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03401/2&1 BECE  
June 2024  
SCIENCE 2&1  
Essay and Objective  
2 hours 10 minutes

**2&1**

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**THE WEST AFRICAN EXAMINATIONS COUNCIL  
GHANA**

**Basic Education Certificate Examination**

SC 2024

**SCIENCE 2&1**  
**Essay and Objective**

**2 hours 10 minutes**

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

*This booklet consists of two papers. Answer Paper 2 which comes first, in your answer booklet and Paper 1 on your Objective Test answer sheet. Paper 2 will last 1 hour 25 minutes after which the answer booklet will be collected. Do not start Paper 1 until you are told to do so. Paper 1 will last 45 minutes.*

This paper is in two sections: A and B. Answer Question 1 in Section A and any other three questions in Section B.

Answer all the questions in your answer booklet.

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

SECTION A  
[40 marks]

Answer all the questions in this section

1. (a) Fig. 1(a) is an illustration of the longitudinal section of the mammalian heart. Study it carefully and answer the questions that follow.

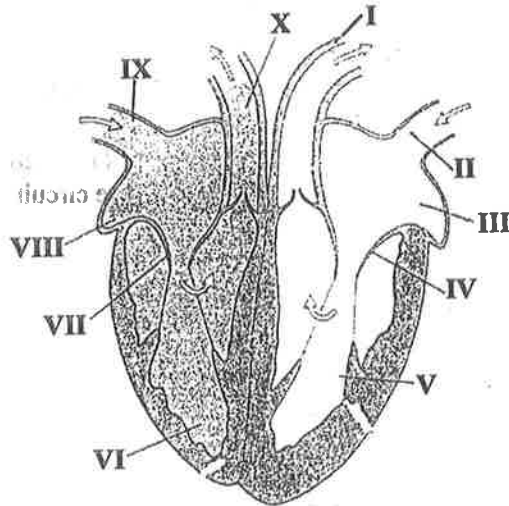


Fig. 1(a)

- (i) State one function for each of the parts labelled I, II, IX and X. [4 marks]
  - (ii) Explain briefly why the left lower part of the heart has a thicker muscle. [2 marks]
  - (iii) State two ways by which the flow of blood to and from the mammalian heart as shown in Fig. 1(a) can be kept at acceptable levels. [2 marks]
  - (iv) Name two parts of the heart where oxygenated blood can be found. [2 marks]
- (b) Fig. 1(b) is an illustration of three sets of plant parts labelled P (maize grains), Q (tomato seedlings) and R (cassava cutting). Study it carefully and answer the questions that follow.

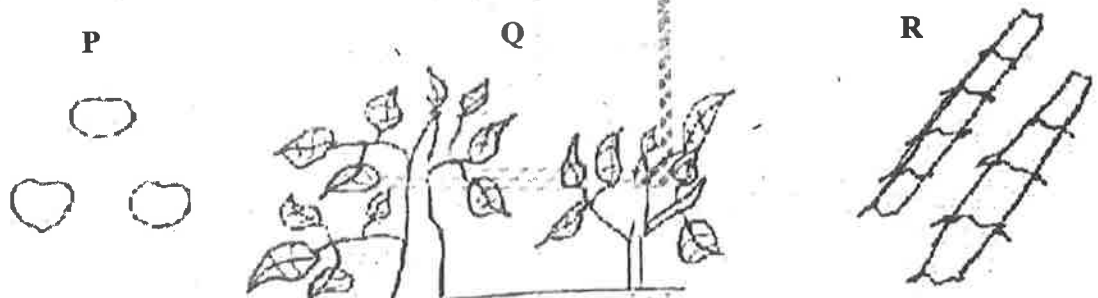


Fig. 1(b)

- (i) Describe briefly how each of the parts labelled P, Q and R are planted on seedbed. [6 marks]
- (ii) State four conditions under which R can be cultivated to produce high yield. [4 marks]

- (c) Fig. 1(c) is an electric circuit diagram. Study it carefully and answer the questions that follow.

