

INTERMEDIATE CERTIFICATE EXAMINATION, 1987

SCIENCE — SYLLABUS A

Examination Number

WEDNESDAY, 17 JUNE — MORNING, 9.30 to 12.00

A

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

Thirty items to be answered. All items carry the same marks.

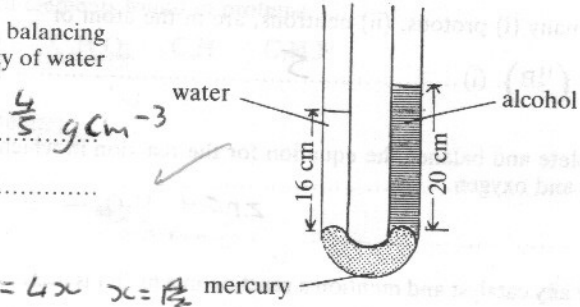
Write your answers in the spaces provided.

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. What is meant by the mass of a body? *Volume x Density*
 2. A force of 20 newtons is exerted at a perpendicular distance of 2.5 metres from the fulcrum of a lever.
Calculate the moment of the force *50*
 3. A body that returns to its original shape when released from the effect of a force is said to be *Elastic* ✓

4. The diagram shows a U-tube containing balancing columns of alcohol and water. If the density of water is 1 g cm^{-3} calculate the density of alcohol



$\frac{4}{5} \text{ g cm}^{-3}$

$16 : 1 = 20 : x$

$\frac{1}{4} = \frac{20}{20}$

$5 = 4x \quad x = \frac{5}{4}$

5. Give any two differences between a solid and a liquid.

(i) solid has a fixed ~~shape~~ ^{shape} and liquid does not

(ii) 2 solids con, 2 liquids can? I cannot understand

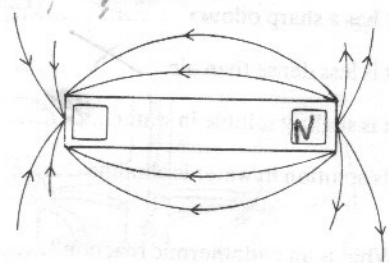
6. What property of mercury makes it very suitable as a liquid in barometers? Density is high ✓

7. Define the term work work is the using of energy to move objects. Is this the definition?

8. Calculate the number of joules of heat required to raise the temperature of 200 grams of water by 5°C if the specific heat capacity of water is $4,200 \text{ J/kg}^\circ\text{C}$ 4,200

9. Name the invisible rays of light which cause certain materials (e.g. a handkerchief washed in a certain type of washing powder) to fluoresce (glow) ultra violet

10. The diagram shows the lines of force around a bar magnet. Place the letter N in the box at the north pole of the magnet.



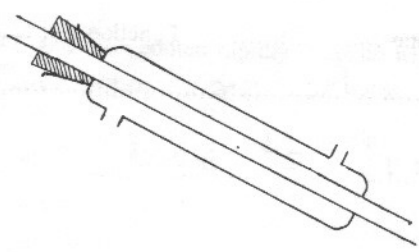
11. Underline in the following list the correct term for resistance to flow in liquids.
capillarity surface tension viscosity diffusion

12. Dispersion occurs when white light is passed through a prism. What is meant by dispersion?
..... The seperation of different wavelengths of light

13. What is meant by a chemical change? A change where new compounds are formed after the change
Give one example Rusting

14. A solution which cannot dissolve any more of a substance at a certain temperature is known as a saturated solution.

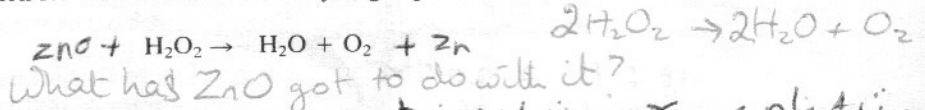
15. Name the part of the distillation apparatus shown in the diagram condenser



16. How many (i) protons, (ii) neutrons, are in the atom of

boron ($^{11}_3\text{B}$). (i) 5 (ii) 6

17. Complete and balance the equation for the reaction in which hydrogen peroxide (H_2O_2) is decomposed to water and oxygen.



