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**AN ROINN OIDEACHAIS**  
**INTERMEDIATE CERTIFICATE EXAMINATION, 1991**

55728

**A**

**SCIENCE — SYLLABUS A**

**TUESDAY, 11 JUNE — MORNING, 9.30 to 12.00**

**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.**

1. A car, starting from rest, accelerates at  $3 \text{ m s}^{-2}$  for 6 seconds. What is the velocity of the car at the end of the 6 seconds? .....

2. Name the state of equilibrium of a spherical marble at rest on a clockglass as shown in the diagram below.



3. What causes the random (Brownian) movement of smoke particles in air or of pollen grains in water? .....

4. Underline, in the following list, the mass of the hydrogen atom.

$3.4 \times 10^2 \text{ kg}$

$2.4 \times 10^{24} \text{ kg}$

$1.7 \times 10^{-27} \text{ kg}$

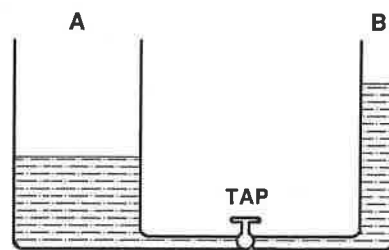
5. Explain the term elastic limit. ....

6. Define centre of gravity .....

7. Calculate the amount of heat released when 3 kg of steam at  $100^\circ \text{C}$  condenses to water at  $100^\circ \text{C}$  given that the specific latent heat of vaporisation of water is  $2.260 \text{ kJ kg}^{-1}$ . .....

C

8. When the tap is opened what happens to the water level in A and in B as shown in the diagram?



.....

.....

.....

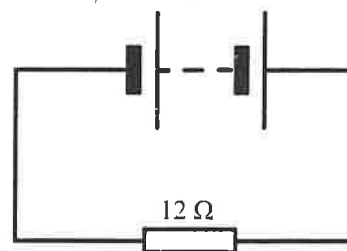
9. If the velocity of sound in air is  $330 \text{ m s}^{-1}$ , calculate the wavelength of a note of frequency 660 Hz.

.....

10. When a polythene (or ebonite) rod is charged 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?

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

11. The potential difference across the resistor as shown in the diagram is 6 volts. What is the current in the resistor?



.....

.....

12. What colour results when the following coloured lights are mixed?

(i) red and blue .....

(ii) blue and yellow .....

13. What is a chemical change? .....

.....

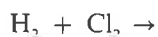
14. Show, on a Bohr-type diagram, the arrangement of the electrons in an atom of fluorine,  ${}^9\text{F}$ .

15. What is meant by the valence of an element?

.....

.....

16. Complete and balance the following equation:

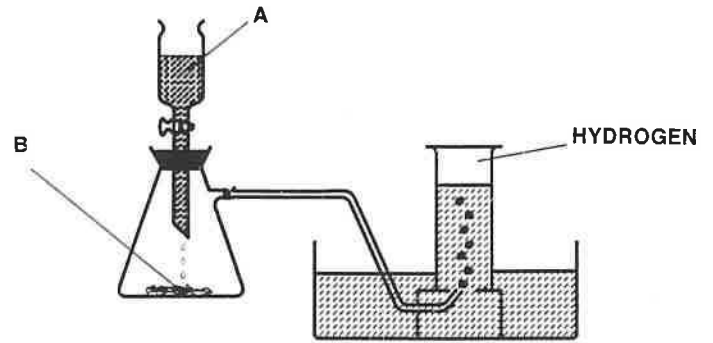


17. Name a substance that sublimes on heating. ....

18. Write down a chemical formula for a liquid A and for a solid B that could be used, as shown, in the diagram of an apparatus for the preparation of hydrogen.

Liquid A .....

Solid B .....



19. Chemical reactions that take in heat from their surroundings are known as ..... reactions.

20. Why is concentrated sulphuric acid *not* used in the preparation of *dry* ammonia?

.....  
 .....