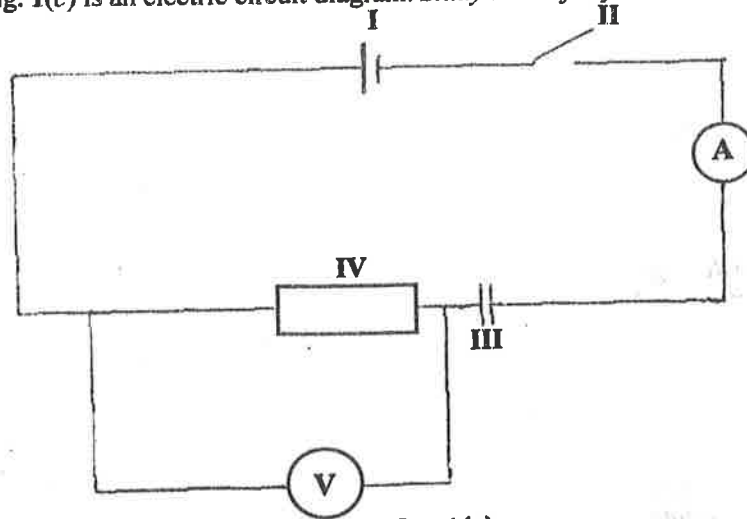


Fig. 1(c)

- (i) State one function for each of the parts labelled I, II, III and IV. [4 marks]
- (ii) If the voltmeter reads 2.4 V and the ammeter reads 0.8 A when the circuit is closed, calculate the value of the part labelled IV. [3 marks]
- (iii) State one way of conserving the value of the part labelled I in the circuit. [1 mark]
- (iv) State two observations that can be made when the circuit is closed. [2 marks]

- (d) Fig. 1(d) illustrates an experiment performed to separate the components of a mixture. Study it carefully and answer the questions that follow.

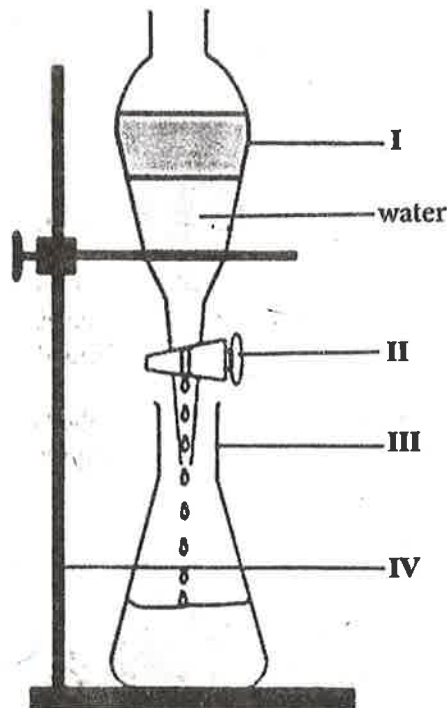


Fig. 1(d)

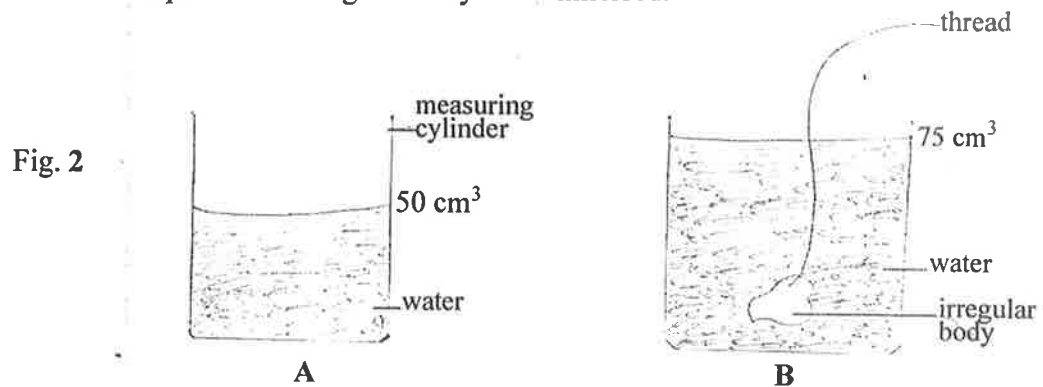
- (i) Describe briefly the process of this experiment. [6 marks]
- (ii) State one function for each of the parts labelled II and IV. [2 marks]
- (iii) State two precautions that should be taken to obtain reliable results when performing this experiment. [2 marks]

