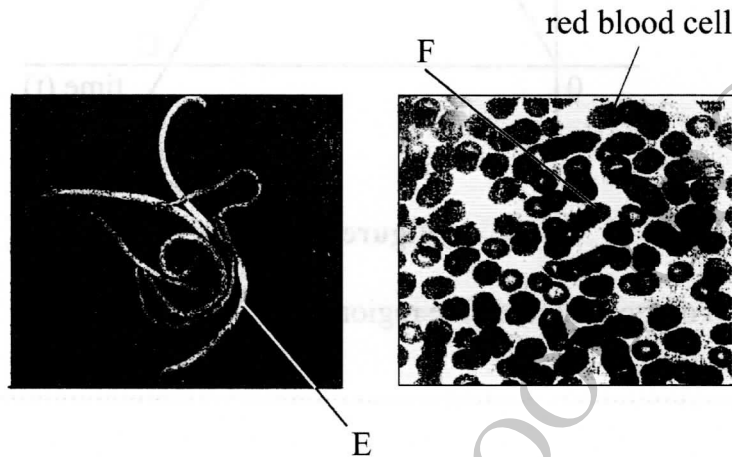


SECTION A: BIOLOGY (34 marks)

Answer **all** the questions in this section in the spaces provided.

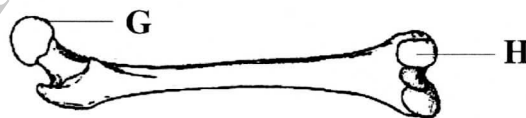
1. The photographs below show two types of parasites.



- (a) (i) Identify the parasite labelled E and F.
- E (1 mark)
- F (1 mark)
- (ii) Name **one** living organism which can host the two parasites. (1 mark)
- (b) Give **three** adaptations of the parasite labelled E to its mode of life. (3 marks)

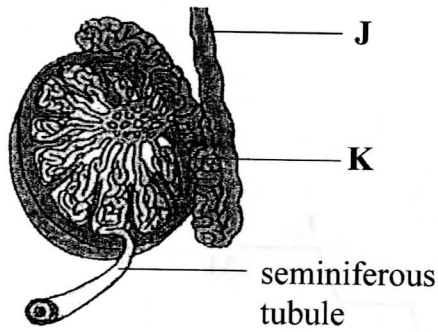
2. Explain how cell biology is an evidence of organic evolution. (3 marks)

3. The diagram below shows a bone found in a mammalian skeleton.



- (a) (i) Identify the bone. (1 mark)
- (ii) Which bone articulates at point G? (1 mark)
- (b) What type of joint is formed at point H? (1 mark)

4. The figure below shows a tissue from a male human being.



- (a) Name the structures labelled **J** and **K**.

J (1 mark)

K (1 mark)

- (b) Give the functions of structure **J** and **K**.

J (1 mark)

K (1 mark)

5. Give **three** adaptations of the sperm cell to its function. (3 marks)

6. In a breeding experiment, plants with red flowers were crossed. The produced plants included 246 red and 82 white flowered plants.

(a) (i) Identify the recessive character. (1 mark)

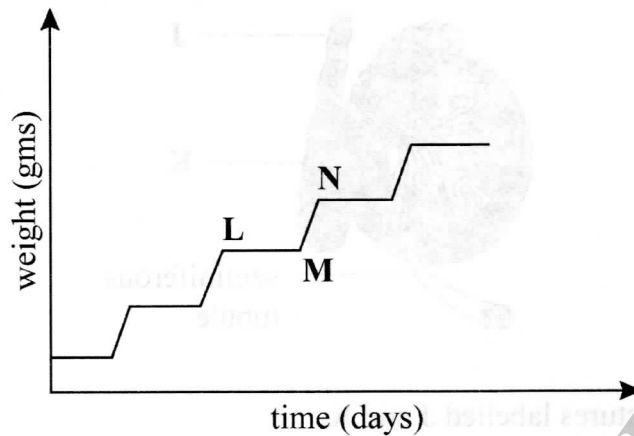
(ii) Give a reason for your answer in (a) (i) above. (1 mark)

