INTERMEDIATE CERTIFICATE EXAMINATION, 1980

SCIENCE—SYLLABUS A **A**

TUESDAY, 17 JUNE - MORNING, 9.30 to 12

Examination Number

SECTION A (See separate sheet for Sections B, C, D.)

Thirty items to be answered. All items carry the same marks.
Write your answers in the spaces provided.
Section A carries half the total marks for the paper.
Be sure to return this Section of the examination paper: enclose it in the answer-book you use in answering Sections B, C, D.

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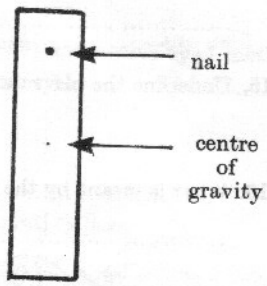
1. Explain what is meant by acceleration and state the units in which it is measured.
Rate of increase in speed
m/s ✓

2. What is the frequency of sound waves in air if the wavelength is 2 metres and the velocity of sound in air is 340 metres per second?

3. Mention any *two* regions of the spectrum which are invisible to the human eye.
(i)
(ii)

4. What is the state of equilibrium of a rectangular piece of wood hanging freely from a nail as shown in the diagram?
stable ✓



5. What colour of light is obtained when each of the following pairs of coloured lights are mixed?
(i) Red and green
(ii) Blue and yellow

6. It is possible to arrange a pin or a blade so as to remain on the surface of water. What does this experiment illustrate? Surface tension ✓
surface tension

7. A current of 0·5 amperes flows through a wire when the potential difference is 12 volts. What is the resistance of the wire?

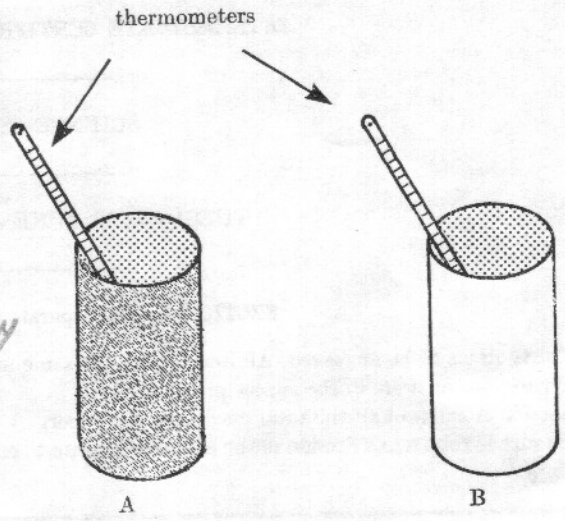
8. Suggest *two* reasons why water is unsuitable as a liquid in thermometers.
(i) It is transparent
(ii) It has a range of only 0°C to 100°C as a liquid ✓

9. A certain mass of gas occupies a volume of 100 cm³ at 20°C and at a pressure of one atmosphere. Calculate its volume at 20°C and at a pressure of two atmospheres.

$\frac{100}{1} \quad \frac{100}{1} = \frac{x}{2} \quad 100x =$

10. The two cans shown in the diagram are identical except that the outside surface of A is black and that of B is white. The cans are filled with boiling water. State, giving your reason, which thermometer will show the more rapid fall in temperature.

The black one as Black radiates Heat more quickly than white ✓



11. If the mass of the proton is $1{\cdot}67 \times 10^{-24}$ grams, write down, in a similar form, its mass in kilograms.

$1{\cdot}67 \times 10^{-27}$ ✓

12. Name *one* other substance showing magnetic properties similar to those found in iron and steel.

cobalt

13. If an atom of potassium has an atomic number of 19 and a mass number of 39, write down

(i) the number of electrons in the atom 19 ✓

(ii) the number of neutrons in the atom ≥0 ✓

14. What is a base according to the Brønsted-Lowry theory?

Something with pH 0

15. Underline the pH value of a hydrochloric acid solution from the following list:

2 8 11 13

16. What is meant by the valence of an element? The No. of Electrons An atom must lose or gain to get a stable structure ✓

17. Complete and balance the following equation:

$$Na + Cl_2 =$$

18. In the reaction between sodium and chlorine (question 17), state the substance oxidised and the substance reduced.

substance oxidised .....

substance reduced .....

19. Underline the metal, in the following list, which does not displace hydrogen from dilute acids:

iron magnesium silver potassium

20. When concentrated sulphuric acid is added to water, heat is evolved. Is the heat of solution, endothermic or exothermic? .....

21. State the law of conservation of matter. Matter may neither be created or destroyed. ✓

22. Describe in words, or by means of a diagram, the shape of the ammonia molecule.

.....

Pyramidal

23. State a method which may be used to remove permanent hardness from water.

.....

.....

24. Write the chemical formula for each of the following compounds:

(i) Ammonium chloride .....

(ii) Sodium hydroxide .....

25. State *two* functions of the root in plants.

(i) .....

(ii) .....

26. Underline in the following list the substance that gives a deep blue colour when tested with iodine solution:

glucose starch water salt

27. At the end of the digestive process proteins have been broken down to.....

.....