18. Name any catalyst and mention a reaction in which it is used Digesting & splitting

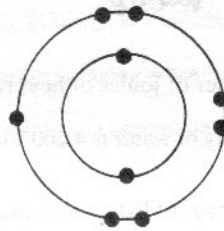
up starch \rightarrow saliva

19. Rhombic and monoclinic sulphur are different physical forms of the element. They are known as Allotropes of sulphur.

20. Underline the non-planar molecule in the following list.

methane hydrogen water

21. The diagram shows the arrangement of electrons in shells for an atom of element X. Give the name and valence of X.



Name Fluorine Valence 1

22. In the following list of statements about ammonia mark X after the one that is incorrect.

- It has a sharp odour.....
- It is less dense than air.....
- It is slightly soluble in water.....
- Its solution in water is alkaline

23. What is an endothermic reaction? takes in heat

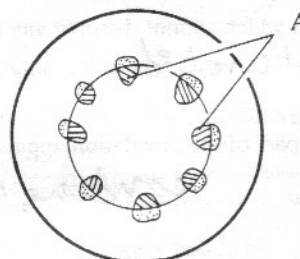
24. Underline the alkali metal in the following list.

magnesium sodium calcium zinc

25. Give two differences between plant and animal cells.

- (i) Plants have vacuole
- (ii) " " cell wall

26. Give the name and function of the part labelled A in the diagram of a transverse section of a dicotyledonous stem.



Name Function

27. Underline in the following list the group of elements found in proteins.

C, H, O, N C, H, O C, H C, H, N

28. State *one* function of the ear other than hearing.

..... Balance

What part of the ear carries out this function? canals

29. Strong heating (e.g. in a crucible over a bunsen burner) removes water and X from soil.

What is X? water

Why is X important in the soil? plants need it ; It ~~is~~ stops
the soil getting blown away

30. Select from the list: colonisation, succession, dispersal, the most suitable term to describe the development of a plant community through a series of stages beginning with the simplest plant forms. dispersal

31. Fungi are unable to make their own food because they lack a substance called chlorophyll which is found in green plants.

32. The chromosomes in the nuclei of cells carry the DNA genes which are responsible for the passing on of characteristics from one generation to the next.

33. Underline in the following list the place where fertilisation normally occurs in the human female.

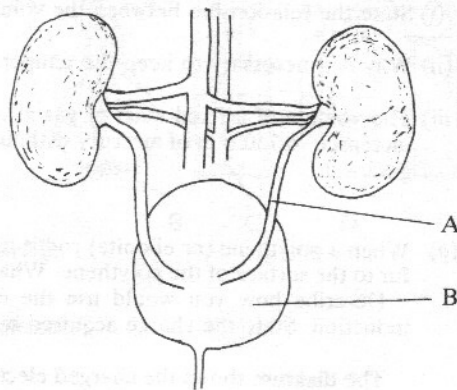
uterus cervix fallopian tube (oviduct) vagina

34. The diagram shows one of the main excretory systems of the human body.

Name A kidneys

What is the function of B?

..... storage & excretion
of urine



35. Put the symbol ✓ in the box opposite the correct order in which the blood passes through the other three chambers of the heart after leaving the left atrium (auricle).

- (i) right atrium, right ventricle, left ventricle
- (ii) left ventricle, right ventricle, right atrium
- (iii) left ventricle, right atrium, right ventricle
- (iv) right ventricle, left ventricle, right atrium

36. In the pasteurization process milk is heated briefly above 70°C and then cooled rapidly. Explain why this helps to keep the milk fresh. It kills bacteria & when

cooled gives them no time to breed again

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SCIENCE — SYLLABUS A

A

WEDNESDAY, 17 JUNE — MORNING, 9.30 to 12.00

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. Define volume.

Describe, with the aid of a diagram, an experiment to measure the volume of a small stone.

Outline how you would find the volume of one drop of water from a dripping tap, assuming that all the drops have the same volume.

