

WARNING

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

EXAMINATION NUMBER

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 JUNIOR CERTIFICATE EXAMINATION, 2000

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

THURSDAY, JUNE 15 – AFTERNOON, 2.00 – 4.30

SECTION A (144 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) Enter the names of the instruments that could be used for the measurements given in the table below.

Measurement	Instrument used
Volume of a liquid	
Diameter of a cylinder	

(b) Underline the correct unit for acceleration.

m/s N/m² kg m/s² m/s² kg/m³.

(c) A lever is a _____ body which is free to rotate about a _____ point.

(d) When the tap is opened the liquid flows into the vessel underneath.

Draw the level of the liquid in both sides of the vessel when it has settled.

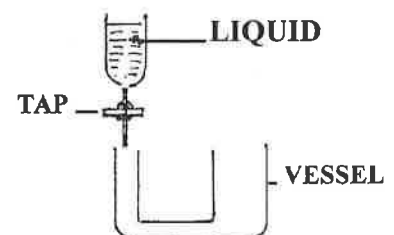


Fig. 1

(e) Calculate the work done when a force of 10 N moves 6 m. _____

(f) The diagram shows a section of a double-glazed window.

Why do double-glazed windows give good heat insulation?

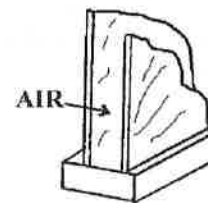


Fig. 2

(g) Give **two** differences between light waves and sound waves.

(i) _____

(ii) _____

(h) Why does a bimetallic strip bend when heated?

Give an application of the bimetallic strip.

(i) Calculate the velocity of a sound wave which has a frequency of 200 Hz and a wavelength of 1.7 m.

(j) A perspex rod loses electrons when rubbed with wool.

The rod is now _____ charged and the wool is _____ charged.

(8 × 6 marks)

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

(a) What is an element? _____

Underline the element in the following list.

STEEL

ALUMINIUM

BRASS

WATER

(b) Name the item shown in the diagram. _____

Give a mixture that could be separated using this item.



Fig. 3

(c) Helium is preferred to hydrogen for filling balloons. Give a reason for this.

To what group in the periodic table does helium belong? _____

(d) Write the chemical formula for calcium chloride. _____

(e) The diagram shows three necessary conditions for fire.

Name X and Y.

X _____ Y _____

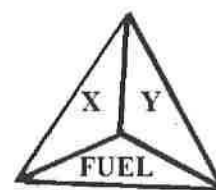


Fig. 4

(f) Name a gas, which combines with water in the atmosphere to form acid rain.

Give a source of the gas named. _____

(g) Why is lime scale formed on the inside of kettles in hard water areas?

(h) The apparatus shown is used to carry out a neutralisation reaction.

Name the piece of apparatus containing the acid.

What is added to the alkali in the flask before the acid is allowed to run in?

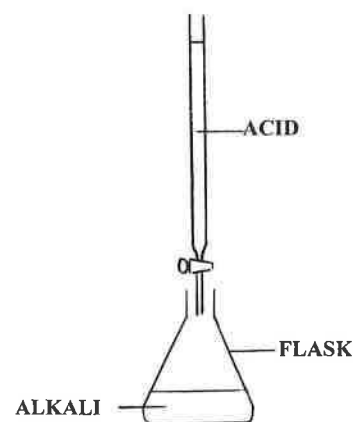
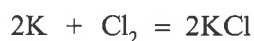


Fig. 5

(i) What is reduction? _____

Underline the substance reduced in the following equation.



- (j) The diagram shows a dry cell.
Name an electrolyte used in this cell.

Mark the positive electrode on the diagram with a plus (+) sign.

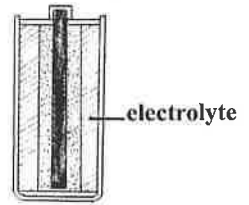


Fig. 6

(8 × 6 marks)

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

- (a) Name **two** parts common to both plant and animal cells.

