

WARNING

You must return this paper with your answer-book, otherwise marks will be lost.

EXAMINATION NUMBER

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AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA
 JUNIOR CERTIFICATE EXAMINATION, 1999

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

TUESDAY, JUNE 15 – AFTERNOON, 2.00 – 4.30

SECTION A (44 marks TO BE ANSWERED BY ALL CANDIDATES)

(See separate sheet for Sections B, C, D and E.)

Answer *each* of the questions, 1, 2 and 3. There are **TEN** parts in each question. Answer any **EIGHT** parts. All questions carry equal marks. Answer the questions in the spaces provided. Return this Section of the examination paper. Enclose it in the answer-book you use in answering the other Sections.

1. Answer **eight** of the following, (a), (b), (c), etc.

(a) Name the instrument used

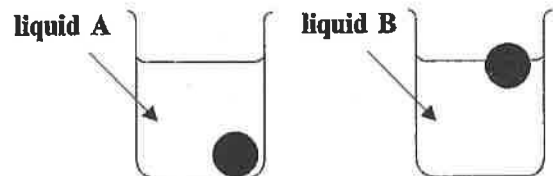
(i) by a pilot to measure altitude _____

(ii) by an engineer to measure the length of a road _____

(b) Two identical spheres are placed in liquids A and B as in the diagram.

Which of the liquids has the greater density?

Give a reason for your answer.



(c) Momentum is the product of _____ and _____

(d) In a department store a sleeping bag with the highest tog value was found to be the most expensive one.

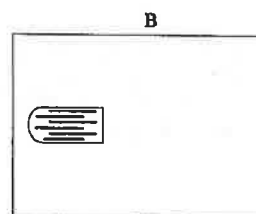
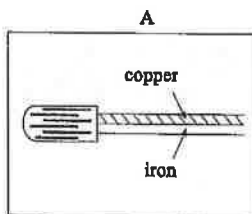
What is meant by the underlined term? _____

(e) What is the voltage across a 4 ohm resistor if the current flowing through it is 2 amperes?

(f) Power is measured in units called _____.

(g) Name the device shown in A.

Complete the diagram in B where the device has been heated.

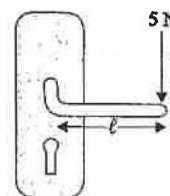


(h) Underline the **two** colours in the following list which, when mixed together, give white light.

YELLOW GREEN BLUE RED

(i) When a force of 5 Newtons is applied to the handle of a door the moment of this force is 0.5 Newton metres.

What is the length (ℓ) of the handle?



(j) In 1997 the land speed record was broken by a car travelling at a speed which was just greater than the speed of sound. Underline the speed in the following list which is closest to the record breaking speed.

3.4×10^2 m/s 6.8×10^2 m/s 1.5×10^3 m/s 3.0×10^8 m/s

(8 × 6 marks)

2. Answer **eight** of the following, (a), (b), (c), etc.

(a) A reaction in which heat is taken in is called an _____ reaction.

Give an example of this type of reaction _____

(b) Give **two** ways in which a dilute solution can be made more concentrated.

(i) _____

(ii) _____

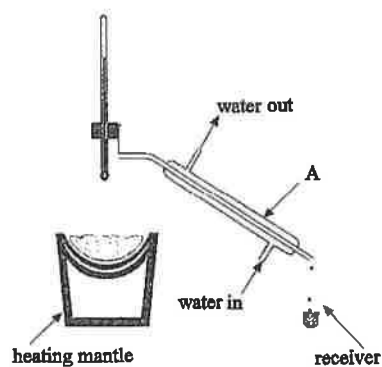
(c) Underline the non-metals in the following list of elements

COPPER CHLORINE ZINC SODIUM CARBON

(d) Name the scientist who proposed the idea that electrons move around the nucleus in fixed paths called orbits or shells _____

(e) Name the part of the apparatus labelled A.

Name the process being carried out.



(f) Tick the boxes which represent a chemical change in the following list.

- Rusting of iron Melting of ice Burning of gas
 Grinding of coffee beans Magnetising of steel

(g) Name the group in the Periodic Table to which argon belongs. _____

Why is argon such an unreactive element? _____

(h) What is the name and chemical formula of the compound formed when iron filings and sulphur are heated together?