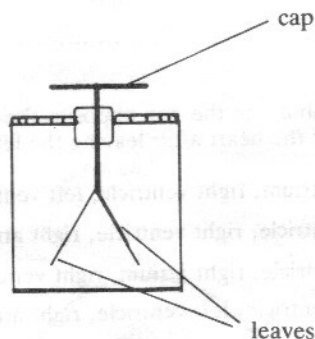
At constant temperature the volume of a fixed mass of gas is related to its pressure.

- (i) State the relationship between the volume and the pressure.
- (ii) Why is it necessary to keep the temperature constant?
- (iii) The volume of a fixed mass of gas at a pressure of 720 mm of mercury is 500 cm^3 . If the pressure is increased to 750 mm of mercury without changing the temperature, what will be the new volume of the gas?

2. (a) When a polythene (or ebonite) rod is rubbed with fur, electrons are transferred from the surface of the fur to the surface of the polythene. What electric charge is acquired (i) by the fur, (ii) by the polythene?

Describe how you would use the charged polythene rod to charge a gold leaf electroscope by induction. State the charge acquired by the electroscope.

The diagram shows the charged electroscope. What change, if any, would you notice in the leaves (i) if the charged fur were held close to the cap, (ii) if a copper rod were held in contact with the cap?

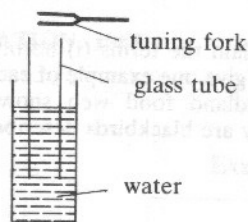
(b) Give *one* example to show that electricity is a form of energy.

Household electricity bills are based on the number of units of electrical energy used. What is the correct name for these units?

If the cost of one of these units of electricity is 8 p and the total cost of using a 2.5 kW heater for X hours is 60 p, calculate the value of X.

3. (a) Explain the terms wavelength, frequency, of a wave. How are they related to the velocity of a wave?

Using the apparatus shown in the diagram, it was found that the tuning fork of frequency 256 Hz emitted a note of wavelength 1.3 metres. Calculate the velocity of sound in air.



Sketch the apparatus you would use to demonstrate that sound waves need a medium in which to travel, and give a brief account of the experiment.

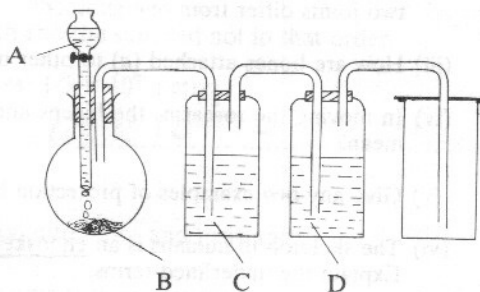
- (b) What is meant by convection of heat?
Describe a simple experiment to show convection in liquids.
Give *one* example of convection.

SECTION C

4. Air is a mixture of the following elements and compounds: nitrogen, oxygen, carbon dioxide, water vapour, the noble gases.

- Explain the underlined terms.
- Name the *two* compounds from the above list.
- Describe simple experiments, one in each case, to show that the two compounds you have named are present in the air.
- In the case of either *one* of these two compounds, name the elements present, and describe an experiment to show that the compound contains *one* of the elements named.
- Choose any named noble gas and explain, in terms of electrons, why it does not normally undergo chemical reactions.

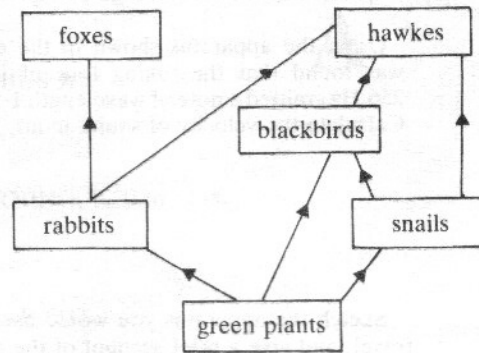
5. The laboratory preparation of pure dry chlorine is carried out in the fume cupboard using the apparatus shown in the diagram.



