

A

INTERMEDIATE CERTIFICATE EXAMINATION, 1988

SCIENCE — SYLLABUS A

Examination Number

WEDNESDAY, 15 JUNE — MORNING, 9.30 to 12.00

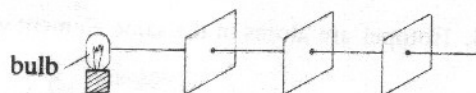
552

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. Name the liquid commonly used in thermometers and barometers *mercury* ✓

2. The diagram shows a ray of light passing through holes in three sheets of cardboard. State what property of light is being demonstrated.



.....

3. The following are the diameters of the moon, the earth and the sun, but not in that order:

1.4×10^9 metres; 3.4×10^6 metres; 1.3×10^7 metres.

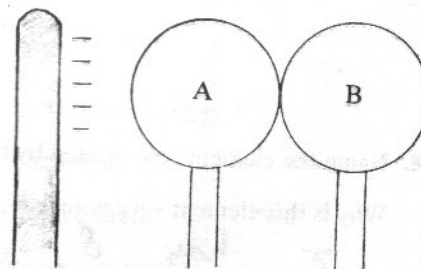
Which is the diameter of the earth? *1.3×10^7*

4. Give the relationship between electric current, potential difference and resistance.

.....

5. A force of 6 newtons extends a taut spiral spring 18 cm. What force would extend the same spring 33 cm? *11.1*

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



(i) What is the charge induced on A? *+*

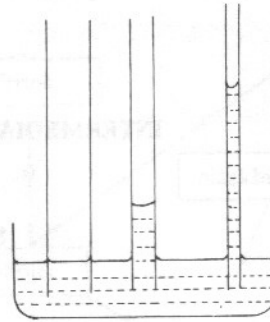
(ii) What is the charge induced on B? *-*

7. The volume of a fixed mass of gas at a temperature of 200 K is 50 cm³. What is the volume of the gas at 300 K if the pressure has not changed?

..... *75 cm³*

8. Underline in the following list the term used for the rise of water in narrow tubes as illustrated in the diagram.

viscosity capillarity diffusion



68.
57
336

9. When driving a nail, the head of a hammer has energy due to its motion called kinetic energy.

10. A tuning fork of frequency 480 Hz, vibrating in air, emits a sound of wavelength 0.7 metres. Calculate the velocity of sound in air 336

11. Which of the following methods of heat transfer requires a medium but does not involve movement of that medium: conduction, convection, radiation? conduction

12. What is meant by a magnetic field? The lines of magnetic force surrounding a magnetic

13. Isotopes are atoms of the same element with different numbers of Neutrons

14. The law of conservation of matter states that in a chemical reaction the total mass of the reactants is always equal to the original mass

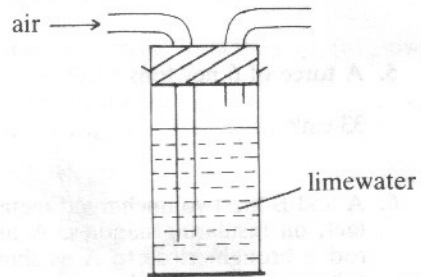
15. Give the valence of each of the elements calcium and fluorine.

Calcium 2 Fluorine 1

16. Write the chemical formula for calcium fluoride CaF₂

17. When air is bubbled through the apparatus shown in the diagram, the limewater turns milky. This shows that the air contains

CO₂



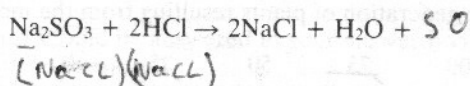
18. Name the element represented by the symbol Ne Neon

Why is this element very unreactive? It is a noble gas & has 8 electrons in its outer shell

19. Underline the physical change in the following list.

rusting expansion bleaching burning

20. Complete the following equation.



21. In the following list of statements about sodium mark X after the one that is incorrect.

It is stored under oil.