(i) _____ (ii) _____

- (b) Give the names of the **two** tooth types shown below.



Fig. 7

A _____ B _____

- (c) Underline the element, which is *not* present in a carbohydrate.

Hydrogen Oxygen Carbon Nitrogen

Name a carbohydrate. _____

- (d) Why does the trachea not collapse when we breathe?

- (e) Name the chambers of the heart marked X and Y.

X _____ Y _____

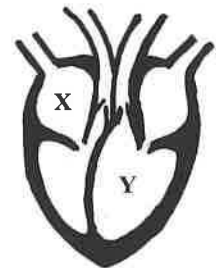


Fig. 8

- (f) State **two** functions of the skeleton in the human body.

(i) _____ (ii) _____

- (g) Name an endocrine gland and a hormone that it secretes.

gland _____ hormone _____

(h) The diagram shows the female part of a flower.

Give the name and give a function of this part.

name _____ function _____

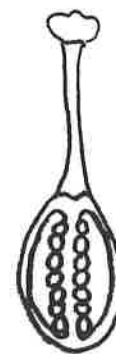
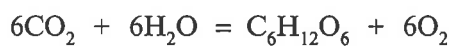


Fig. 9

(i) What process is represented by the following equation?



process _____

Give a necessary condition, excluding presence of CO_2 , for this process to take place.

condition _____

(j) The quadrat and line transect are used in habitat study.

Explain, briefly, what **one** of the above items is used for.

quadrat _____

or

line transect _____

(8 × 6 marks)

JUNIOR CERTIFICATE EXAMINATION, 2000

SCIENCE – HIGHER LEVEL
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THURSDAY, 15 JUNE – AFTERNOON, 2.00–4.30

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) What is density? (3)

State the units used to measure density. (3)

A student measured the volume and mass of two cubes. The results are shown in the table below.

Cube	Material	Volume (cm ³)	Mass (g)
A	material A	30	15
B	material B	30	45

Give a reason for the difference in mass. (3)

What volume of material A would have the same mass as cube B? (3)

Describe, with the aid of a diagram, how to measure the density of a liquid. (12)

(b) What is friction? (3)

A student set up the apparatus shown in the diagram to investigate the movement of a block on a bench top. The following conditions were used:

- the block alone
- the block with sandpaper glued to the underside
- the block with oiled underside.

Describe how the experiment is performed. (6)

What results would be observed? Give a reason for your answers. (12)

Where is friction useful to a cyclist? (3)

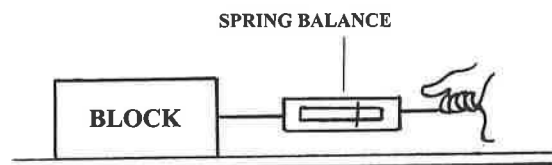


Fig. 10

5. (a) State Ohm's law. (3)

The measurements made by a student in an experiment to verify Ohm's law are shown in the table.

Voltage (V)	1.0	2.0	3.0	4.0	5.0	6.0
Current (A)	0.1	0.2	0.3	0.4	0.5	0.6

Use the table to draw a graph, on graph paper, of voltage against current. Put voltage on the Y-axis. (12)

Is Ohm's law verified by this experiment? Give a reason for your answer. (6)

Calculate the resistance of the resistor used in this experiment. (3)

- (b) What is the unit of electrical energy used by the E.S.B. on electricity bills? (3)

Name the type of current which flows through an electric fire when it is connected to the mains. (3)

Calculate the cost of running a 2.4 kW electric fire for 5 hours if each unit of electricity costs 8 pence. (6)

The 2.4 kW electric fire is connected to a 240 V supply. What current flows through the element of the fire? (6)

There is a 3 A fuse in the plug of this fire. Will the fire operate when it is switched on? Give a reason for your answer. (6)

SECTION C – CHEMISTRY (48 marks)