## SECTION B

[60 marks]

Answer three questions only from this section.

2. (a) (i) Given a flashlight, a tennis ball and a screen; draw a diagram to show how a shadow can be formed.
- (ii) A student seeking to determine the volume of an irregular body of mass 4 kg used a graduated cylinder in an experiment. Fig. 2 illustrates two key stages of the experiment where **A** indicates a setup before the irregular body was immersed and **B** indicates the same setup after the irregular body was immersed.



Determine the density of the irregular body.

- (iii) State **two** precautions that must be taken to obtain reliable results. [8 marks]
- (b) State **three** safety precautions to prevent accidents during the use of liquefied petroleum gas in the home. [3 marks]
- (c) Explain **briefly** the scientific principle underlying **each** of the following waste management practices:
- Composting;
  - Recycling;
  - Incineration. [6 marks]
- (d) The digestive system of two domestic animals were provided. One is that of a goat and the other is that of a rabbit. Outline **three** features that would help to differentiate between the two digestive systems. [3 marks]
3. (a) You have been given maize, cowpea, cassava and cabbage to cultivate on a piece of land using crop rotation system.
- Design a **4-year** rotational program using the given crops. ✓
  - Give **two** reasons for the sequence given in 3(a)(i). [6 marks]
- (b) A student is suspected of having contracted COVID-19.
- Give **three** symptoms that the student may exhibit to confirm this suspicion.
  - Suggest **two** ways to prevent the spread of COVID-19 in the school.
  - Give **two** reasons why COVID-19 was declared as a pandemic. [7 marks]
- (c) The mass of a vehicle is 1000 kg and travels at 100 m s<sup>-1</sup>. If the vehicle accelerates to 150 m s<sup>-1</sup> in 10 s, calculate the:
- acceleration of the vehicle;
  - force that acts on the vehicle;
  - final momentum when the vehicle comes to a stop. [7 marks]

4. (a) A student who went to bed immediately after eating complained of stomach upset the next morning. A doctor prescribed a liver salt, whose major composition is  $\text{NaHCO}_3$ , as the medication. Using a balanced chemical equation, explain how the liver salt would relieve the student from this discomfort. [4 marks]
- (b) Fig. 4 is an illustration of a body of mass 20 kg placed on top of a wall of height 10 m.

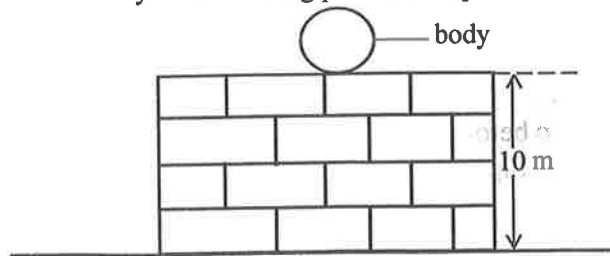


Fig. 4

Calculate the energy of the body. [3 marks]

- (c) (i) Define the term *light emitting diode* (LED).  
 (ii) Mention **two** devices that use LED in their operation. [4 marks]
- (d) A student was tasked to prepare a raised nursery bed for nursing tomato seeds:  
 (i) Suggest **two** simple tools that could be used in the nursery bed preparation;  
 (ii) State **one** function **each** of the tools listed in (d)(i). [4 marks]
- (e) (i) State **three** observable features of an animal cell.  
 (ii) State **two** functions of a nerve cell. [5 marks]
5. (a) Fig. 5 is an electrical circuit diagram. Study it and answer the questions that follow.