28. Use one word to describe the change from tadpole to frog.....

29. In the inner ear, there is a coiled structure which converts sound into nerve impulses. The name of this structure is the .....cochlea.....cochlea

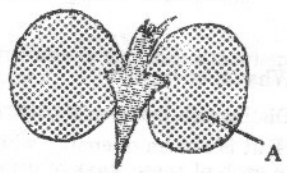
30. In eye colour, brown is dominant over blue. A brown-eyed father (genotype BB) and a blue-eyed mother (genotype bb) have a family of four children. How many of the children have brown eyes?.....3.....

31. Name *two* substances excreted by the lungs.

(i)..... (ii).....

32. Name the structure marked A in the diagram of a dissected pea seed.

.....



What is the function of A? .....

.....

33. Give the names of any *two* organs of vegetative propagation in plants.

(i).....

(ii).....

34. Underline in the following list the organ which produces the female gametes:

uterus vagina ovary fallopian tube

35. Mention briefly *two* ways in which arteries differ from veins (i).....one carrys .....ox.....

.....

(ii) .....

.....

36. Give *two* examples of how bacteria are beneficial to man.

(i) .....

(ii) .....

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SCIENCE—SYLLABUS A **A**

TUESDAY, 17 JUNE - MORNING 9.30 to 12

Answer Section A and **one** question from each of the Sections B, C, D.

SECTION A

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

SECTIONS B, C, D

The questions from these sections should be answered in your answer-book.

Answer **one** question from each Section. All questions carry the same marks.

SECTION B

1. (*a*) Draw a labelled diagram of a gold-leaf electroscope and describe how you would charge it positively by induction.

Describe how you would use the charged electroscope

(i) to determine whether a charged body is positively or negatively charged,

(ii) to determine whether a piece of plastic is a conductor or an insulator.

(*b*) Describe how you would plot the magnetic field around a current-carrying straight wire and draw a diagram showing the result you would expect to obtain from the experiment.

2. What is energy?

Distinguish between kinetic energy and potential energy.

Heat is a form of energy which may be generated mechanically, chemically or electrically. Give one example of each of these ways of generating heat.

Define (i) specific heat capacity, (ii) specific latent heat of evaporation (vaporisation).

The heat required to convert 10 grams of water at 100°C into steam at 100°C is 2260 joules. Calculate the specific latent heat of evaporation (vaporisation) of water.

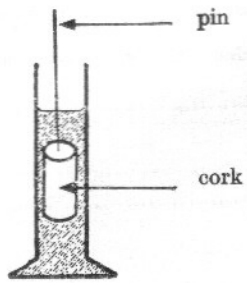
3. (*a*) Explain the terms: (i) force, (ii) pressure.

Describe a simple experiment to show that the atmosphere exerts pressure.

(*b*) Define density.

Describe how you would measure the density of a small potato.

A floating cork displaces 2 cm^3 of water. When held below the surface of the water with a pin (see diagram), the cork displaces 10 cm^3 of water. Calculate the density of the cork.



SECTION C

4. Explain the terms: element, compound, mixture.

Mention *two* differences between a compound and a mixture.

In the case of each of the following substances, state whether it is an element, a compound or a mixture: water, air, nitrogen, ammonia, chlorine.

In the case of either a compound *or* a mixture from the above list, name the elements it contains and describe an experiment to show that it contains *one* of these elements.

5. "Isotopes and allotropes of carbon exist". Explain clearly the underlined words.

Name *two* allotropes of carbon and mention one common use of each of the allotropes you have named.

Describe, with the aid of a diagram, the preparation of carbon dioxide and list *three* of its physical properties and *three* of its chemical properties. Give a balanced equation for the reaction involved in the preparation.

6. Draw simple diagrams to show the structures of atoms of the following elements: lithium, sodium, potassium and explain why these elements are so similar chemically.

Select one of the above elements and state how the element reacts with water. Name the products and explain how one of the products could be used to prepare a salt. Name the salt. What type of bonding is present in the salt?

SECTION D

7. (*a*) Describe simple experiments, one in each case, to show the presence of air, humus and micro-organisms in a sample of soil. For each of these three soil components, mention one way in which it is useful in the soil.

(*b*) Explain the terms: (i) producer, (ii) consumer.

Beginning with a producer, construct a food chain of not less than two consumers from the ecosystem you have studied. In the case of one consumer in the food chain, mention one way in which it is adapted to life in the ecosystem.

8. Two major functions of the leaf in green plants are photosynthesis and transpiration. Explain clearly the underlined words.

Describe simple experiments, one in each case, to show (i) that oxygen is produced during photosynthesis, (ii) that the leaves of a green plant transpire.

Plant shoots usually bend towards light. Name this process and describe a simple experiment to illustrate it. What advantage is the process to the plant?

9. Explain the terms: sensory neuron, motor neuron, reflex action.

Give *one* example of a reflex action and draw a simple diagram showing the nerve pathway involved.

What is a hormone?

Name *one* hormone found in the human body. Name the gland that produces it and indicate where the gland is located in the body. Give *one* function of the hormone you have named.

Compare briefly nerve action with hormone action under the following headings:

(i) how quickly the action takes place,

(ii) how long the effect lasts.