

INTERMEDIATE CERTIFICATE EXAMINATION, 1986

SCIENCE--SYLLABUS A

A

TUESDAY, 17 JUNE MORNING, 9.30 to 12.00

Examination Number

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

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

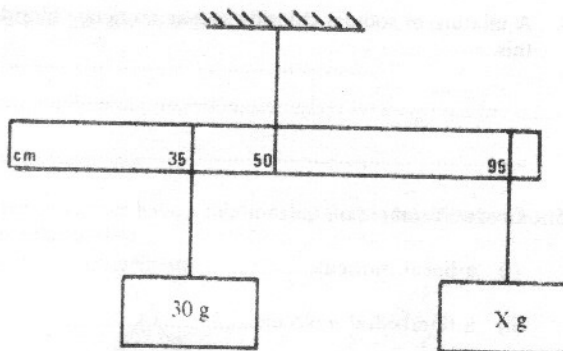
Write your answers in the spaces provided.

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. A girl, cycling in a northerly direction, travelled a distance of 210 metres in 30 seconds. What was her average velocity?
 2. In the case of each of the items numbered (i) and (ii) below, state whether it is an example of surface tension, capillarity, viscosity or diffusion.
 - (i) The slow flow of treacle
 - (ii) A drop of water hanging from a leaf
 3. The approximate speed of sound in air in metres per second is contained in the following list. Underline it.
100 210 340 450 700

4. The diagram shows a balanced uniform metre stick with two masses hanging from it. What is the value of X?

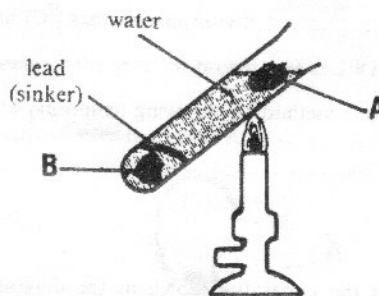


5. A beaker, containing 10 cm³ of a certain liquid, has a mass of 64 grams. If the mass of the beaker when empty is 56 grams, what is the density of the liquid?

6. Define specific latent heat of evaporation.

7. If the mass of the nitrogen atom is 2.32×10^{-23} grams write down, in a similar form, its mass in kilograms.

8. In the apparatus shown in the diagram, state which piece of ice, A or B, melts first and give a reason for your choice.



9. Complete the statement.

If the load (force) on a taut spiral spring is doubled then the extension produced in the spring is

10. Select the correct words from the list: chemical, kinetic, atomic, electrical, nuclear, potential, to fill the gaps in the following statement.

As the water begins to fall from the top of a dam, theenergy of the water stored behind the dam changes to the energy of the falling water.

11. Calculate the cost in pence of using a 100 watt bulb for 40 hours at 8 pence per kilowatt-hour.

12. When the cap of a charged gold-leaf electroscope is touched with an uncharged polythene rod, the leaves of the electroscope remain open. What information does this give about the polythene rod?

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

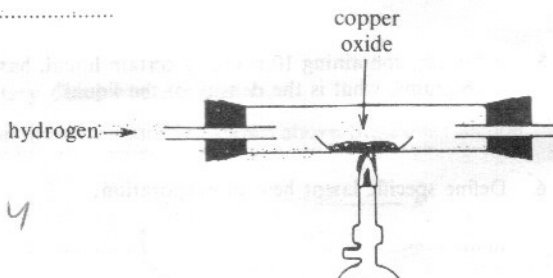
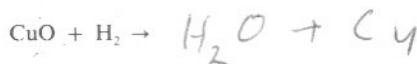
14. A mixture of sodium chloride and ammonium chloride can be easily separated by heating. State the reason for this.
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15. Give an example of

(i) a linear molecule.....

(ii) a tetrahedral molecule.....

16. The reduction of copper oxide by hydrogen can be carried out using the apparatus shown in the diagram. Complete the equation for the reaction:



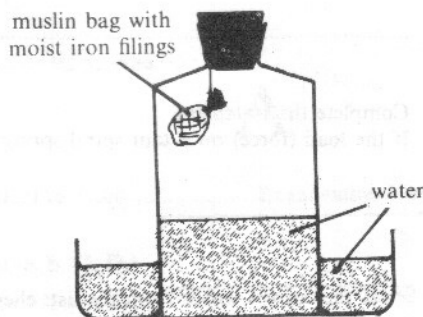
17. Give the name and formula of the salt formed in the reaction between magnesium and dilute hydrochloric acid.