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

6. (a) Explain the term 'exothermic reaction'. (3)
- Give **one** example of an exothermic reaction. (3)
- Describe an experiment to show that a reaction is exothermic. (9)
- Distinguish between physical and chemical changes. (3)
- How can powdered sulphur and iron filings be used to show a chemical change? (6)
- (b) What is meant by the valency of an element? (3)
- Describe how sodium forms an ionic bond with chlorine. (9)
- What would you observe when a small piece of sodium is dropped into a beaker of water? State a safety precaution that should be taken during this experiment. (6)
- Give the names **or** the chemical formulas of the substances produced by the reaction of sodium with water. (6)

7. (a) Describe, with the aid of a diagram, an experiment to show the presence of water vapour in air. (9)

Name the most abundant gas present in air. (3)

The apparatus shown is used to prepare oxygen.

Name the substances A and B.

What is the function of B?

How would you confirm that the gas collected is oxygen? (12)

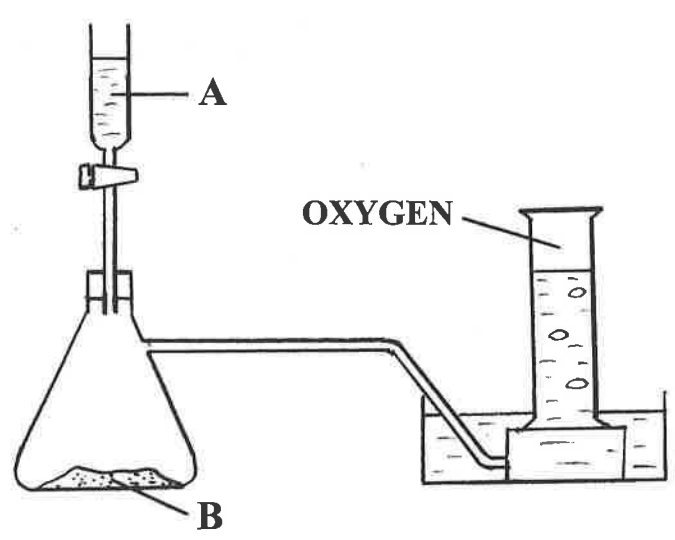


Fig. 11

(b) What is the activity series? (3)

A student put 1 g of metal filings into four test tubes.
 A different metal was placed in each tube.
 The metals were: copper, iron, magnesium and zinc.
 Dilute hydrochloric acid was added to each test tube.
 The diagram shows the rate of production of hydrogen in the test tubes.

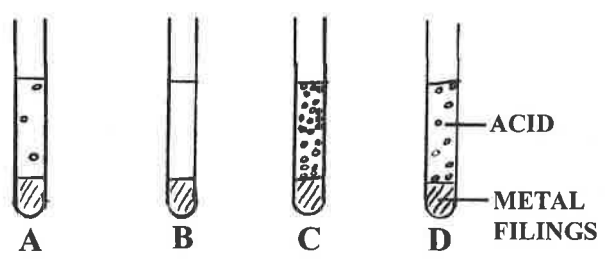


Fig. 12

State which metal is in each tube. (12)

Arrange these metals in decreasing order of activity. (3)

Select any two of the metals and show, with a diagram, how to use them to make a simple electrical cell. (6)

SECTION D – BIOLOGY (48 marks)

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

8. (a) What is meant by digestion? (3)

The diagram shows the human digestive system.

Name the parts labelled **A**, **B** and **C**. (9)

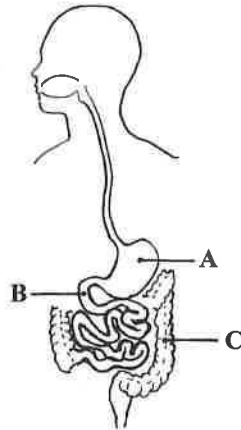


Fig. 13

What is an enzyme? (3)

What do enzymes, found in the digestive system, do to proteins in food? (3)

Describe a laboratory experiment to show the action of an enzyme. (12)

- (b) Explain the term 'phototropism'. (3)

Describe, with the aid of a diagram, an experiment to show phototropism in plants. (12)