It sinks in water.

It is easily cut. **X**

It is very reactive.

22. State any two disadvantages of hard water.

(i) **Doesn't lather easily**

(ii) **Blocks pipes**

23. The heat change involved in the reaction between an acid and a base is known as heat of

..... **Neutralisation**

24. Name an indicator **Litmas**

What is the colour of this indicator in ammonia solution? **Blue**

25. Give two functions of human skin.

(i) **Protection from base**

(ii) **Sensory organ of Touch**

26. Underline the angiosperm (flowering plant) in the following list.

grass fern moss seaweed

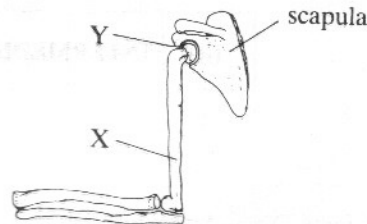
27. State one function of the petals and one function of the sepals in a flower.

Petals **Attract pollinators**

Sepals

28. The bone labelled X in the diagram is the

What kind of joint is found at **Ball socket**



29. The optic nerve carries impulses from the **eye** to the brain.

The auditory nerve carries impulses from the **ear** to the brain.

30. What is a hormone? **A hormone control is a chemical which controls reactions**

Give an example **Adrenalin**

31. In peas the gene tall(T) is dominant over the gene dwarf(t). Underline in the following list the percentage of tall plants in the generation of plants resulting from the monohybrid cross: Tt × Tt.

100 75 50 25 0

32. Give the names of two parts of the alimentary canal where starch is broken down.

(i) stomach (ii) intestine

33. Exchange of substances between a mother and the developing baby in her uterus takes place across the placenta. One substance that passes from mother to baby is oxygen

One substance that passes from baby to mother is CO₂

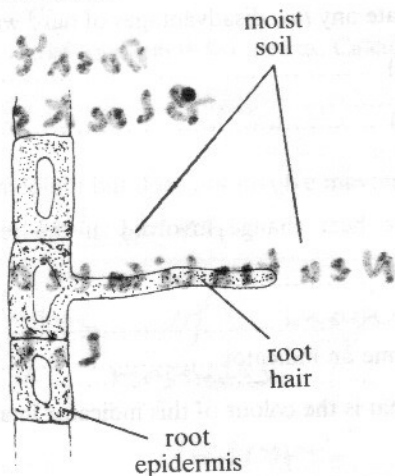
34. The diagram shows part of the epidermis of a root.

How does water enter the cells from the soil?

osmosis

How does the root hair help in the process?

Increase surface Area



35. Put the symbol ✓ in the box opposite the correct order of events in plant reproduction.

- Pollination, germination, fertilisation, dispersal
- Pollination, fertilisation, germination, dispersal
- Pollination, dispersal, fertilisation, germination
- Pollination, fertilisation, dispersal, germination

36. Of the illnesses caused by viruses, bacteria or vitamin deficiency, only those caused by viruses are treated using antibiotics.

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SCIENCE — SYLLABUS A

A

WEDNESDAY, 15 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

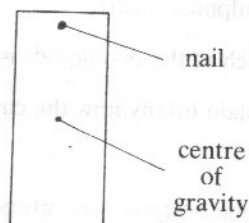
The questions from these sections should be answered in your answer-book.

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

SECTION B

1. (a) Define centre of gravity.

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

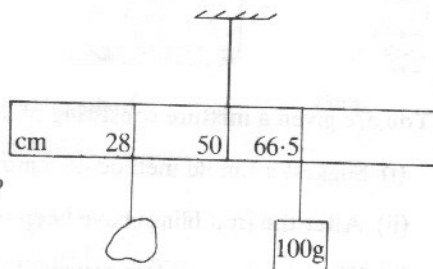


Name the other two states of equilibrium and show each of these states by means of a labelled diagram similar to the one given above.