(b) What were the genotypes of the parent plants that gave rise to the plants with red and white flowers? (1 mark)

(c) Determine the genotypes of the plants that were produced from the cross. Show your working. (3 marks)



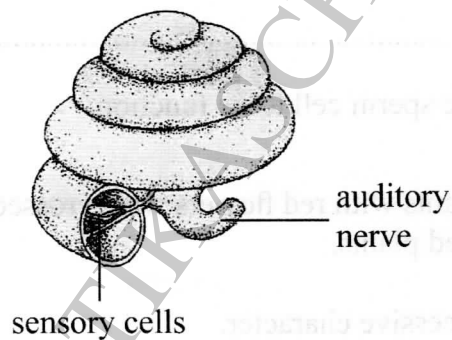
7. The graph below illustrates intermittent growth in insects.



Account for the shape of the graph between

- (a) L and M (2 marks)
- (b) M and N (2 marks)

8. The following structure represents a part of the ear responsible for hearing.



- (a) Name the structure (1 mark)
- (b) Which structure in the ear detects changes in posture? (1 mark)
- (c) Give **three** causes of deafness in human beings. (3 marks)

SECTION B: CHEMISTRY (33 marks)

Answer *all* the questions in this section in the spaces provided.

9. (a) State Boyle's Law. (1 mark)
- (b) A fixed mass of a gas occupies a volume of 225 cm^3 at 330°C and 740 mmHg . Calculate the volume the gas will occupy at 13°C and 780 mmHg . (2 marks)
10. (a) What is meant by a molar solution? (1 mark)
- (b) Determine the amount of water that should be added to 15 cm^3 of 3M hydrochloric acid to dilute the acid to 1 molar solution. (2 marks)
11. The molecular formula of an organic compound is C_5H_{12} .
- (a) Draw the structure of the compound. (1 mark)
- (b) Name the structure in (a). (1 mark)
12. (a) What is meant by an endothermic reaction? (1 mark)
- (b) Hydrogen gas burns in air to form water vapour, releasing 286 kJ of energy per mole. Draw an energy level diagram for the reaction. (2 marks)
13. Polymers are large organic molecules formed by combining small molecules.
- (a) Name **two** natural polymers. (1 mark)
- (b) State **one** use of each polymer named in (a) above. (1 mark)
14. Firewood is used as a source of energy. State **two** disadvantages of this fuel. (2 marks)
15. Calculate the mass of 0.35 moles of calcium hydrogen carbonate. (2 marks)
- (Ca = 40 ; H = 1.0 ; C = 12.0 ; O = 16.0)



16. The diagram in **Figure 1** shows curves obtained when equal amounts of zinc granules were reacted with different concentrations of hydrochloric acid. Study it and answer the questions that follow.

