SC 517105
WASSCE 2025
INTEGRATED
SCIENCE 1
Objective Test
1 hour

1

THE WEST AFRICAN EXA

West African Senior School Certificate Examination
for School Candidates

SC 2025 — INTEGRATED SCIENCE 1 — 1 hour
OBJECTIVE TEST
[50 marks]

Do **not** *open this booklet until you are told to do so. While you are waiting, read and observe the following instructions. Write your* **name** *and* **index number** *in the spaces provided above.*

1. Use **2B** pencil throughout.
2. On the pre-printed answer sheet, check that the following details are **correctly** printed:
   (*a*) In the space marked **Name**, check your **surname** followed by your **other names**.
   (*b*) In the spaces marked *Examination*, *Year*, *Subject* and *Paper*, check 'WASSCE', 'SC 2025', 'INTEGRATED SCIENCE', and '1' respectively.
   (*c*) In the box marked *Index Number*, your **index number** has been printed vertically in the spaces on the left-hand side, and **each** numbered space has been shaded in line with **each** digit. **Reshade** each of the shaded spaces.
   (*d*) In the box marked *Subject Code*, the digits 517113 are printed vertically in the spaces on the left-hand side. **Reshade** the corresponding numbered spaces as you did for your index number.
3. An example is given below. This is for a male candidate whose name is Ben Abu TETTEH His *index number* is 7102143958 and he is offering *Integrated Science* 1.

THE WEST AFRICAN EXAMINATIONS COUNCIL
ANSWER SHEET

PRINT IN BLOCK LETTERS

Name: TETTEH BEN ABU | GHA

Examination: WASSCE SC Year: 2025

Subject: INTEGRATED SCIENCE Paper: 1

INSTRUCTIONS TO CANDIDATES
1. Use grade 2B pencil throughout.
2. Answer each question by choosing one letter and shading like this: ⊏A⊐ ⊏C⊐ ⊏D⊐
3. Erase completely any answer you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right hand edge of your answer sheet.

INDEX NUMBER	0	1	2	3	4	5	6	7	8	9
7	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	■	⊏8⊐	⊏9⊐
1	⊏0⊐	■	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
0	■	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
2	⊏0⊐	⊏1⊐	■	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	■	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
4	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	■	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
3	⊏0⊐	⊏1⊐	⊏2⊐	■	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
9	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	■
5	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	■	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
8	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	■	⊏9⊐

SUBJECT CODE	0	1	2	3	4	5	6	7	8	9
5	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	■	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	■	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
7	⊏0⊐	⊏1⊐	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	■	⊏8⊐	⊏9⊐
1	⊏0⊐	■	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
1	⊏0⊐	■	⊏2⊐	⊏3⊐	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐
3	⊏0⊐	⊏1⊐	⊏2⊐	■	⊏4⊐	⊏5⊐	⊏6⊐	⊏7⊐	⊏8⊐	⊏9⊐

For Supervisors only

If candidate is absent shade this space ⊏ ⊐

Answer **all** *the questions.*

Each question is followed by four options lettered A *to* D. *Find the* **correct** *option for* **each** *question and shade in* **pencil** *on your answer sheet, the answer space which bears the same letter as the option you have chosen.*

Give only **one** *answer to* **each** *question. An example is given below.*

Which of the following elements is a metal?

A. Carbon
B. Copper
C. Helium
D. Krypton

The correct answer is Copper, *which is lettered* **B**, *and therefore answer space* **B** *would be shaded.*

⊏A⊐ ⊏B⊐ ⊏C⊐ ⊏D⊐

Think carefully before you shade the answer spaces; erase completely any answers you wish to change.

Do all rough work in this question paper.

Now answer the following questions.