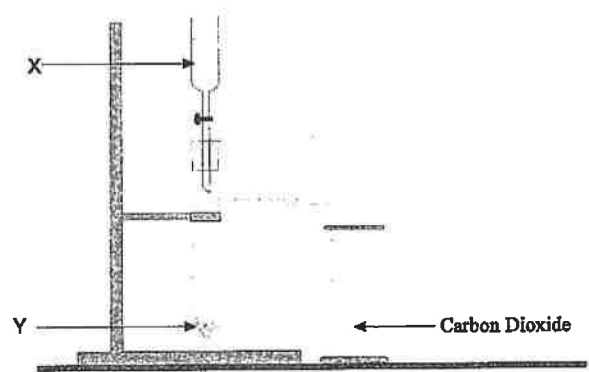
Name _____ Chemical formula _____

(i) The diagram shows the apparatus used in the preparation of carbon dioxide.

Name the chemicals X and Y.

X _____

Y _____



(j) Give a reason why copper and gold were among the first elements to be discovered.

_____ (8 x 6 marks)

3. Answer eight of the following, (a), (b), (c), etc.

(a) Name one plant organ and one animal organ.

plant organ _____ animal organ _____

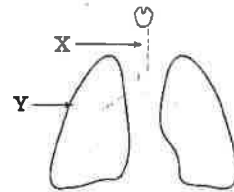
(b) What are enzymes? _____

Name an enzyme _____

(c) Identify the parts of the human breathing system labelled X and Y.

X _____

Y _____



(d) The type of nerve which links a sensory organ to the brain is called a _____ nerve.

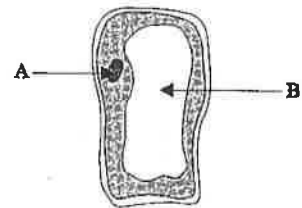
The type of nerve which links the brain to a muscle is called a _____ nerve.

(e) The diagram shows the structure of a plant cell.

Name the parts labelled A and B.

A _____

B _____



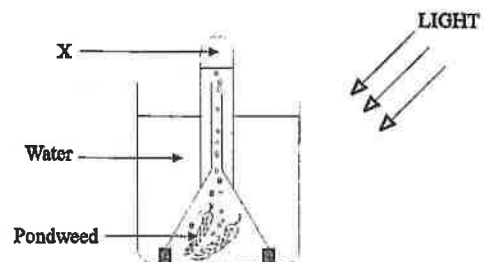
(f) State two methods of seed dispersal in plants.

(i) _____

(ii) _____

(g) What process is being investigated in the experiment shown in the diagram?

Name the gas produced at X.



(h) Fill in the missing words in the sentence below.

Pollination is the transfer of pollen from the _____ of a flower to the _____ of a flower of the same species.

(i) Name a substance used to test exhaled air for the presence of (i) water vapour and (ii) carbon dioxide.

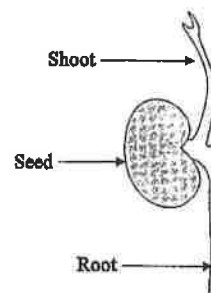
(i) _____

(ii) _____

(j) The diagram shows the root of a germinating seed growing downwards.

What is the name for this plant response?

Name another growth response in plants.



(8 × 6 marks)

JUNIOR CERTIFICATE EXAMINATION, 1999

SCIENCE – HIGHER LEVEL

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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.

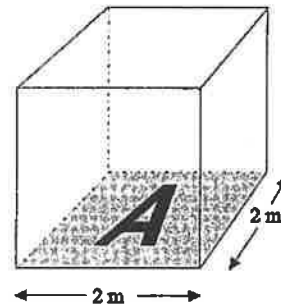
Answer ONE question from each of the Sections B, C and D. All questions carry equal marks.
Answer TWO questions from Section E. All questions carry equal marks.

SECTION B: PHYSICS (18 marks)

Answer either question 4 or question 5.

4. (a) What is pressure? (3)

The block in the diagram has a weight of 16 N and stands on its end on a flat surface. Calculate the pressure which it exerts on the surface A. (6)



Describe, with the aid of a diagram, one type of barometer and explain how it works. (12)

- (b) What is the effect of increased pressure on the melting point of ice? (3)

What is the scientific principle on which a thermometer works? (6)

Name a liquid used in thermometers and give one advantage of using this liquid. (6)

Distinguish between temperature and heat. (6)

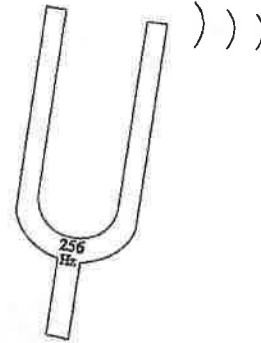
What is the effect of increased pressure on the boiling point of water?