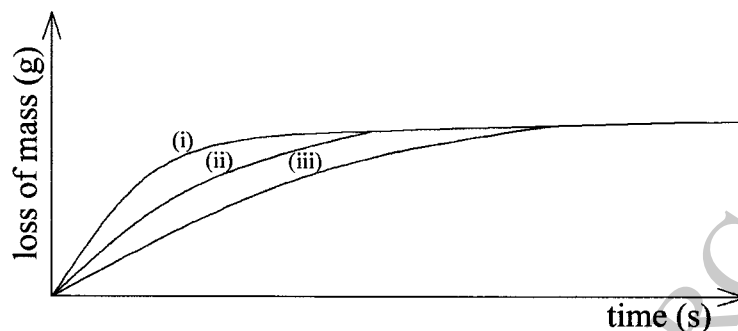


Figure 1

- (a) Identify the curve that represents the most concentrated acid. Explain. (2 marks)
- (b) State **two** factors that affect rate of a chemical reaction. (2 marks)
17. Sodium metal is extracted from molten rock salt.
- (a) Name the ions present in the molten liquid. (1 mark)
- (b) Reduction method is not used in the extraction of sodium. Explain. (1 mark)
- (c) State **two** uses of sodium. (1 mark)
18. In the manufacture of sulphuric(VI) acid, sulphur(VI) oxide is absorbed in concentrated sulphuric acid and the product diluted with soft water.
- (a) Name the product that is diluted. (1 mark)
- (b) Write an equation for the reaction between sulphur(VI) oxide and concentrated sulphuric(VI) acid. (1 mark)
- (c) Concentrated sulphuric(VI) acid was added to a beaker containing sugar crystals. Explain the observations made. (1 mark)
19. (a) State the impurities present in the aluminium ore. (1 mark)
- (b) Aluminium is preferred to iron in making utensils. Explain. (1 mark)



20. The set-up in **Figure 2** was used in the preparation of gas **B**. Study it and answer the questions that follow.

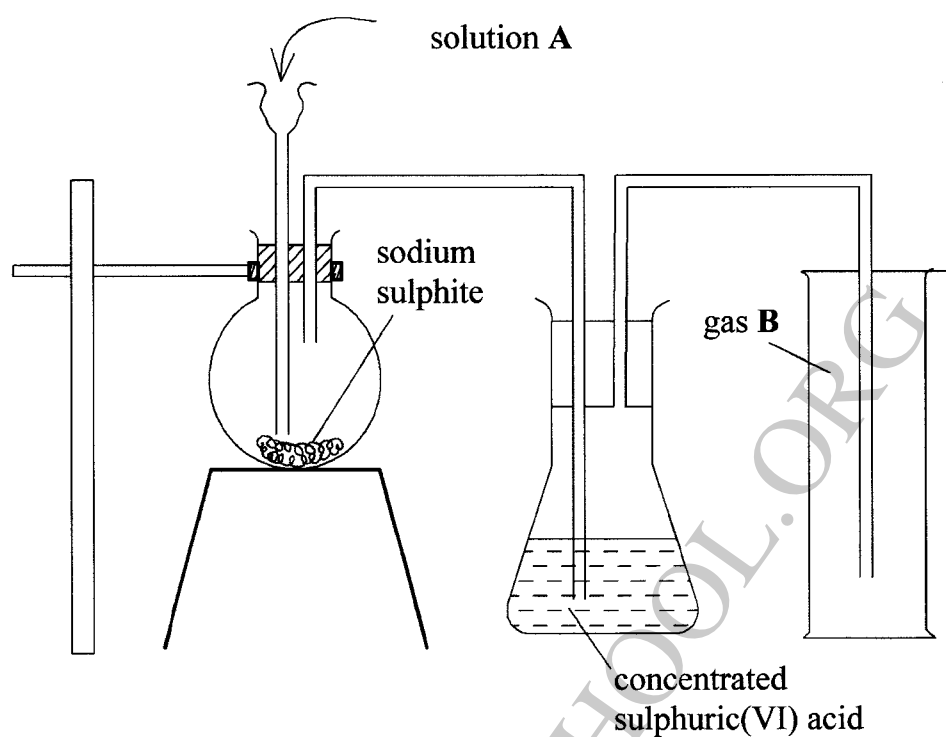


Figure 2

- (a) Identify:
- (i) Solution A (1 mark)
 - (ii) Gas **B** (1 mark)
- (b) State the property that enables the gas to be collected as shown. (1 mark)
- (c) State **two** uses of gas **B**. (1 mark)

SECTION C: PHYSICS (33 marks)

Answer *all* the questions in this section in the spaces provided.

21. **Figure 3** shows an opaque object placed between the screen and a point source of light in the form of a small hole in a cardboard placed in front of the source of light.