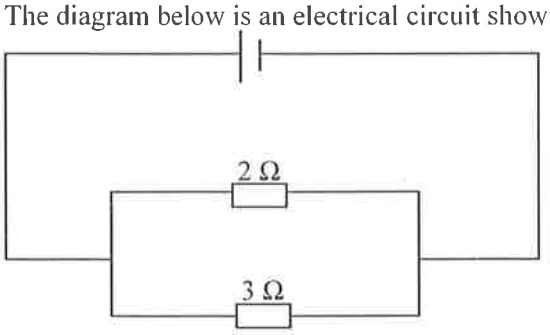
1. A body has a mass of 70 kg. What is the force due to the earth acting on it? [g = 10 m s^{-2}]

A. 3500 N
B. 700 N
C. 70 N
D. 7000 N

2. The **main** practice which is carried out in the nursery just before seedlings are transplanted is

A. shading.
B. pricking-out.
C. hardening-off.
D. thinning.

3. The diagram below is an electrical circuit showing two resistors connected in parallel.



Determine the effective resistance of the combination.

A. 5.00 Ω
B. 1.20 Ω
C. 0.83 Ω
D. 6.00 Ω

4. The following statements are examples of application of biotechnology in Agriculture **except**
   A. improving upon colour and size of a flower.
   B. development of pest-resistant crops.
   C. crossing animals with desired characteristics.
   D. introduction of foreign genes into livestock.

5. The movement of water into root hairs is by
   A. osmosis.
   B. diffusion.
   C. capillarity.
   D. transpiration.

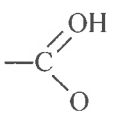
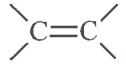
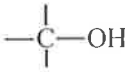
6. An example of soil micronutrient is
   A. nitrogen.
   B. iron.
   C. calcium.
   D. sulphur.

7. Which of the following systems in the human body is directly affected when carbon monoxide is inhaled?
   A. Respiratory
   B. Excretory
   C. Circulatory
   D. Endocrine

8. The part of the human brain that controls body temperature is
   A. medulla oblongata.
   B. hypothalamus.
   C. cortex.
   D. cerebellum.

9. How many moles of HCl is contained in 14.6 g of HCl?
   [H = 1, Cl = 35.5]
   A. 0.4 mol
   B. 0.04 mol
   C. 0.004 mol
   D. 4.0 mol

10. In which of the following blood vessels is the pressure **highest**?
   A. Dorsal aorta
   B. Renal artery
   C. Hepatic artery
   D. Vena cava

11. The functional group for alkanol is
   A. 
   B. 
   C. 
   D. 

12. Which of the following statements about magnetic fields are **correct**? A magnetic field
I. has magnetic lines of force.
II. is a force field.
III. has direction.

A. II and III only
B. I and III only
C. I and II only
D. I, II and III

13. Substances excreted by the skin of humans include
A. salts and water only.
B. urea and salts only.
C. water and urea only.
D. salts, urea and water only.

14. The type of livestock raised in any area depends mainly on the
A. inputs available.
B. availability of land.
C. type of climate.
D. availability of labour.

15. The IUPAC name for Na_2SO_4 is
A. sodium tetraoxosulphate (IV).
B. disodium sulphate.
C. sodium (II) sulphate.
D. sodium tetraoxosulphate (VI).

16. Which of the following vegetables provide the **largest** amount of roughage in the diet of humans?
A. Carrot
B. Cabbage
C. Beans
D. Pepper

17. The immunization of children is important because it
A. increases the production of white blood cells.
B. stimulates the production of antibodies.
C. destroys pathogens in the body.
D. stimulates the production of antigens.

18. What is the kinetic energy of a body of mass 20 kg moving with a velocity of 4 m s^{-1}?
A. 80 J
B. 160 J
C. 320 J
D. 5 J

19. The gas produced when a dilute hydrochloric acid reacts with calcium carbonate is
A. chlorine.
B. carbon dioxide.
C. carbon monoxide.
D. hydrogen.

20. Which of the following statements about the image formed in a pinhole camera are **correct**? The image is
I. inverted.
II. upright.
III. real.