21. Oxidation is the ..... of electrons while reduction is the ..... of electrons.

22. Underline the amphoteric oxide in the following list:

MgO      Al<sub>2</sub>O<sub>3</sub>      CaO      SO<sub>2</sub>

23. Name a metal that can displace copper from a solution of copper sulphate.....

24. State the shape of each of the following molecules.

(i) water .....

(ii) methane .....

25. Distinguish between ligaments and tendons.

.....  
 .....

26. Give the word used to describe the changes that take place during the pupal stage of the life cycle of an insect:

.....

27. What is meant by respiration? .....

.....

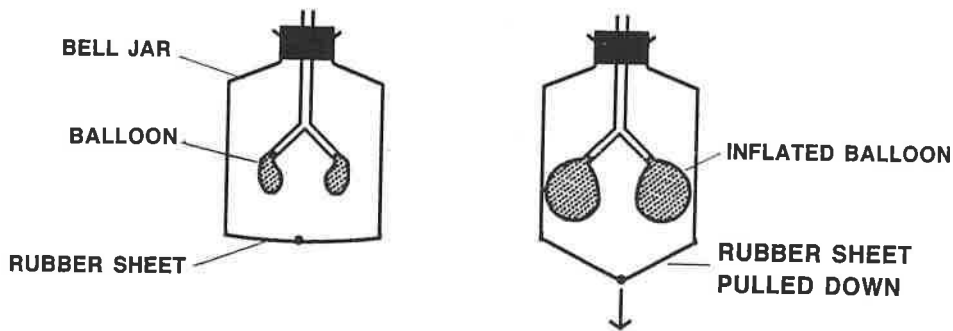
28. Underline which of the following is the normal number of permanent teeth in an adult human.

20      26      28      32

29. Enzymes are .....

.....

30. The diagrams show a simple model used to demonstrate the breathing mechanism in humans. Why do the balloons inflate when the rubber sheet is pulled down?



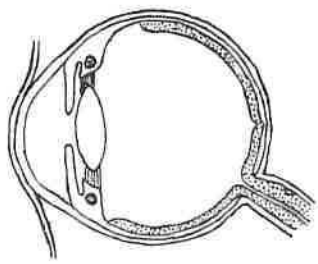
31. Give one function of each of the following in the human body: (i) iron, (ii) calcium.

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

32. What is meant by pollination?

.....

33. Indicate clearly *on* the diagram of the eye  
(a) the lens, (b) the retina.



34. How does perspiration cool our bodies?

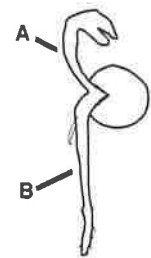
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35. State *two* functions of the placenta.

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

36. Name the parts labelled A and B in the diagram of a germinated pea.

(i) A .....  
(ii) B .....



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**SCIENCE — SYLLABUS A**

A

TUESDAY, 11 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.

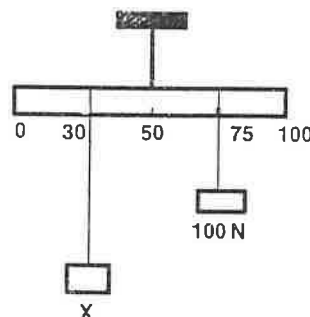
**SECTION B**

1. (a) Define pressure. State the units in which pressure can be measured.  
 Name *one* way of increasing pressure.  
 Describe a simple experiment to show that the atmosphere exerts a pressure.

- (b) State the law of the lever.

What is meant by the moment of a force?

A uniform metre stick was balanced as shown in the diagram using a known weight 100 N and an unknown weight X.



Calculate the value of X.

The volume of the unknown weight X was found by experiment to be 40 cm<sup>3</sup>. Outline an experiment in which the volume can be determined.

Calculate the density of X stating the units in which it is expressed.

2. (a) What is energy?

Outline an experiment to show that light is a form of energy. How many joules of electrical energy are converted into heat by a 2 kW electric convector heater in 1 minute?

- (b) Explain, using diagrams, how the positions of the mercury thread at (i) the ice point on the Celsius Scale (0 °C), (ii) the steam point on the Celsius Scale (100 °C), could be located and marked on a laboratory thermometer with no scale.