- Why is it essential to use the fume cupboard?
 - Name A and B.
 - Give the name and function (a) of liquid C, (b) of liquid D.
 - State the following properties of chlorine:
colour, odour, solubility in water, reaction to moist litmus.
 - Hydrogen combines readily with chlorine.
Write a balanced equation for this reaction and name the product.
 - Tiny amounts of chlorine are added to the drinking water supply in many towns and cities. Explain the purpose of this.
6. (a) Explain the terms (i) acid, (ii) base, (iii) salt.
Describe how you would prepare a reasonably pure sample of a named salt and write an equation for the reaction involved.
What is the pH scale?
The pH of pure water is 7. If sulphuric acid were added to pure water, would the pH increase, decrease, or remain the same?
- (b) Hardness in water is due to the presence of certain ions which make it difficult to form a lather with soap. The hardness may be temporary or permanent.
- Name an ion that causes hardness in water.
 - What is meant by *permanent* hardness?
Describe one method of removing permanent hardness from water.

SECTION D

7. (a) Explain the terms (i) herbivore, (ii) carnivore, and give one example of each from the part of a woodland food web shown in the diagram. Why are blackbirds described as omnivores?

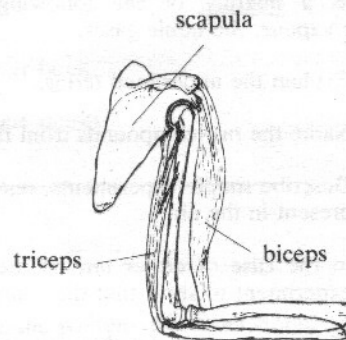


Select a food chain from the food web diagram, and draw a pyramid of numbers for the food chain you have selected. Suggest an explanation for the different numbers of organisms in the pyramid.

- (b) Choose *one* of the following: pooter, quadrat, Tullgren funnel, beating tray, and describe briefly how you would use it in your study of an ecosystem.

The nitrogen cycle plays a very important part in the life of the ecosystem. Give a simple outline of this cycle and explain briefly why it is important.

8. The diagram shows the arm bones, the scapula (shoulder blade), and two of the muscles in the human arm.

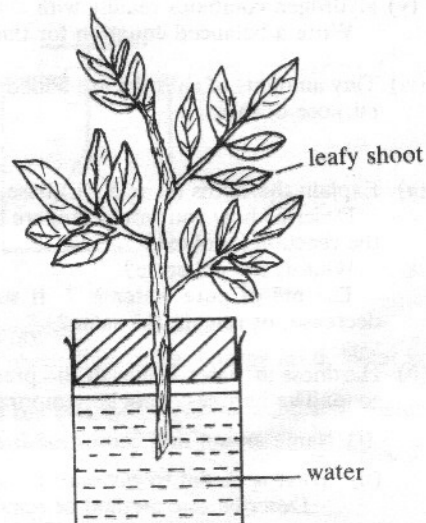


- (i) Name (a) the bone in the upper arm, (b) the two bones in the forearm.
- (ii) What type of joint is found (a) at the shoulder, (b) at the elbow? In terms of movement, how do these two joints differ from one another?
- (iii) How are bones attached (a) to other bones, (b) to muscles?
- (iv) In moving the forearm, the biceps and triceps act as an antagonistic pair of muscles. What does this mean?
- (v) Give any *two* examples of protection by the skeleton of important organs of the body.
- (vi) The skeleton in humans is an endoskeleton while the skeleton in crabs and lobsters is an exoskeleton. Explain the underlined terms.

9. (a) Explain the terms (i) seed, (ii) germination. Draw a labelled diagram of a seed, and say what part of the seed (i) grows to form the root, (ii) grows to form the shoot, (iii) acts as a food store. Describe an experiment to show that germination depends on temperature.

- (b) What is meant by *transpiration*? The apparatus shown in the diagram was weighed at noon, 6 p.m. and midnight. The masses obtained are given in the following table.

Time	12 noon	6 p.m.	12 midnight
Mass	491 g	482 g	479 g



Assuming that the changes in mass are due entirely to transpiration, calculate the average transpiration rate in grams per hour (i) for the period from noon to 6 p.m., (ii) for the period from 6 p.m. to midnight. Suggest a reason for the difference between the two rates.