A. II and III only
B. I and III only
C. I and II only
D. I, II and III

21. Which of the following traits in humans is an example of continuous variation?
A. Body mass
B. Colour blindness
C. Gender
D. Blood group

22. Which of the following chemical equations is balanced?
A. $Na + Cl_2 \longrightarrow NaCl$
B. $Mg + O_2 \longrightarrow MgO$
C. $K + O_2 \longrightarrow K_2O$
D. $H_2 + Cl_2 \longrightarrow 2\,HCl$

23. The instruments used to measure the mass of a body include
I. top pan balance.
II. spring balance.
III. electronic balance.

A. II and III only
B. I and III only
C. I and II only
D. I, II and III

24. Which of the following animals is a non-ruminant herbivore?
A. Poultry
B. Pig
C. Cattle
D. Rabbit

25. The energy needed for natural cycles to operate is obtained from
A. fossils.
B. the sun.
C. the air.
D. decomposers.

26. Ectoparasites of farm animals are effectively controlled by
A. handpicking.
B. drenching.
C. dipping.
D. quarantine.

27. A device which converts chemical energy to electrical energy is
A. resistor.
B. cell.
C. bulb.
D. voltmeter.

28. A flowering plant with poorly developed roots, yellow buds and yellowing new leaves is **likely** to be deficient in

A. manganese.
B. copper.
C. boron.
D. sulphur.

29. Water is **not** suitable as a thermometric liquid because it

I. is opaque.
II. wets glass.
III. expands abnormally.

A. II and III only
B. I and III only
C. I and II only
D. I, II, and III

30. Conversion of nitrites to nitrates in the nitrogen cycle is caused by

A. *Azotobacter.*
B. *Nitrobacter.*
C. *Nitrosomonas.*
D. *Rhizobium.*

31. In the control of malaria, the main aim of spraying stagnant water bodies is to

A. ensure that the adult mosquitoes have no hiding place.
B. prevent the larvae from breathing in air.
C. make the water unsuitable for egg development.
D. prevent the laying of eggs by the mosquitoes.

32. Aluminium does **not** corrode easily because it

A. forms aluminium oxide on its surface.
B. is a strong metal.
C. is hard.
D. forms aluminium hydroxide on its surface.

33. Which part of the leaf is the amount of glucose produced during photosynthesis the **least**?

A. Guard cell
B. Palisade mesophyll
C. Spongy mesophyll
D. Upper epidermis

34. Which of the following physical properties of water are **correct**?

I. It is tasteless.
II. It has a pH of 7.
III. It is colourless.

A. II and III only
B. I and III only
C. I and II only
D. I, II and III

35. During rusting, iron reacts with oxygen to form
A. iron (III) oxide.
B. iron (IV) oxide.
C. iron (II) oxide.
D. iron (V) oxide.

36. Members of the same species living at the same place at the same time make a/an
A. population.
B. ecosystem.
C. community.
D. trophic level.

37. The westerlies are winds that blow
A. from the poles.
B. towards the poles.
C. towards the equator.
D. from the equator.

38. The P–N junction diode has
A. equal number of holes and electrons.
B. no holes.
C. no electrons.
D. more electrons than holes.

39. The **correct** sequence of the arrangement of vertebrae in a mammal is
A. thoracic, caudal, lumbar, cervical.
B. cervical, lumbar, thoracic, caudal.
C. thoracic, cervical, lumbar, caudal.
D. cervical, thoracic, lumbar, caudal.

40. Which of the following structures is present in animal cells **only**?
A. Mitochondrion
B. Lysosomes
C. Golgi body
D. Ribosome

41. Loss of appetite and poor growth in humans are due to the deficiency of
A. sodium.
B. iodine.
C. copper.
D. zinc.

42. *Nucleons* refer to the sum of
A. electrons and neutrons in an atom.
B. protons and neutrons in an atom.
C. protons and electrons in an atom.
D. electrons and molecules in an atom.

43. Which of the following statements are **correct**?
I. Green house effect can be reduced by afforestation.
II. One effect of ozone layer depletion is global warming.
III. Green house effect is reduced by bush burning.

A. II and III only
B. I and III only
C. I and II only
D. I, II and III

44. The nuclide $^{226}_{88}Ra$ undergoes alpha decay. The mass number and atomic number of the daughter nuclide are respectively
A. 230, 90.
B. 226, 88.
C. 226, 89.
D. 222, 86.