State *two* properties of mercury that make it suitable for use in a thermometer.

Name another liquid commonly used in thermometers.

Give *two* advantages of this type of thermometer in comparison with a mercury thermometer.

3. Explain the terms: magnetic pole, magnetic field.

How could you (i) identify by experiment the north pole of a bar magnet, (ii) show by experiment the magnetic field of an electric current?

Name *two* elements that are attracted by magnets.

Explain, with the aid of a labelled diagram, how the electric bell works.

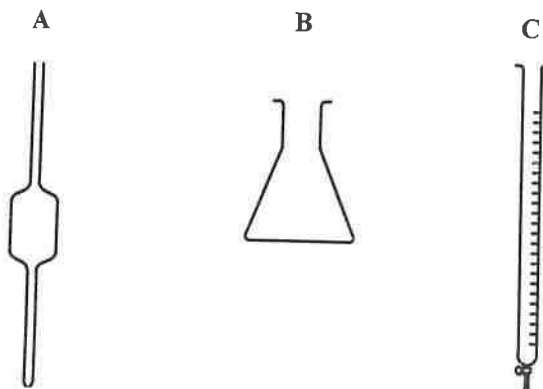
### SECTION C

4. What is the Brönsted-Lowry definition of (i) an acid, (ii) a base?

What is meant by the term neutralisation?

Name the pieces of apparatus below labelled A, B and C.

State how these pieces of apparatus can be used with a *named* indicator to find the exact volume of hydrochloric acid solution that is required to neutralise a *definite* volume of a sodium hydroxide solution.



Write a balanced chemical equation for the reaction of hydrochloric acid with sodium hydroxide solution.

What is the pH scale? What is (i) the pH range of an acidic solution, (ii) the pH range of a basic solution?

5. (a) Give *two* physical and *two* chemical properties of water.

Describe, using a labelled diagram, an experiment to show that water is a compound of hydrogen and oxygen.

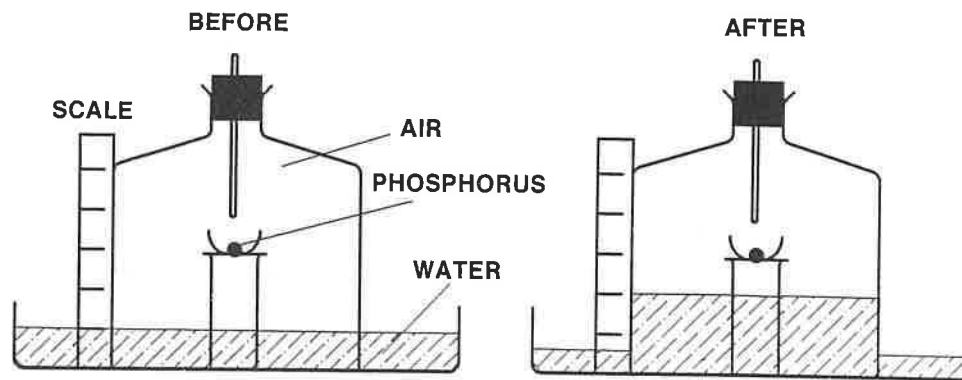
- (b) What is hard water?

Distinguish between temporary and permanent hardness.

Name the ions that cause permanent hardness in water and outline how these ions may be removed using an ion-exchange resin.

State *one* advantage and *one* disadvantage of hard water.

6. (a) "Air is a mixture of gases. About 99% of air is composed of two main elements". Explain the underlined terms and name the two main elements present in air.
- (b) A piece of phosphorus was burned in an enclosed volume of air in a bell-jar as shown in the diagrams below.



Why does the water level rise up in the bell-jar after burning?

Name the element that is mainly present in the gas remaining in the bell-jar.

What does this experiment tell about the approximate percentage of each of the two main elements present in air?

- (c) How can the presence of carbon dioxide in air be demonstrated? State one way in which carbon dioxide gets into the air.
- How could you show that water vapour is present in air?