Give an everyday example of where this effect is used. (6)

5. (a) What is meant by the reflection of light? (3)
- Draw a diagram to show how light is reflected from a plane surface (e.g. a plane mirror). (6)
- Explain, with the aid of a diagram, how a periscope uses light reflection. (6)
- Describe an experiment to show that light is a form of energy. (9)

- (b) What is a wave? Describe an experiment to show that sound needs a medium to travel. (12)

What property of sound, emitted from the tuning fork, as in the diagram, is determined by its frequency? (3)



- (c) A radio station transmits radio waves of wavelength 600 m at a frequency of 5.0×10^5 Hz. Calculate the speed of the radio waves from the transmitter. (9)

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SECTION 2

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

6. (a) Explain what is meant by a compound. (6)

Name the elements represented by the symbols (i) Na and (ii) Cl in the Periodic Table. (6)

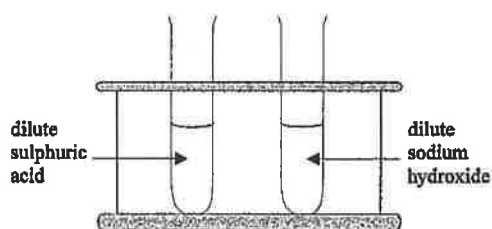
Draw a diagram to show the arrangement of the electrons in an atom of the element whose symbol is Na. (6)

Name **two** other elements whose properties are similar to those of this element. (6)

(b) What is (i) an indicator (ii) the pH scale? (6)

Describe an experiment you would carry out in the laboratory to measure the pH of a solution.

You are given two test tubes as shown in the diagram, one with dilute sulphuric acid and the other with dilute sodium hydroxide.



State the pH value you would expect to obtain for each. (15)

What term is used to describe the reaction which takes place when the contents of the two tubes are mixed to produce a salt and water? (3)

7. (a) Water supplies are usually treated in a water treatment plant before domestic use.

Name **three** stages in the treatment of water.

State what happens to the water during each of these stages. (18)

Why is it recommended in some countries that water should be boiled before drinking? (3)

(b) What is meant by **hard water**? Name a substance which causes hardness. (6)

A student tested four different water samples for hardness using soap flakes. Equal amounts of each water sample were tested before boiling and after boiling. The number of soap flakes needed to produce a permanent lather was recorded in each case.

Water sample	Number of soap flakes needed to form lather	
	before boiling	after boiling
Sample A	24	10
Sample B	4	4
Sample C	12	4
Sample D	20	20

From the data collected identify the following:

(i) the softest water sample

(ii) the hardest water sample

(iii) the sample which contained temporary hardness only

(iv) the sample which contained both temporary and permanent hardness. (12)

Why was it necessary for the student to use the same amount of water when testing each sample? (3)

What would you use to remove permanent hardness from water? (6)



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

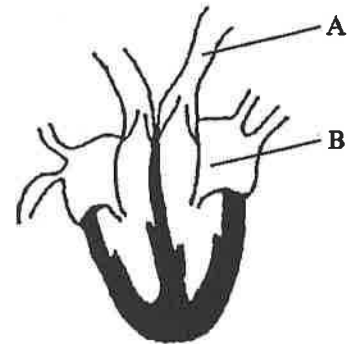
8. (a) What is meant by transpiration in plants? (6)

List **two** factors which accelerate the rate of transpiration in plants. (6)

Describe an experiment to demonstrate transpiration in plants. (12)

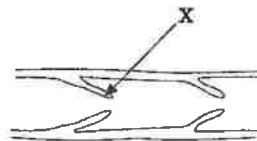
(b) State **two** functions of the blood. (6)

Identify the parts of the heart labelled **A** and **B** in the diagram. (6)



Identify the type of blood vessel shown in the diagram below.

What is the function of the part labelled **X**? (6)



When you exercise your heart beat and pulse rate increase. Why does this occur? (6)

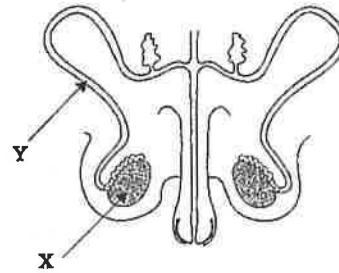
9. (a) What is meant by fertilisation? (3)

The diagram shows the structure of the male reproductive system.

Name the parts labelled X and Y. (6)

Name the gamete produced by X. (3)

What is the normal length of a human pregnancy? (3)



Describe the changes in the female reproductive system after fertilisation. (9)

(b) Name one plant and one animal from a habitat you have studied. (6)

Explain how the plant and the animal you have named have adapted to that habitat. (6)

Draw a diagram of one of the following instruments and explain how you would use it in studying a habitat.

POOTER HAND NET PITFALL TRAP

Describe one way in which the habitat you have named could become polluted. (12)

Answer TWO questions from this Section.