45. Ash from cocoa pod tastes bitter because it contains
A. alcohol.
B. alkali.
C. acid.
D. soap.

46. A musical note is sound with a definite
A. intensity.
B. frequency.
C. amplitude.
D. velocity.

47. Hydrological cycle is the system by which water continuously circulates through the
A. troposphere.
B. biosphere.
C. atmosphere.
D. mesosphere.

48. The structure associated with the absorption of fatty acids and glycerol in the small intestines is the
A. lacteals of the villi.
B. lymphatic system.
C. blood capillaries.
D. hepatic portal veins.

49. It is **most** difficult to detect carbon (II) oxide gas than most poisonous gases because it
A. does not support combustion.
B. is insoluble in water.
C. is heavier than air.
D. has no smell and colour.

50. Metamorphic rocks are formed through
A. chemical change caused by heat and pressure.
B. biological change of original rocks.
C. physical disintegration of igneous rocks.
D. combination of igneous and sedimentary rocks.

END OF PAPER

SC 5172 WASSCE 2025 INTEGRATED SCIENCE 2 Essay Test 1½ hours	2

CANDIDATE'S NAME	
INDEX NUMBER	**SIGNATURE**
DATE:	

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination
for School Candidates

SC 2025

INTEGRATED SCIENCE 2
[Essay]

1½ hours

INSTRUCTIONS TO CANDIDATES

1. *In the spaces provided above, insert your* **name**, **full index number**, *normal* **signature** *and the* **date of examination**.

2. *This booklet consists of* **six** *questions. Answer* **four** *questions in all.* **All** *questions carry* **equal** *marks.*

3. *Write the* **question number** *and your* **index number at the top of each page**.

4. *Write on both sides of the paper unless otherwise instructed on the question paper.*

5. *Begin each answer to a question on a fresh page. Leave two lines between answers where there are sub-questions to the same question.*

6. *On* **no account** *should you tear off* **any** *part of the booklet.* **It is an examination malpractice to do so**. *The entire booklet will be collected at the end of the examination.*

7. *Write in the space provided below, the* **number of the questions you have answered** *in the order in which you have written them.*

For Examiner's Use Only	
Question Number	Mark
TOTAL	

PAPER 2 1½hours

ESSAY

[80 marks]

Answer **four** *questions* **only** *from this section.*

Credit will be given for clarity of expression and orderly presentation of material.

All *questions carry* **equal** *marks.*

1. (*a*) (i) What are *exotic breeds*? [2 marks]

(ii) State **three** advantages of exotic breeds of poultry. [3 marks]

(*b*) (i) Define *relative atomic mass*. [2 marks]

(ii) Calculate the molar mass of **each** of the following compounds:

(α) Na_2CO_3

(β) CH_3COOH

[4 marks]

[Na = 23, O = 16, C = 12, H = 1]

(*c*) (i) Name **two** organisms **commonly** used in biotechnology. [2 marks]

(ii) Give **one** example of an industry which uses **each** of the organisms named in (i). [2 marks]

(*d*) (i) List **three** other sources of electric power generation apart from hydro and thermal sources. [3 marks]

(ii) State the energy transformation that takes place in **any** two of the listed sources. [2 marks]

2. (*a*) (i) The nuclides of sodium and fluorine are represented as $^{23}_{11}Na$ and $^{19}_{9}F$ respectively. State the number of:

(α) protons in **each** atom;

(β) neutrons in **each** atom.

[2 marks]

(ii) Draw a diagram to show the electron configuration of:

(α) sodium ion;

(β) fluorine ion.

