant by the term *fermentation* when applied to the production of beer/wine? (6)
(ii) Describe an experiment to *show fermentation* in a school laboratory. (12)



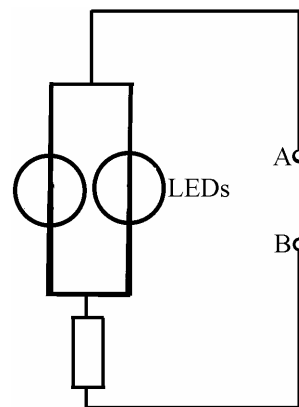
14. ELECTRONICS. Answer **both** parts, (a) and (b).

(a) The photograph shows three LEDs.



(i) 'LED' uses the first letter of each word of the name of the device shown. Give the *name in full*. (3)

Copy the incomplete circuit diagram shown into your answer-book. This circuit is to test the polarity (+/-) of a power supply e.g. battery. The power supply is connected across **A, B**.



(ii) Complete the *LED symbols* in your diagram. (6)
(Hint: use **two** different colours of LED)

(iii) Explain how to *use this circuit* to test polarity. (6)

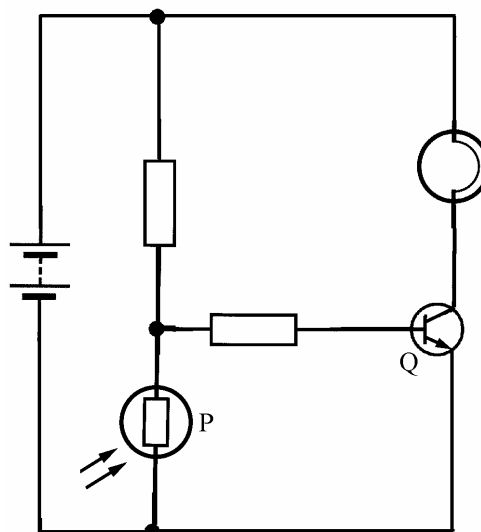
(iv) Give an *everyday use* of LEDs. (3)

(b) The diagram shows a circuit which responds to the brightness of light. Changes in light intensity can turn on or off the lamp.

(i) Name the *components* labelled **P** and **Q** in the diagram. (6)

(ii) What *happens* to component **P** when it gets dark? (3)

(iii) Draw *component Q* as it appears in the circuit diagram in your answer book and *label and name any two of its terminals*. (6)

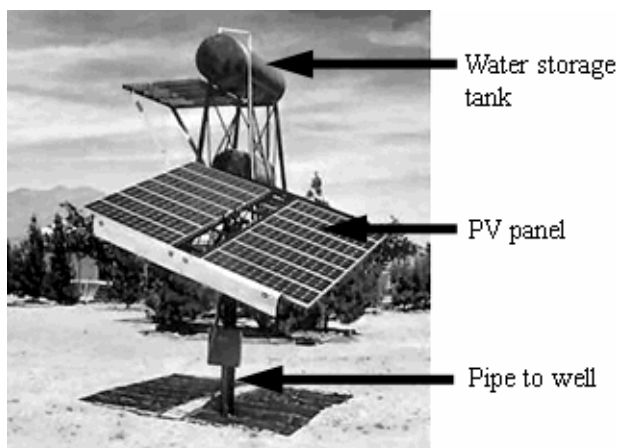


(iv) Give an *application* of this circuit. (3)

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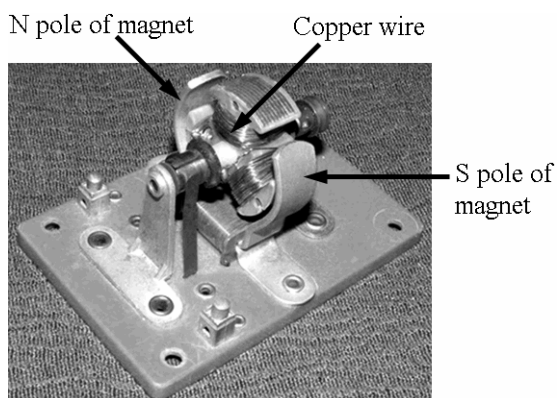
15. ENERGY CONVERSIONS. Answer **both** parts, (a) and (b).

- (a) The photograph shows a solar powered water pump. The PV (solar) panel takes in light energy from the sun. This energy is used by an electric motor to pump water up a pipe from a well to a storage tank. The water in the tank has potential energy. A number of energy conversions occur in this system.



- (i) In the PV (photovoltaic/solar) panel, what *form of energy* is sunlight converted into? (3)
- (ii) Give the *energy conversion* that takes place in the electric motor which operates the water pump. (6)
- (iii) Give the *energy conversion* that occurs when the water is moved up the pipe from the well to the storage tank by the pump. (6)
- (iv) When water is drawn from the tank for use, what *energy conversion* happens? (3)

- (b) The photograph shows a model of an electric motor. It is a simple d. c. motor.



Describe an experiment, apart from turning on an electric motor, to show the *principle of the electric motor* i.e. that a *current carrying conductor in a magnetic field experiences a force*. An appropriately labelled diagram is required with your answer. (12)

Outline, no diagram required, the principle by which a *dynamo* (generator) produces electricity from motion. (6)