Name Formula

18. Two isotopes of chlorine can be represented as $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$. The difference between them is that $^{35}_{17}\text{Cl}$ has neutrons whereas $^{37}_{17}\text{Cl}$ has neutrons.

19. State one method of removing temporary hardness that cannot be used for removing permanent hardness from water.....

20. Using the apparatus shown in the diagram, it was found that, when iron rusts in an enclosed volume of air, about one-fifth of the air is used up. This suggests that, in the rusting process, the iron is combining with.....



21. X is a colourless gas with a sharp odour. It is very soluble in water and the solution turns red litmus blue. Give the name and formula of X.

Name Formula

22. Underline the metal in the following list that will *not* displace hydrogen from dilute acids.

iron calcium zinc silver

23. In the following list of statements about a sodium hydroxide solution, one of the statements is *incorrect*. Mark X after this statement.

It has a soapy feel

It has a low pH

It can damage the skin

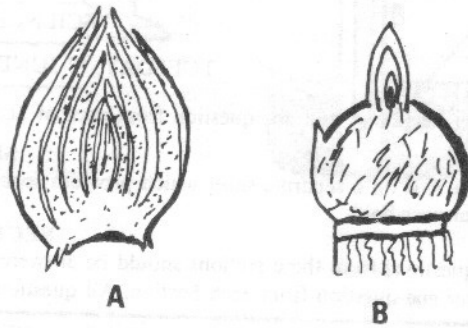
It can neutralise acids

24. When concentrated sulphuric acid is dissolved in water, the temperature of the solution rises. Underline, in the following list, the correct term for this reaction.

exothermic homeothermic endothermic hypothermic

25. Give one function for each of the following components of human blood.
 (i) Platelets
 (ii) White cells
26. Muscles are attached to bones by
27. Mammals and certain groups of bacteria that live in their intestines have a relationship that is beneficial to both. Underline, in the following list, the name given to this relationship.
 predation symbiosis parasitism

28. A and B are organs of vegetative reproduction. A is found in tulips and daffodils; B is found in crocuses and gladioli. Select the names of the organs from the following: rhizome, corm, runner, tuber, bulb.

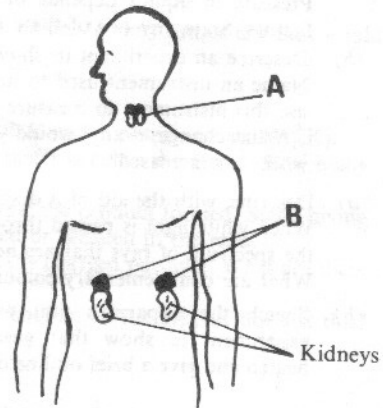


A
 B

29. From a batch of 100 pea seeds, 50 were planted in an open (unshaded) plot and the other 50 near a wall. When fully grown, the plants near the wall were taller, on the average, than those in the open plot. Suggest a reason for this
30. A certain brown-eyed person has the genotype **Bb** in which **B** represents the gene for brown eyes and **b** represents the gene for blue eyes.
 The gene foreyes is dominant and the gene foreyes is recessive.

31. Name the endocrine glands labelled A and B in the diagram.

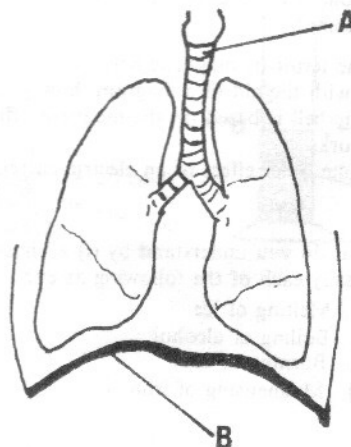
A
 B



32. State one function of the root hairs in plants
33. The monthly cycle of changes taking place in the body of the human female is thecycle.

34. Name the parts labelled A and B in the diagram of the human respiratory organs.

A
 B



35. Place the symbol \surd in the box opposite the correct order of events in human reproduction.
- ovulation, implantation, fertilisation
- ovulation, fertilisation, implantation
- implantation, ovulation, fertilisation
- fertilisation, ovulation, implantation
36. What term is used to describe a plant that completes its life cycle in two years?.....

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SCIENCE—SYLLABUS A

A

TUESDAY, 17 JUNE — MORNING, 9.30 to 12.00

Answer Section A and one question from each of 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.