[4 marks]

(*b*) (i) State **two** reasons why salt is important in the diet of humans. [2 marks]

(ii) Give **two** examples of an abiotic factor which is non-climatic in terrestrial ecosystem. [2 marks]

(*c*) (i) What is an *electrical conductor*? [2 marks]

(ii) Two lamps of resistances 3Ω and 5Ω are connected in parallel to a 6 V source. Calculate the value of the current supplied by the source. [3 marks]

(*d*) (i) Distinguish between *ear-notching* and *ear-tagging* in farm animals. [2 marks]

(ii) List **three** ecto-parasites that infest goats in West Africa. [3 marks]

3. (*a*) (i) State **three** functions of the respiratory system of humans. [3 marks]

(ii) Name **one** reagent used to test for **each** of the following food substances in the school laboratory:

(α) proteins;

(β) lipids;

(γ) reducing sugars.

[3 marks]

(b) (i) What is a *longitudinal wave*? [2 marks]

(ii) State **two** differences between *music* and *noise*. [2 marks]

(c) (i) Explain the term *ruminants* as used in animal production. [2 marks]

(ii) State **three** advantages of rearing rabbits. [3 marks]

(d) (i) What is a *standard solution*? [2 marks]

(ii) A standard hydrochloric acid solution is to be prepared from a stock solution of HCl of concentration 10 moldm^{-3}.

(α) What volume of the stock solution is needed to prepare 0.50 dm^3 of 2.0 M HCl? [2 marks]

(β) Calculate the volume of water required. [1 mark]

4. (a) (i) State **three** advantages that parallel electrical wiring has over series electrical wiring in a household. [3 marks]

(ii) An immersion heater is rated 220 V. 850 W. Determine the current flowing through the heater. [2 marks]

(b) (i) Explain the term *soil conservation*. [2 marks]

(ii) State **two** ways by which **each** of the following activities help in conserving the soil:

(α) addition of organic matter;

(β) crop rotation. [4 marks]

(c) (i) What are *petrochemicals*? [2 marks]

(ii) Name **two** uses of petrochemicals in Agriculture. [2 marks]

(d) With the aid of a genetic diagram, explain **briefly** how a couple of normal skin colours produces an albino. [5 marks]

5. (a) Describe **briefly each** of the following post-harvest practices:

(i) Winnowing;

(ii) Dehusking;

(iii) Shelling. [6 marks]

(b) (i) Name the type of movable joint found at **each** of the following locations in the human body:

(α) fingers;

(β) where the neck joins the head. [2 marks]

(ii) State **one** characteristic feature **each** of the joints named in (i). [2 marks]

(c) (i) What is a *magnetic field*? [2 marks]

(ii) Draw a bar magnet and show the magnetic field around it. [3 marks]

(d) (i) Complete the following chemical equations:

(α) $H_2SO_4 + NaOH \longrightarrow$ _____ + _____

(β) $CH_3COOH + CH_3OH \underset{\Delta}{\overset{H^+}{\rightleftharpoons}}$ _____ + _____ [3 marks]

(ii) Name **each** of the reactions in (α) and (β). [2 marks]

6. (*a*) State **one** significance **each** of the following stages of treatment of water for public consumption:
   (i) Aeration:
   (ii) Sedimentation:
   (iii) Filtration;
   (iv) Chlorination;
   (v) Coagulation. [5 marks]

   (*b*) (i) What is *weight of a body*? [2 marks]
   (ii) The mass of a body is 70 kg. Determine the weight of the body. [g = 10 m s^{-2}] [3 marks]

   (*c*) State **five** challenges associated with pig production in Ghana. [5 marks]

   (*d*) (i) State **three** effects of Sexually Transmitted Infections (STIs) on the male reproductive system of humans. [3 marks]
   (ii) Name **two** glands of the human reproductive system that produce hormones. [2 marks]

END OF PAPER

Index Number:..... 11 Question:.....

Index Number:..... 14 Question:.....

Index Number:..... 15 Question:.....