(b) Explain the terms (i) lever, (ii) density.

Outline a simple experiment to measure the volume of a stone.

The diagram shows a uniform metre stick, suspended at its mid-point. A stone, suspended at the 28 cm mark, is balanced by a 100 gram mass, suspended at the 66.5 cm mark. Calculate the mass of the stone.



If the volume of the stone is 20 cm^3 what is its density?

2. Define (a) velocity, (b) acceleration, (c) force.

State *two* ways in which the velocity of a body can be changed by a force.

The velocity of a body increases uniformly with time. The following table gives the values of the velocity at different times.

Time (s)	0	2	4	6	8	10
Velocity (m/s)	0	5	10	15	20	25

Use these values to draw a graph on graph paper, putting time on the horizontal axis (x-axis) and velocity on the vertical axis (y-axis).

Answer each of the following.

- Mark on the graph the velocity of the body after 3 seconds.
- Mark on the graph the time taken for the body to reach a velocity of 17.5 metres per second.
- What is the acceleration of the body?

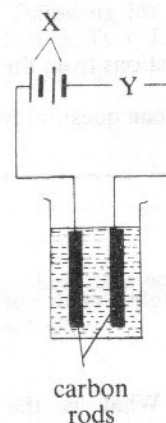
3. (a) The apparatus shown in the diagram can be used to test if liquids conduct electricity.

Name X. What could be used at Y to detect a current in the circuit?

What, if anything, would you see when the rods are dipped in (i) distilled water, (ii) acidulated water (i.e. water containing a little sulphuric acid)?

Which of the two liquids is a conductor of electricity?

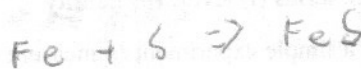
Explain briefly how the current passes through the liquid.



- (b) Describe a simple laboratory experiment to show the heating effect of an electric current.

An electric water heater of 1 kilowatt supplies 1,000 joules of heat per second. How long would it take to raise the temperature of 5 kilograms of water by 10°C if the specific heat capacity of water is 4,200 J/kg°C?

The actual time required to heat the water is found to be longer than the calculated value. Suggest a reason for this.

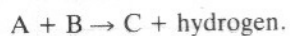


SECTION C

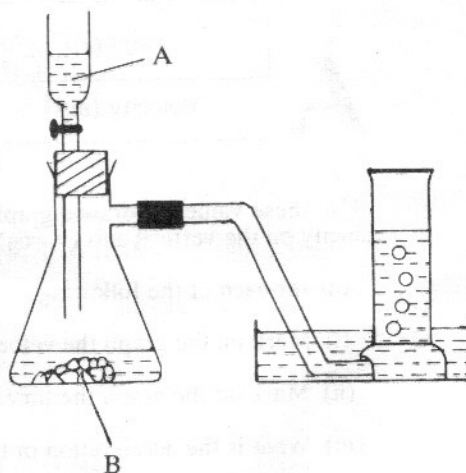
4. You are given a mixture consisting of iron filings, rhombic sulphur and sodium chloride.

- Suggest a simple method of removing the iron filings from the mixture.
- After the iron filings have been removed, how would you then remove the sulphur?
- What further procedure would be necessary in order to obtain a reasonably pure sample of sodium chloride?
- What are allotropes? Describe how you would convert rhombic sulphur into any other named allotrope of sulphur.
- When a mixture of iron filings and sulphur is heated strongly, the elements combine to produce a grey solid. Name the product and write an equation for the reaction.

5. The diagram shows the apparatus for the preparation and collection of hydrogen gas. The reaction may be represented:



- Name A, B and C and write a balanced equation for the reaction.
- Before collecting the hydrogen in gas jars, test tubes of the gas were collected and tested. Explain how the testing was carried out and why it was necessary to do so.
- If dry hydrogen were required, indicate how the gas could be dried and how the dry gas could be collected. What happens when dry hydrogen is passed over heated copper oxide?
- Give *three* physical properties and *three* chemical properties of hydrogen.
- State *one* use of hydrogen gas.