Give **one** way in which phototropism is beneficial to plants. (3)

9. (a) Why are excretory organs essential in the human body? (3)

The diagram shows the urinary system in the human body. Name the parts labelled X and Y. (6)

Name a substance excreted by the kidney. (3)

Why are the kidneys connected to an artery and a vein? (6)

Name another excretory organ in the human body and name a substance excreted by it. (6)

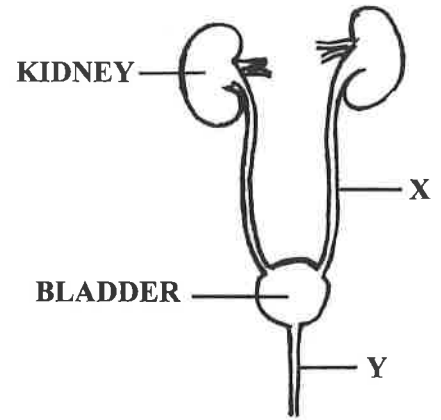


Fig. 14

(b) Name an organism present in soil. (3)

Draw the apparatus that you would use to extract small animals from soil and explain clearly how this apparatus works. (12)

Why is it important that soil should contain air? (3)

In an experiment to find the percentage of water in a soil sample a student recorded the following measurements:

Mass of fresh soil = 12.5 g
 Mass of dried soil when experiment is complete = 10.0 g

Use these measurements to calculate the percentage water in the soil. (6)

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 Earth is part of the solar system. Explain the underlined term. (3)

Name a planet of the solar system other than Earth. Compare its surface temperature and its atmosphere with those of Earth. (9)

Explain in terms of the Earth's movements:

(i) a day

(ii) a year. (6)

(b) Name the form of energy that powers the Sun. (3)

Describe the 'life cycle' of a star like the Sun. (12)

At what stage in its 'life cycle' is the Sun at present? (3)

(c) "The greenhouse effect benefits life on Earth but it could present dangers in the future".

Explain the underlined term. (9)

State the benefit to life on Earth of the greenhouse effect. (3)

Give a possible effect of an increase in the greenhouse effect. What action can be taken to avoid such an increase? (6)

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

(a) A soil sample was shaken vigorously with water and then allowed to settle. The result is shown in the diagram opposite.

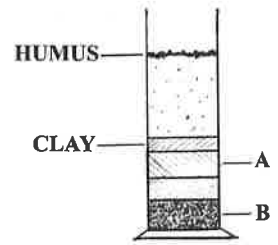


Fig. 15

What is humus? (3)

Name the parts labelled **A** and **B**. (6)

Describe an experiment to show the effect of the absence of a named essential element on the growth of a seedling. (9)

(b) What is a dormant seed? (3)

Give **one** advantage of seed dormancy for plants. (3)

Describe an experiment to investigate dormancy in seeds. (9)

120 seeds were planted and only 90 seeds germinated. Calculate the percentage germination. (3)

(c) Describe the steps taken when planting bedding plants outdoors in spring. (6)

Outline the life cycle of a named garden pest. (12)

12. MATERIALS SCIENCE. Answer **both** parts.

- (a) Name a natural fibre and a synthetic fibre used to make textiles. (6)
- Explain, using an example, how mixing fibres will improve the properties of a fabric. (6)
- Identify the following care labels on clothing. (6)

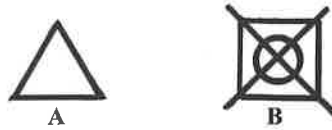


Fig. 16

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

(i) PLASTICS

- What is the raw material from which polythene is produced? (3)
- Why is the burning of plastics undesirable? (3)
- Describe an experiment to compare the hardness of two different plastics. (12)

(ii) METALS

- Name an alloy and say what it is made from. (6)
- Describe an experiment to compare the flexibility of two metals. (12)

(iii) TEXTILES

- What is meant by the term 'absorbency'? (3)
- Give an example of a textile which has good absorbency. (3)
- Describe an experiment to compare the resistance to wear of two different fabrics. (12)

(iv) TIMBER

- Name a hardwood. (3)
- Why are softwoods rather than hardwoods grown in most forestry plantations in Ireland? (3)
- Describe an experiment to compare the bending strengths of thin strips of hardwood and softwood. (12)

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

(a) Name the food types which are essential in a balanced diet.

