

INTERMEDIATE CERTIFICATE EXAMINATION, 1972

SCIENCE—SYLLABUS A

THURSDAY, 15th JUNE—AFTERNOON, 2.30 to 5

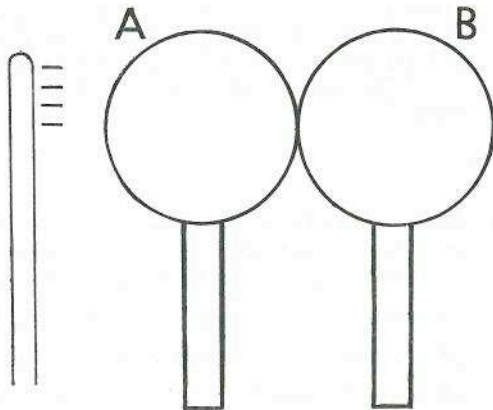
Six questions to be answered, one question at least being chosen from each Section. All the questions carry the same number of marks.

A Periodic Table is given in the Mathematics Tables.

SECTION I

1. (a) How would you show that the weight of the liquid displaced by a floating body is equal to the weight of the body?
A submarine floats when its ballast tanks are empty but not when the tanks are filled with water. Why?
- (b) How would you demonstrate surface tension?
Sketch (i) the meniscus of mercury, (ii) the meniscus of water, in a vertical tube.
2. (a) What is meant by (i) velocity, (ii) acceleration?
The velocity of a car increases uniformly from 4 metres (400 cm) per second to 10 metres (1,000 cm) per second in 3 seconds. Find the acceleration of the car.
- (b) How would you demonstrate the distinction between heat and temperature?
Sometimes it is possible to give heat to a substance without raising its temperature: give two examples.

3. (a) A and B are two uncharged metal spheres, in contact, on insulating handles. A negatively charged polythene rod is brought close to A as shown, and then the spheres are separated.



- (i) What charge is induced on A?
- (ii) What charge is induced on B?

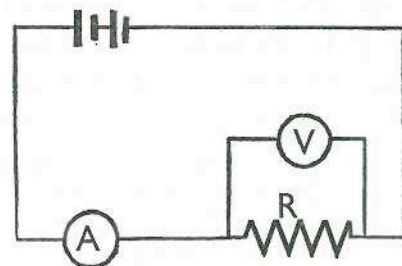
Account for what happens in terms of the movement of electrons.

- (b) Name three effects of an electric current and describe an experiment to demonstrate one of them.

What does it cost to run a 100 watt lamp for 25 hours at 0.8p per kilowatt-hour?

4. Answer ten of the following (a), (b), (c), etc. Keep your answers short.

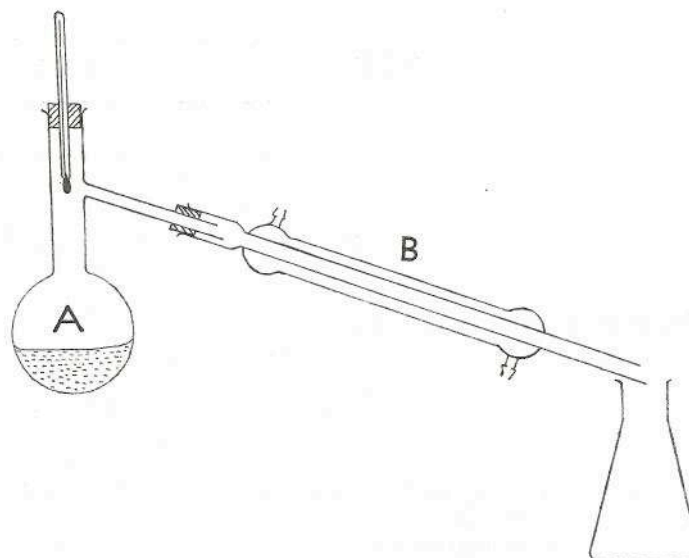
- (a) When the pressure on a gas is doubled, what happens to the volume?
- (b) If the ammeter A (see diagram) reads 2.5 amperes and the voltmeter V reads 7.5 volts, what is the resistance of R?
- (c) The densities of lead, iron, gold and mercury are respectively 11.3, 7.8, 19.3, 13.6 grams per cm^3 . Which of these solids would sink in mercury?
- (d) What energy conversions take place (i) in a coal fire, (ii) in a microphone?



- (e) What effects can a force have on a body?
- (f) The following represent the radius of an atom, the radius of the moon, the radius of the sun (but not in that order): 1.4×10^{-10} metres, 7.0×10^8 metres, 1.7×10^6 metres. Which is the radius of the sun?
- (g) A 10 gram weight extends a taut spiral spring 1 cm. If a pencil extends the spring by 0.5 cm, what is the weight of the pencil?
- (h) What is meant by the kinetic energy of a body?
- (i) Write down the relationship between wavelength, frequency and velocity.
- (j) If you were to measure the pressure of the atmosphere what value approximately would you expect to get?
- (k) What light is obtained (i) when red, green and blue lights are mixed, (ii) when red light and green light are mixed?
- (l) Name the main ways in which heat is transmitted (i) when water is heated in a beaker, (ii) when the sun heats the earth.