6. The bonds in magnesium oxide (MgO) are electrovalent (ionic) whereas the bonds in chlorine (Cl₂) and in methane (CH₄) are covalent.
- What is an electrovalent (ionic) bond? Draw simple atomic diagrams for magnesium (²⁴₁₂Mg) and oxygen (¹⁶₈O). Indicate clearly how the electrovalent bond is formed in magnesium oxide.
 - Why do we say that oxygen has been reduced in the reaction with magnesium?
 - What is a covalent bond? Draw a simple atomic diagram for chlorine (³⁵₁₇Cl) and show how the bond in the chlorine molecule is formed.
 - State (a) the shape of the chlorine molecule, (b) the shape of the methane molecule. Why is it incorrect to refer to magnesium oxide as a molecule?

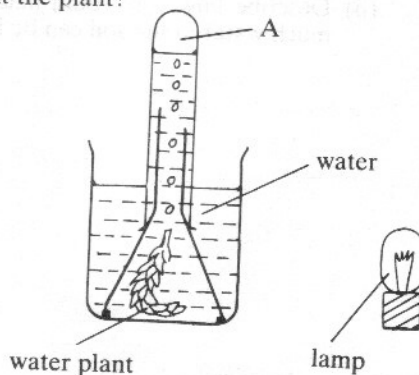
SECTION D

7. (a) Give any two functions of the stem in plants.

Plant shoots bend towards light. Name this process and describe a simple experiment to demonstrate it.

How does the bending of the shoot towards light benefit the plant?

- (b) In an experiment the apparatus was set up as shown in the diagram. The number of bubbles produced in three minutes was counted with the lamp placed at a distance of 10 cm from the water plant. The measurement was then repeated with the lamp at distances of 20 cm and 30 cm from the plant.



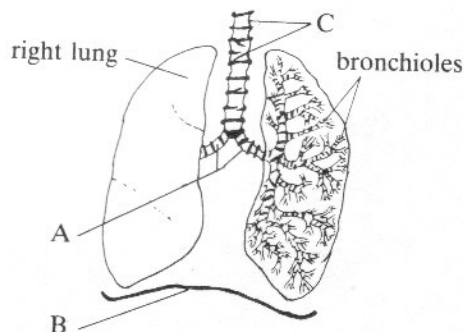
The results are given in the following table.

Distance from lamp to plant (cm)	10	20	30
Number of gas bubbles produced in three minutes	189	45	21

- Name the gas A. Describe a simple test for it.
 - What biological process taking place in the water plant is responsible for producing this gas?
 - Calculate the rate of gas production in bubbles per minute for each of the three distances. Why does the rate decrease as the distance increases?
8. The diagram shows the human respiratory system.

- (i) Name A, B, C.

Explain briefly the part played by B in the inhaling of air into the lungs.



- The bronchioles end in tiny air sacs, the walls of which are richly supplied with blood capillaries. What are these air sacs called and what is their function?
- From which chamber of the heart is the blood pumped to the lungs? Name the arteries involved. How does the blood in these arteries differ from that found in other arteries in the body?

(iv) During vigorous exercise the breathing rate increases. Suggest *two* ways in which this is of benefit to the body.

9. (a) Using the knowledge you have gained from the ecosystem you have studied, give a brief explanation of each of the following:

- (i) interdependence of plants and animals;
- (ii) competition in the ecosystem;
- (iii) the balance of nature.

If the number of herbivores in the ecosystem was greatly reduced, what would be the likely consequences for the ecosystem?

(b) Air and water are two important non-living components of soils.

- (i) How would you show the presence of air in a soil sample? State *two* reasons why air is important in soils.
- (ii) Describe how you would find the percentage of water in a soil sample. Explain why too much water in the soil can be harmful.