Which of these food types has the greatest energy content? (9)

Describe a test you would carry out in the laboratory to show the presence of glucose in food. (9)

(b) What are E numbers?

How would you know, from the E numbers on a food packet, that

(i) preservatives were used

(ii) colourings were used

in preparing the food?

Explain the role of anti-oxidants in a food. (12)

Describe a method used to preserve

either a fruit like strawberries

or pig meat as bacon.

Explain how the method you have chosen works. (6)

(c) Cheese is rich in calcium. What is the function of calcium in our diet?

Cheese is made from pasteurised milk. Why must the milk be pasteurised? (6)

Describe the processes involved in cheese-making. (12)

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

(a) The diagram shows an electronic component. What is it called?

Name the terminal X or name the terminal Y.

Give one use for this component. (9)

The diagram shows a circuit used to identify the positive pole of a battery.

Explain how, using the letters P and Q, the circuit can be used for this purpose. (9)

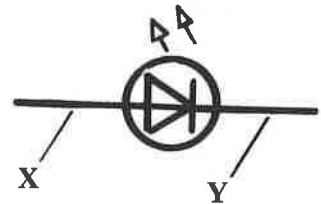


Fig. 17

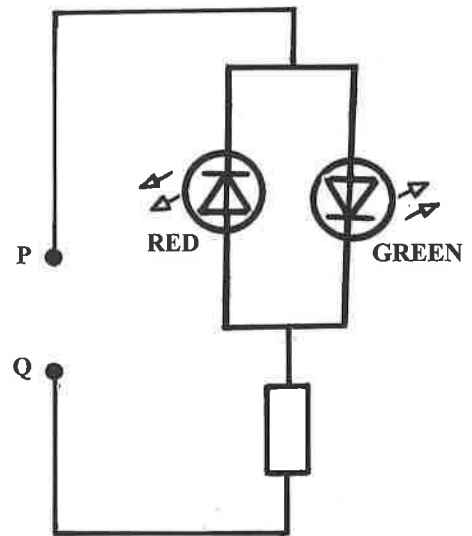


Fig. 18

(b) Name the components labelled A and B in the circuit shown below. (6)

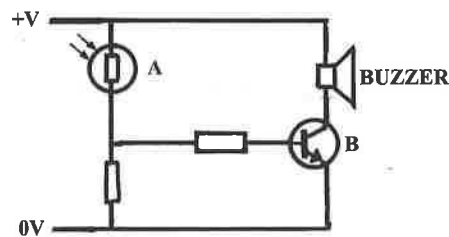


Fig. 19

What would happen to the buzzer if a light were shone on A? Give a reason for your answer. (12)

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

(a) The primary source of our energy is the Sun.

List **three** ways in which the Sun's energy can be harnessed by us for our benefit. (9)

What energy changes occur in each of the following cases:

(i) petrol used by the engine of a car going on a journey

(ii) a girl moving back and forth on a swing? (6)

(b) The diagram shows a simple dynamo wired to a lamp.

Name the parts labelled X and Y. (6)

Explain why the lamp lights when the handle is rotated. (9)

State the energy change that occurs in a dynamo. (3)

What will determine the brightness of the lamp in this circuit? (3)

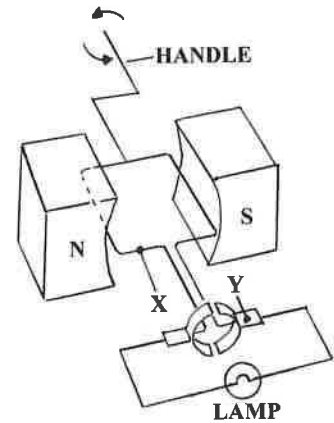


Fig. 20