SECTION II

5. (a) Why do we say that water is a compound and air is not?
- (b) Describe, with the aid of an example in each case, what you understand by
- crystallisation,
 - sublimation,
 - evaporation.
- (c) The flask A contains a mixture of alcohol and water. What happens on heating the mixture to about 78°C ? What is the process called? What is the function of B and what is B called? How may the sample of alcohol be purified further?

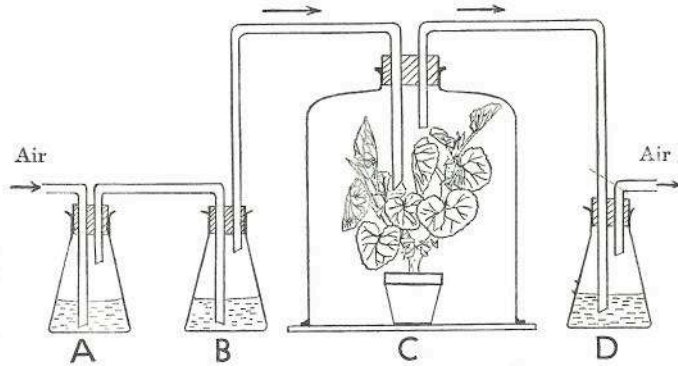


6. Chlorine, bromine and iodine form part of the same family of elements. What is the family called? What kind of bond do they form with (a) metals, (b) non-metals? Give one example of (a) and one example of (b).
 Draw a clearly labelled diagram of the apparatus you would use to prepare and collect chlorine.
 List the principal properties of chlorine and compare them with those of bromine and iodine.
7. What is (i) an acid, (ii) a salt, (iii) an indicator, (iv) pH?
 Outline the principal properties of nitric acid. How would you use nitric acid to prepare sodium nitrate? Write a chemical equation for the preparation.
 What pH would you expect distilled water to have? Name a solution that has a pH greater than 7.
8. Answer ten of the following items, (a), (b), (c), etc. Keep your answers short.
- When carbon dioxide is passed into limewater a precipitate is formed, but this precipitate dissolves if the gas continues to be passed into the solution. Explain these reactions.
 - Name a catalyst and give an example of its use.
 - Mention two elements which have allotropes.
 - State the number of electrons in the potassium atom which is represented by ${}_{19}^{39}\text{K}$.
 - State whether the following changes are oxidation or reduction: (i) obtaining copper from copper oxide, (ii) changing sodium sulphite into sodium sulphate.
 - What use may be made of an ion-exchanger?
 - Arrange in decreasing order of activity the metals iron, calcium and copper.
 - What do you understand by heat of solution?
 - Name a substance that causes permanent hardness in water.
 - A solid element X is easily cut with a knife, reacts vigorously with water and takes fire, forming an alkaline solution. To what family of elements does X belong? What is the valence of X?
 - An element on burning in oxygen forms a compound which is a gas at room temperature. Which of the following elements could it be: magnesium, sulphur, carbon, phosphorus?
 - Mention a chemical property of methane and name any other paraffin.

SECTION III

9. Describe under the following headings a habitat you have studied.
- Map or diagram to show the main features of the habitat.
 - Four plants and four animals commonly found in the habitat.
 - Two food chains that involve some of the above plants and animals.
 - An example, other than in food chains, of (a) the dependence of plants on animals, (b) the dependence of animals on plants.
 - An example of (a) competition, (b) adaptation.

10. The apparatus shown here is used to find out if a green plant gives out carbon dioxide during respiration. A green plant is placed in the bell-jar C and the bell-jar is then covered with a black cloth. Flask A contains sodium hydroxide. Flasks B and D contain another solution.

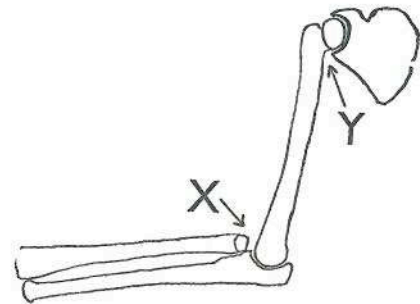


- Name the solution in B and D. Why is this solution used in B and why is it used in D?
- What is the purpose of the sodium hydroxide?
- Why is the bell-jar covered?
- What else other than a green plant would give the same result in the experiment?
- Explain briefly why respiration does not lead to an accumulation of carbon dioxide in the atmosphere.

11. What functions, other than movement, has the skeleton of an animal?

The diagram represents the arm bones and shoulder joint of man.

- What type of joint is shown at X?
- What type of joint is shown at Y?
- Explain how the movement of joint X differs from the movement of joint Y.
- Name one other place in the body where a joint similar to X occurs and a place where a joint similar to Y occurs.
- Describe how the muscles raise and lower the forearm.
- What is the chief difference between the way in which the muscles and the skeleton are arranged in mammals and the way they are arranged in arthropods (e.g. insects, crustaceans)?



12. Answer **ten** of the following, (a), (b), (c), etc. Keep your answers short.

- A green plant is illuminated on one side. What effect would this have on the growth of the shoot?
- Give one function of petals.
- What is meant by metamorphosis in the life cycle of the frog?
- Give one way in which fungi are useful to man.
- What conditions are necessary for the germination of seeds?
- What is meant by fertilization?
- State one function of white blood cells.
- What do you understand by reflex action?
- What part of the eye controls the amount of light entering it?
- Where are protein foods broken down in the human digestive system?
- Give an example of a stem modified for vegetative reproduction.
- What is the main function of the kidneys?