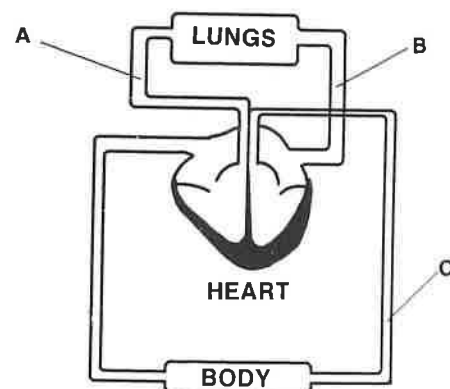
#### SECTION D

7. The diagram represents the human heart and the main blood vessels of the circulatory system.

- (i) Name the blood vessels labelled A and C.

Which of the blood vessels A or B carries deoxygenated blood?

- (ii) State the function of (a) the ventricles, (b) the valves of the heart, in the circulation of the blood.
- (iii) Name two types of cell found in blood and give one function of each type.



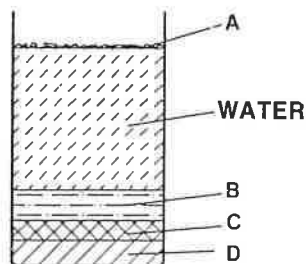
- (iv) Mention two ways in which the transport system of a green plant differs from the human circulatory system.
- (v) Describe, with the aid of a simple labelled diagram, an experiment you could carry out in the laboratory to show that air breathed out from the lungs contains more carbon dioxide than the air breathed in.

8. (a) Explain the terms: producer, consumer and decomposer.

Give *one* example from a *named* ecosystem of each of the following: (i) a producer, (ii) a primary consumer, (iii) a secondary consumer, (iv) a decomposer.

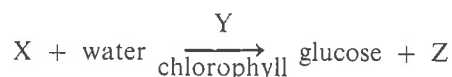
Write down the terms that describe the kind of feeding of (i) primary consumers, (ii) secondary consumers.

(b) A sample of fresh soil was vigorously shaken with water. The soil and water mixture was allowed to settle for a day. The result of this experiment is shown in the diagram. Name the parts labelled A, B, C and D of the soil.



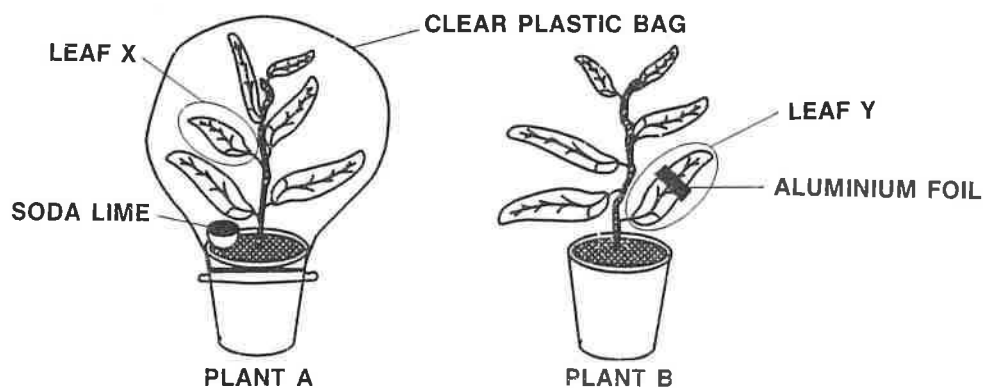
Outline an experiment to determine the percentage by volume of air in a sample of soil.

9. Photosynthesis may be represented by the following equation:



Complete the equation by naming X, Y and Z.

In an investigation of the conditions necessary for photosynthesis two healthy potted plants were set up as shown in the diagram and left in a sunny position for a number of hours. The plant leaves had been destarched before the experiment was set up.



- (i) State which condition was being investigated (a) using plant A. (b) using plant B.
- (ii) Outline how you would test leaves X and Y for the presence of starch at the end of the experiment.
- (iii) State the result you would expect for the starch test on leaf X and the result you would expect for leaf Y and give a reason for your answer in each case.
- (iv) How are leaves destarched? Why was it necessary to destarch the leaves at the start of this investigation?