

AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1971

SCIENCE — SYLLABUS A

FRIDAY, 18th JUNE — MORNING, 9.30 to 12

Answer *six* questions, choosing at least one question from each section.
All the questions carry the same number of marks.

A Periodic Table is given in the Mathematical Tables which may be had from the Superintendent.

SECTION I

- (a) Describe, with the aid of a diagram, how you would construct a mercury barometer. State how you would use it to measure the pressure of the atmosphere.
(b) When a 15 gram weight is attached to a taut spiral spring it extends the spring by 1.2 cm. When the 15 gram weight is replaced by another weight, the extension of the spring is 1.8 cm. Why can we conclude that the other weight is 22.5 grams?
Under what circumstances would a spiral spring fail to give the correct result?
- What is meant by conduction, convection, radiation of heat? Give an example of each.
What is meant by the conservation of energy? Explain why a nail becomes hot when struck a number of times by a hammer.
List the quantities that must be measured in order to calculate the heat lost by a hot body in an experiment.
- Draw a labelled diagram of a gold-leaf electroscope and describe how it may be charged.
Using the charged electroscope and a plastic rod, how would you show that plastic is a good electrical insulator?
Name the units in which current, potential difference, are measured. Write down the relationship between the current (I) and the potential difference (E) for a given piece of wire.
- Answer *three* of the following.
 - In terms of moving molecules account for (i) the pressure exerted by a gas, (ii) the evaporation of a liquid on being heated.
 - Write down the relationship between the wavelength, frequency, velocity of a wave. A guitar string emits a note of wavelength 1.7 metres. Calculate the frequency of the note given that the velocity of sound in air is 340 metres per second.
Give an example which shows that light travels faster than sound.
 - Describe how you would show the magnetic field around a straight wire that is carrying a current.
Draw a sketch to show the magnetic field due to a solenoid carrying a current.
 - Explain the terms (i) velocity, (ii) acceleration, (iii) work. Give an example to illustrate that "to every action there is an equal and opposite reaction".
 - Describe an experiment to demonstrate diffusion in liquids or in gases.
What is meant by viscosity? Name a liquid that is more viscous than water.

SECTION II

- The formula for a molecule of water is H_2O . What does that tell you about the composition of water?
Describe, with the aid of a labelled diagram, an experiment to show that hydrogen is one of the elements of which water is composed.
How would you show that tap-water contains (i) dissolved solids, (ii) dissolved gas?
- (a) Draw a labelled diagram to show how you would prepare and collect hydrogen. Write the name and formula for any four compounds of hydrogen.
(b) What do you understand by the pH of a solution? Name a solution which has a pH less than 7. Where in the human digestive system is the pH less than 7?
- Mention the similarities between the properties of the elements lithium, sodium, potassium and account for the similarities by reference to their electronic structures.
Draw a diagram to show the structure of an atom of chlorine. Describe how a sodium atom and a chlorine atom combine electrovalently. Show where oxidation and reduction take place and name the oxidising agent.

[P.T.O.]

8. Answer *three* of the following.

- Distinguish between elements and compounds. State which of the following are compounds: helium, calcium carbonate, aluminium, ammonia, air, carbon, sugar.
- Describe how you would burn carbon in oxygen. Name the compound formed and describe a test you would perform in order to identify it. How would you show that sugar contains carbon?
- If you were given iron, copper and calcium, state what experiments you would perform in order to place these metals in the order of their activities. Write down the three metals in the order in which they occur in the activity series.
- Distinguish between electrons and neutrons.
In terms of atomic structure how do isotopes of an element (i) resemble one another, (ii) differ from one another?
What can be said of the chemical properties of isotopes of the same element?
- List the principal properties of sulphur dioxide. Calculate the mass of sulphur dioxide formed when 4 grams of sulphur are burned, given the equation



SECTION III

9. Give three sketches of a twig as it would appear in winter, spring and summer to show the seasonal changes undergone by a deciduous tree.

During a field trip it was observed that flowering plants favoured areas at some distance from trees rather than close to trees. Give two possible reasons for this.

Give an example of the part an insect may play in the life cycle of a flowering plant. Name two ways in which the plant attracts the insect for this purpose.

10. Draw a simple labelled diagram to show the following parts of a flowering plant: root, stem, leaf, axillary bud.

Give two functions of the root and two functions of the stem in the life of the plant.

Describe how you would show experimentally that water is lost to the atmosphere through the aerial parts of a plant.

Give two functions of water in the plant. Mention two atmospheric conditions which would cause an increase in the rate of water loss by the plant.

11. The skin is part of the sensory system by which the body detects changes in the external environment. Name three other organs used by the body for detecting changes in the external environment.

When you touch an object with your finger, how is the signal sent from the fingertip to the brain? Compare that system with the action of hormones in regard to the time taken to react and the duration of the action.

The skin is also an excretory organ: what does this mean? Name (i) a substance excreted by the skin, (ii) two other excretory organs, (iii) two types of substance excreted by one of those organs.

12. Answer *three* of the following.

- List three methods by which seeds are dispersed.
Name two methods, other than seed, which may be used to reproduce plants, and describe one of the methods briefly.
- Describe an experiment you would perform to show that there are bacteria on your fingers.
- Classify each of the following under the two headings "primary producers" or "consumers": algae, fungi, earthworms, mosses, insects, ferns. Give an example of a food chain.
- Draw a simple diagram of the male reproductive system of the rabbit and label the following parts: testis, sperm duct (vas deferens), prostate gland, urethra, penis.
- What do you understand by phototropism and geotropism?
Describe an experiment to demonstrate one of these.