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

- (a) The Moon is a satellite of the Earth. Explain what this means. (6)
- What is a lunar eclipse? (6)
- Explain, with the aid of a diagram, how a lunar eclipse occurs. (6)
- (b) Tides are movements of the seas caused by the Moon and the Sun.
- Name the phases of the Moon during which a spring tide occurs. (6)
- Explain, with the aid of a diagram, how a spring tide occurs during one of these phases. (12)
- (c) State Boyle's Law. (6)
- Describe, with the aid of a diagram, an experiment to investigate this law. (12)

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

- (a) What is meant by compost? (3)
Name or describe a growing compost and state **one** advantage of using it. (6)
Describe an experiment to determine the percentage germination of seeds. (9)
- (b) Describe the life cycle of a named insect which is harmful in the garden. (12)
State how a named insect is beneficial in the garden. (6)
- (c) Describe **two** precautions which should be taken in harvesting cut flowers. (6)
Describe an experiment to show how a named substance added to water in a vase will prolong the life of cut flowers. (12)

12. MATERIALS SCIENCE. Answer both parts.

(a) Identify the hazard symbols labelled A, B, C below.

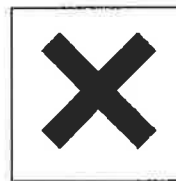
(9)



A



B



C

Explain how materials can deteriorate and describe one way in which deterioration of a named material can be prevented.

(9)

(b) Answer one of the following.

(i) PLASTICS

Name a plastic and state one use for it.

(6)

Describe an experiment to show that plastic is an insulator.

(12)

(ii) METALS

Name a metal mined in Ireland and state one use for it.

(6)

Describe an experiment to show that a metal is a conductor.

(12)

(iii) TEXTILES

Name a synthetic textile and state one use for it.

(6)

Describe an experiment to compare the absorbency of two textiles.

(12)

(iv) TIMBER

Name one type of manufactured board and state one use for it.

(6)

Describe an experiment to examine the effect of grain direction on the strength of a piece of timber.

(12)

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

(a) What is the role of protein in the human diet? (3)

Name **one** food, other than milk, which is rich in protein. (3)

Describe an experiment to show that protein is present in milk. (9)

What other constituent of milk is necessary for the development of strong bones? (3)

(b) Explain how milk is pasteurised. (6)

Describe how you would make yoghurt in the laboratory. (12)

(c) State **one** advantage of food preservation. (3)

Name a food, **one** in each case, which is preserved

(i) by freezing

(ii) by dehydrating. (6)

Explain how each of these methods preserves the food you have named. (6)

State **one** of the primary causes of famine in the world today. (3)

14. ELECTRONICS. Answer all parts.

(a) Draw the symbol for a light-emitting diode (LED). (3)

What is a transducer? (3)

Explain why a LED is a transducer. (3)

You are provided with the following components – switch, LED, resistor, battery.

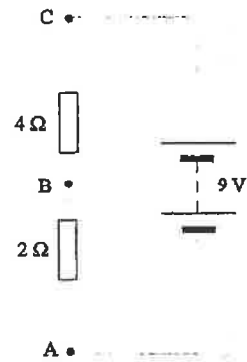
Draw a simple circuit diagram with these components arranged in such a way that the LED will light when the switch is closed. (6)

(b) What is a potentiometer? (3)

Use the information in the circuit diagram on the right to calculate

(i) the potential difference between A and B,

(ii) the potential difference between B and C. (6)

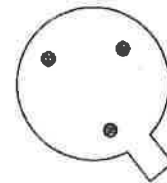


What is the purpose of a potentiometer in a radio? (3)

(c) The diagram shows the underside of a transistor.

Name two of the terminals on a transistor.

State one common use of a transistor. (9)



15. ENERGY CONVERSIONS. Answer both parts.

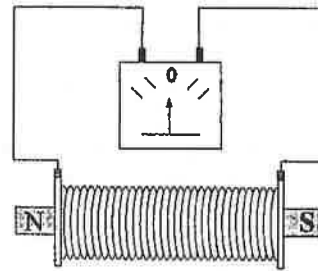
(a) What is kinetic energy? (3)

Give an example of kinetic energy being converted to heat. (3)

The diagram shows a coil which is connected to an ammeter. There is a bar magnet inside the coil.

Explain what happens when the magnet is pulled out of the coil. (3)

What energy change occurs when the magnet is removed? (3)



(b) Give an everyday example of the use of an electric motor. (3)

What is the purpose of a transformer? (3)

Draw a diagram of a transformer. (9)

Describe an experiment to show that a current-carrying wire experiences a force when placed in a magnetic field. (9)