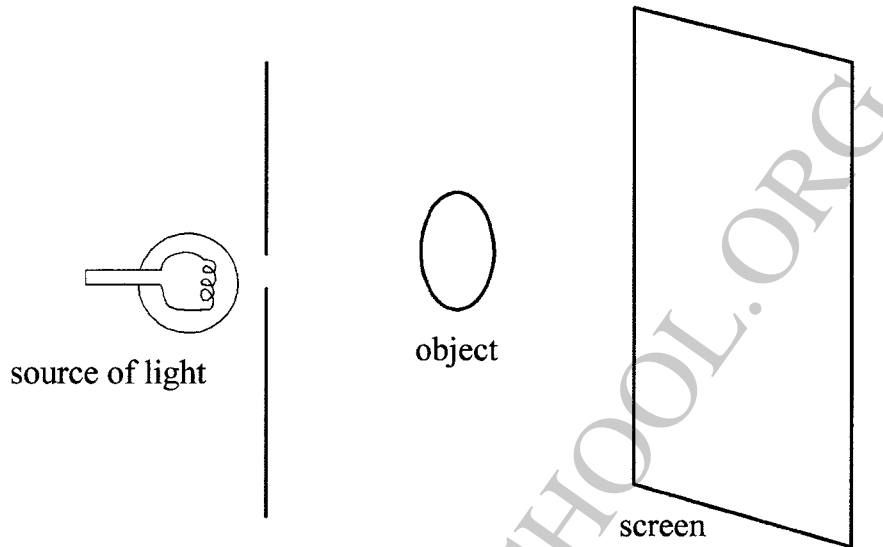


Figure 3

- (a) Complete the ray diagram to show the shadow formed on the screen. (2 marks)
- (b) State what would be the effect on the shadow if the hole is enlarged. (1 mark)
22. (a) Draw a simple circuit showing two cells in series with a bulb and a switch. (1 mark)
- (b) Indicate on the diagram the direction of current in (a). (1 mark)
23. Define the following:
- (a) A wave pulse (1 mark)
- (b) Wavelength (1 mark)
24. Explain why repulsion is the only sure test for the polarity of a magnet. (2 marks)
25. Explain how a glass rod acquires a positive charge when rubbed with silk cloth. (2 marks)
26. Explain how an echo is formed. (2 marks)

27. **Figure 4** shows the scale of an electrical device used to measure a current.

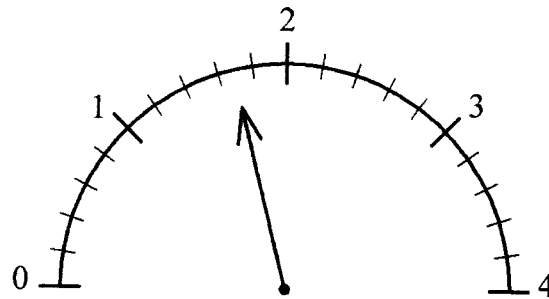


Figure 4

- (a) Name the device (1 mark)
- (b) Record the current shown by the device. (1 mark)
28. **Figure 5** shows a pin lying at the bottom of a beaker full of water and an observer above the surface of water.

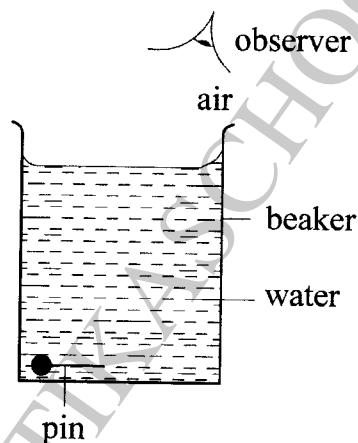


Figure 5

- Draw a ray diagram to show how the observer sees the head of the pin. (3 marks)
29. State the energy changes that take place as the electrons travel to the anode for the production of X-rays in an X-ray tube. (3 marks)
30. A house has four 75 W lamps. Determine the cost of using the lamps for 6 hours each day for 30 days if the cost of electricity is ksh.9.30 per kWh. (3 marks)
31. State **two** properties of an alpha particle. (2 marks)
32. State **three** advantages of using a Cathode Ray Oscilloscope as a voltmeter instead of a moving coil meter. (3 marks)
33. State how the electrical conductivity of a semiconductor can be increased. (1 mark)
34. State **two** properties of images formed by diverging lenses. (2 marks)
35. Name **one** device that functions by using the heating effect of an electrical current. (1 mark)