SC 5173
WASSCE 2025
INTEGRATED
SCIENCE 3
Test of Practical Work
2 hours

3

CANDIDATE'S NAME	

INDEX NUMBER	SIGNATURE

DATE:

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination
for School Candidates

SC 2025 — INTEGRATED SCIENCE 3 — 2 hours

TEST OF PRACTICAL WORK

[60 marks]

DIRECTIONS TO CANDIDATES

1. Do **not** turn over this booklet until you are told to do so.
2. In the spaces provided above, insert your **name**, **full Index number**, **normal signature** and the **date of examination**.
3. Answer **all** the questions in this booklet.
4. On **no account** should you tear **any** part of the booklet. The entire booklet will be collected at the end of the test.
5. **All rough work should be done in this booklet** and then crossed out neatly. Under **no circumstance** should you work on **any** other paper.
6. Write the **NUMBERS OF THE QUESTIONS YOU HAVE ANSWERED** in the order in which you have answered them, in the space provided below.

For Examiner's Use Only	
Question Number	Mark
TOTAL	

1. Fig. **1** is an illustration of a set-up used in preparing ammonia gas in the laboratory using Calcium hydroxide and Ammonium chloride.
Study the figure carefully and answer the questions that follow.

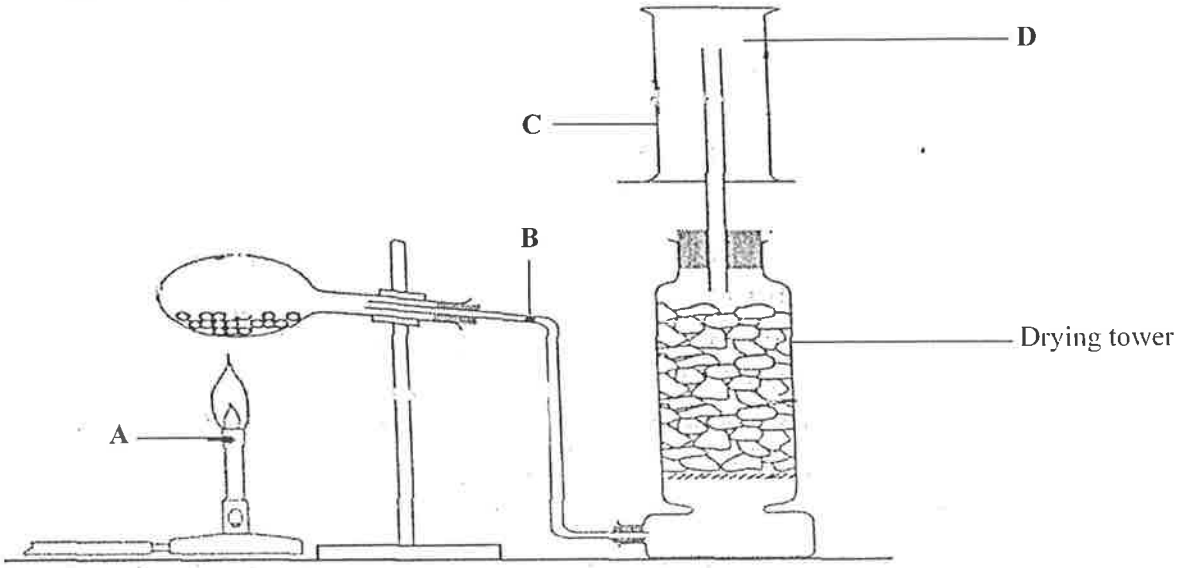


Fig. **1**

(*a*) (i) Name **each** of the parts labelled **A**, **B** and **C**.

A.....

B.....

C.....

(ii) Name what is labelled as **D**.

.....

[4 marks]

(*b*) Write a balanced reaction equation for the experiment.

.....

.....

[2 marks]

(*c*) Name the drying agent in the drying tower.

.....

[1 mark]

(*d*) Explain **briefly** why concentrated H_2SO_4 and $CaCl_2$ may **not** be **suitable** drying agents in this experiment.

.....

.....

.....

.....

[2 marks]

(*e*) Name the method of collection of the gas in the experiment.

.....

[1 mark]

(*f*) Give a reason for the method of collection named in (*e*).

.....

[1 mark]

(*g*) How could the gas be tested for in the laboratory?

.....

.....

.....