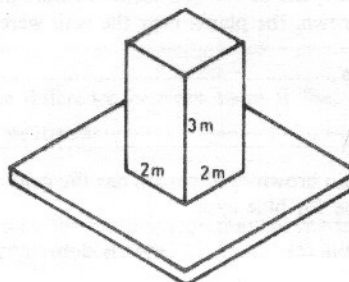
Answer one question from each Section. All questions carry the same marks.

SECTION B

1. (a) Define pressure.

A box, weighing 48 newtons, has a length of 2 metres, a breadth of 2 metres, and a height of 3 metres. It is standing on a table as shown in the diagram.

Calculate the pressure exerted by the box on the table (i) when one of its square faces is resting on the table as shown, (ii) when it is turned so that one of its rectangular faces is resting on the table.



Pressure in liquids depends on a number of factors. State any two of these factors.

- (b) Describe an experiment to show that the atmosphere exerts pressure.

Name an instrument used to measure the pressure of the atmosphere. Explain briefly why it is possible to use this instrument to measure altitude.

What change, if any, would you expect in the pressure of the atmosphere if the amount of water vapour in the air increased?

2. (a) Describe, with the aid of a diagram, an experiment to show that light travels in straight lines.

When white light is passed through a prism a spectrum is obtained. How would you show the presence in the spectrum of rays that are *not* visible to the eye?

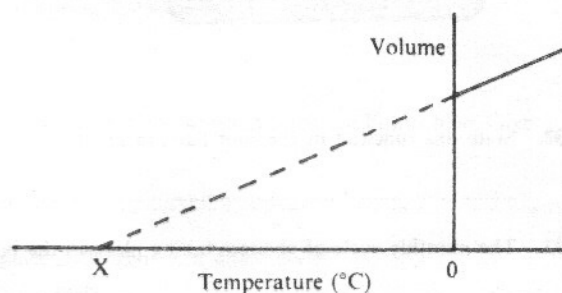
What are complementary colours? What is the complementary colour of (i) blue, (ii) red?

- (b) Sketch the apparatus you would use in an experiment to show that gases expand when heated and give a brief outline of the experiment.

State the relationship between the volume and the temperature of a definite mass of gas at constant pressure.

The graph shown illustrates this relationship. What is the temperature X?

The volume of a definite mass of hydrogen at a temperature of 27°C(300 K) is 600 cm³. What is its volume at 77°C(350 K) if the pressure remains the same?



3. Explain the terms (i) magnetic field, (ii) magnetic line of force.

Describe, with the aid of a diagram, how you would plot the magnetic field around a bar magnet.

The electric bell is based on the magnetic effect of an electric current. Explain, with the aid of a diagram, how the bell works.

Mention one other effect of an electric current and describe how it could be demonstrated in the laboratory.

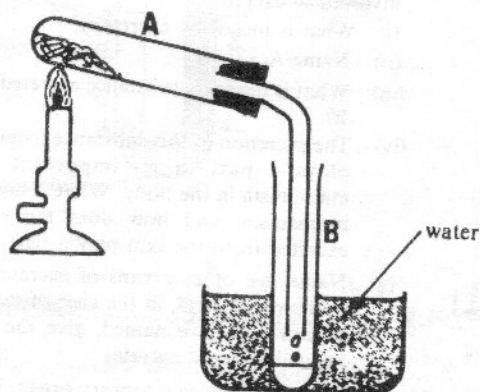
SECTION C

4. (a) What do you understand by (i) a physical change. (ii) a chemical change?

Classify each of the following as either a physical change or a chemical change.

- (i) Melting of ice
 (ii) Boiling of alcohol
 (iii) Burning of coal
 (iv) Magnetising of iron.

(b) The apparatus shown in the diagram was used to verify that water is produced when crystalline copper sulphate (bluestone) is heated. As a result of heating a colourless liquid was collected in test tube B.



- What is the advantage of having test tube A tilted as shown in the diagram?
- Why is test tube B kept cool by having it standing in a beaker of cold water? Suggest another piece of apparatus that could be used to carry out this function more efficiently.
- State *two* ways in which the crystalline copper sulphate is changed as a result of its loss of water.
- State *two* properties of the liquid in test tube B that could be used to identify it as water.
- Outline briefly how the solid remaining in test tube A may be changed back to crystalline copper sulphate.

5. Carbon and sulphur are non-metallic elements which exist in different allotropic forms. Both elements burn in oxygen to produce acidic oxides.