[3 marks]

2. Fig. **2** is an illustration of a farm animal.
Study the figure carefully and answer the questions that follow.

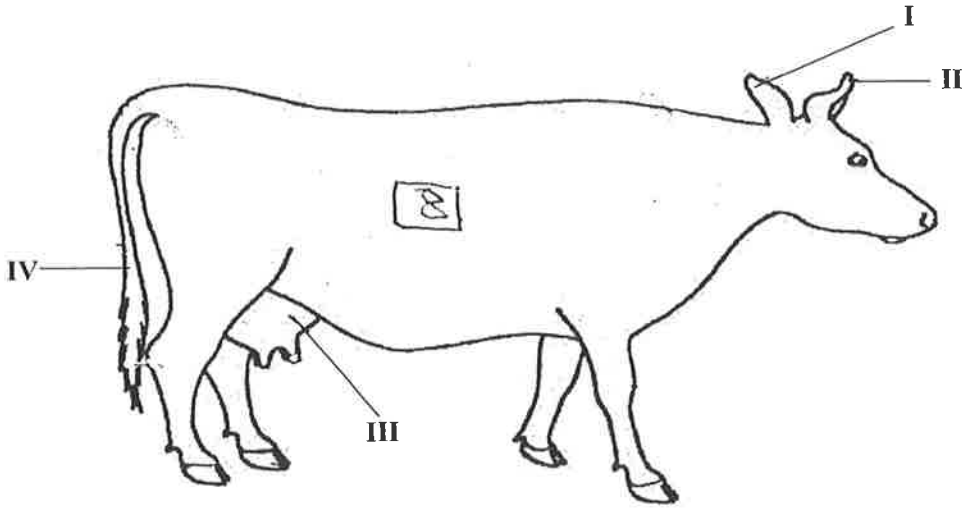


Fig. **2**

(*a*) Identify the farm animal illustrated. [1 mark]

.....

(*b*) Give the reason for the answer stated in (*a*). [1 mark]

.....

(*c*) Name **each** of the parts labelled **I**, **II**, **III** and **IV**.

I .....

II .....

III.....

IV.....

[4 marks]

(*d*) State the management practice undertaken on **each** of the parts labelled **I** and **II**.

I .....

.....

II .....

.....

[2 marks]

(*e*) State **one** reason **each** for the management practices performed on **I** and **II**.

I .....

II .....

[2 marks]

(*f*) Name the management practice illustrated as 8 on the body of the farm animal.

.....

[1 mark]

(*g*) Describe **briefly** how the management practice named in (*f*) is performed.

.....

.....

.....

.....

[3 marks]

3. Fig. 3 is an illustration of an experimental set-up to collect a gas produced by a pond weed kept in water containing sodium hydrogen carbonate. The set-up was exposed to the sunlight for few hours.
Study the figure carefully and answer the questions that follow.