- Explain the underlined terms.
- From the following list of symbols, select *two* other non-metallic elements, giving the full names of the elements you have chosen.

F Al Ar P Li

In the case of each of the elements you have chosen state whether it is a solid, a liquid or a gas at room temperature.

- Name *two* allotropes of carbon and *two* allotropes of sulphur.
- Describe, with the aid of a diagram, a method (other than a burning of the element) by which dry carbon dioxide may be prepared and collected in the laboratory.
- Describe (a) how you would confirm that carbon dioxide is an acidic oxide, (b) any simple test that would allow you to distinguish it from sulphur dioxide.

6. Define (i) atomic number, (ii) mass number.

Draw simple atomic diagrams (Bohr-type structures) for a sodium atom ($^{23}_{11}\text{Na}$) and a potassium atom ($^{39}_{19}\text{K}$). When a sodium atom reacts with an atom of chlorine there is an electron transfer between the atoms. How many electrons are transferred?

Write a balanced equation for the reaction of sodium with chlorine and name the product formed. State, giving an explanation for your answer, whether the sodium atom has been oxidised or reduced in the reaction.

After the reaction with chlorine, the sodium is present in the form of electrically charged particles. What are these particles called and what electric charge do they carry?

As a result of the reaction, the chlorine becomes chemically bonded to the sodium. What type of bond is this? Give *two* typical properties of compounds having this type of bond.

SECTION D

7. (a) What is meant by *adaptation* in ecology?

Describe briefly how (i) a named plant, (ii) a named animal, are adapted to life in the ecosystem you have studied.

(b) What term is used for an animal, like the fox, that feeds on other animals.

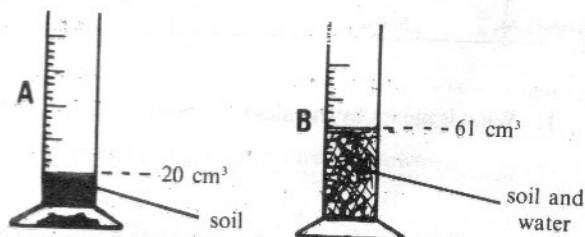
In a certain ecosystem, foxes live on a diet consisting mainly of rabbits, rats and mice. If the number of rabbits were reduced, either by disease or trapping, what effect do you think this would be likely to have (i) on the fox population, (ii) on the population of rats and mice?

(c) Give *two* reasons why air is important in the soil.

Soil was placed in a graduated cylinder up to the 20 cm³ mark (diagram A).

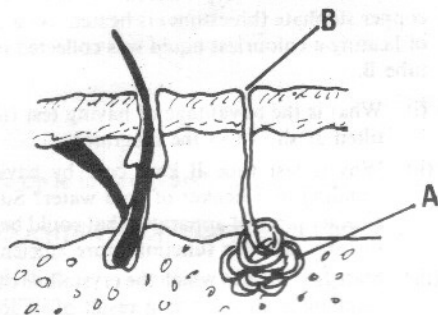
50 cm³ of water were added and, after all the air had escaped from the soil, the combined volume of the soil and the water was found to be 61 cm³ (diagram B).

Calculate the percentage by volume of air in the soil.



8. (a) The diagram shows a vertical section through human skin. The parts labelled A and B are involved in excretion.

- What is meant by excretion?
- Name A.
- What is the main substance excreted through B?
- The excretion of this substance from the skin plays a part in an important control mechanism in the body. What is this control mechanism, and how does the substance excreted from the skin play a part in it?
- Name *two* other organs of excretion in the human body and, in the case of each of the organs you have named, give the name of *one* substance it excretes.



- The skin also acts as a sensory organ. One example of its sensory function is the instant withdrawal of the hand if it touches a hot object.
 - What term is used to describe the action involved in the example given above?
 - Draw a simple labelled diagram showing the nerve pathway responsible for bringing about the withdrawal of the hand.
 - Name *two* other sensory organs in the human body.
9. Explain what is meant by respiration in living cells and write an equation, in words or symbols, for the respiration reaction of a molecule of glucose ($C_6H_{12}O_6$). Describe, with the aid of a diagram, how you would show that respiration is taking place in a green plant or a green leafy shoot. Much of the glucose used by green plants for respiration is got by the action of enzymes on the starch produced in the leaf.
- What are enzymes?
 - Outline a simple test to show the presence of starch in a green leaf.
 - Name the process by which the food is produced in a green leaf. What conditions are necessary if this process is to take place?