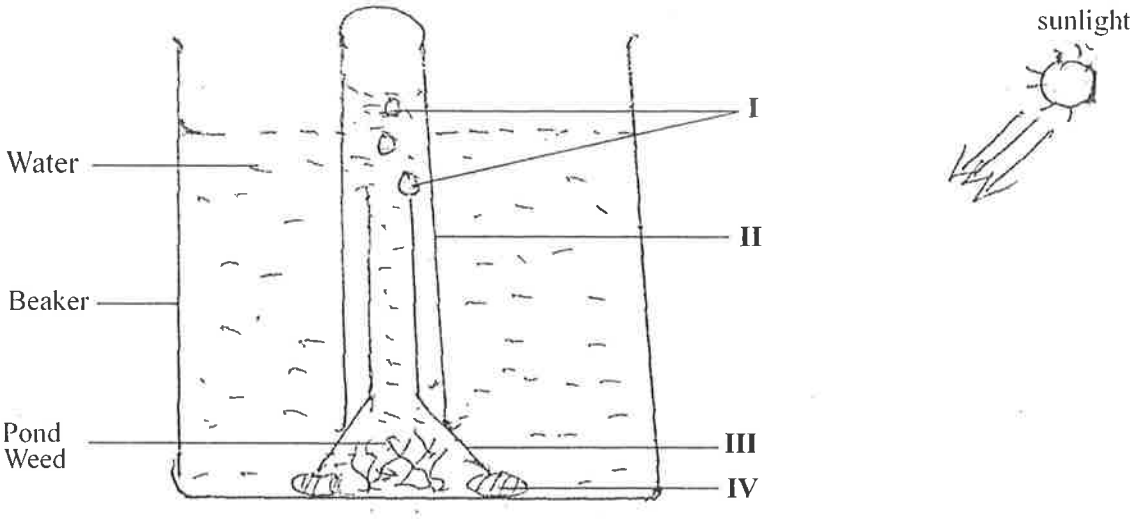


Fig. 3

(*a*) (i) Name **each** of the parts labelled **II**, **III**, and **IV**.

II .....

III .....

IV .....

(ii) Name what is labelled as **I**.

.....

[4 marks]

(*b*) State **two** precautions to be taken in setting up the experiment.

.....

.....

.....

[2 marks]

(*c*) Draw a diagram to show the control for the experiment.

[2 marks]

(*d*) Give **one** reason **each** for the following activities carried out during the experiment:

(i) sodium hydrogen carbonate is added to water;

.....

[1 mark]

(ii) the test tube is filled with water to the brim;

.....

[1 mark]

(iii) the set-up is left in sunlight for some few hours;

.....

[1 mark]

(iv) the funnel is supported.

.....

[1 mark]

(*e*) State the difference in composition of the gas collected in the test tube and atmospheric air.

.....

[1 mark]

(*f*) State what would happen to the pH of the water in the beaker at the end of the experiment.

.....

[1 mark]

(*g*) Give reason to support the answer stated in (*f*).

.....

[1 mark]

4. A ball was thrown from the ground up into the air and attained potential energy, P, at a height h.

Fig. **4**(*a*) is an illustration of the potential energies $p = p_1, p_2, p_3, p_4$ and p_5.

Fig. **4**(*b*) is an illustration of the corresponding heights. $h = h_1, h_2, h_3, h_4$ and h_5.

Study the Figure carefully and answer the questions that follow.

Fig. **4**(*a*)

1 cm ≡ 100 J

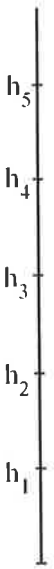


Fig. **4**(*b*)

1 cm ≡ 10 m

(*a*) Measure and record the raw potential energies $p = p_1, p_2, p_3, p_4$ and p_5.

(*b*) Measure and record the corresponding heights $h = h_1, h_2, h_3, h_4$ and h_5.

(*c*) Convert the raw potential energies into actual potential energies $\boldsymbol{P} = \boldsymbol{P}_1, \boldsymbol{P}_2, \boldsymbol{P}_3, \boldsymbol{P}_4$ and $\boldsymbol{P}_5$ using the scale provided.

(*d*) Convert the raw heights $\boldsymbol{h} = \boldsymbol{h}_1, \boldsymbol{h}_2, \boldsymbol{h}_3, \boldsymbol{h}_4$ and $\boldsymbol{h}_5$ into actual heights $\boldsymbol{H} = \boldsymbol{H}_1, \boldsymbol{H}_2, \boldsymbol{H}_3, \boldsymbol{H}_4$ and $\boldsymbol{H}_5$ using the scale provided.

Complete the table below.

p/ cm	$p_1 =$	$p_2 =$	$p_3 =$	$p_4 =$	$p_5 =$
P/ J	$P_1 =$	$P_2 =$	$P_3 =$	$P_4 =$	$P_5 =$
h/ cm	$h_1 =$	$h_2 =$	$h_3 =$	$h_4 =$	$h_5 =$
H/ m	$H_1 =$	$H_2 =$	$H_3 =$	$H_4 =$	$H_5 =$

[10 marks]

(*e*) Plot a graph of actual potential energy, ***P***, on the vertical axis and actual height, ***H***, on the horizontal axis. [5 marks]

(*f*) From the graph, determine the slope.

.....

.....

.....

.....

[2 marks]

END OF PAPER