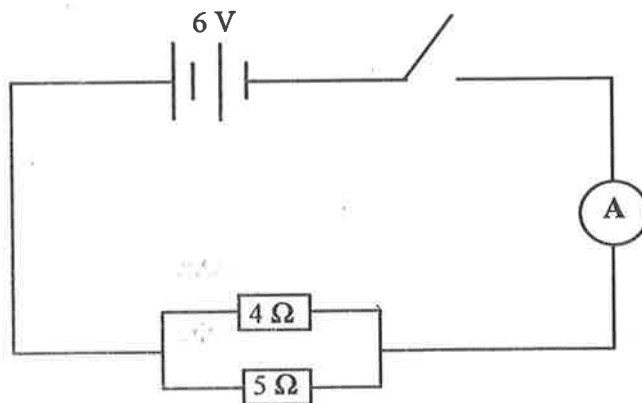


Fig. 5

Calculate the:

- (i) effective resistance in the circuit when it is closed;  
 (ii) current that will flow through the circuit when it is closed. [6 marks]
- (b) (i) Differentiate between an *organic fertilizer* and an *inorganic fertilizer*.  
 (ii) Outline **briefly** the steps involved in preparing raised beds. [4 marks]
- (c) (i) State **one** function **each** of the following components of blood:  
 (α) red blood cells;  
 (β) white blood cells;  
 (γ) blood plasma.  
 (ii) Explain **briefly** the impact of **each** of the following organisms on humans:  
 (α) housefly;  
 (β) grasshopper. [7 marks]

- (d) Describe **briefly** the formation of an ammonia molecule after an interaction between  ${}^1_1\text{H}$  and  ${}^7_7\text{N}$  atoms.

[3 marks]

***END OF ESSAY TEST***

# DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

**YOU WILL BE PENALIZED SEVERELY IF YOU ARE FOUND  
LOOKING AT THE NEXT PAGE BEFORE  
YOU ARE TOLD TO DO SO.**

PAPER 1  
OBJECTIVE TEST

45 minutes

*Answer all the questions on your Objective Test answer sheet.*

1. Use 2B pencil throughout.
2. On the pre-printed answer sheet, check that the following details are **correctly** printed: Your **surname** followed by your **other names**, the *Subject Name*, your *Index Number*, *Centre Number* and the *Paper Code*.
3. In the boxes marked *Candidate Number*, *Centre Number* and *Paper Code*, **reshade** each of the shaded spaces.
4. An example is given below. This is for a female candidate whose name is Erica Afiba MANU. Her *index number* is 772384188 and she is writing the examination at *Centre Number* 77234. She is offering *Science 1* and the *Paper Code* is 0341.

**THE WEST AFRICAN EXAMINATIONS COUNCIL, GHANA  
BASIC EDUCATION CERTIFICATE EXAMINATION  
OBJECTIVE ANSWER SHEET**

CANDIDATE NAME: <b>MANU ERICA AFIBA</b>	SUBJECT: <b>SCIENCE 1</b>
--------------------------------------------	------------------------------

1. Use 2B pencil, Press firmly.
2. Answer each question by choosing one letter and then, shade through the letter chosen like this **A**  **B**  **C**  **D**  **E**
3. If you want to change an answer, erase your first mark completely.
4. If any four alternative answers are given for each question, ignore the letter E.
5. Your question paper may have fewer than 60 questions.

CENTRE NUMBER										CENTRE NUMBER					PAPER CODE				For Supervisors only. If candidate is absent shade this space. <input style="width: 20px; height: 15px;" type="text"/>	
7	7	2	3	8	4	1	8	8		7	7	2	3	4	0	3	4	1		
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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 substances is not an element?

- A. Aluminium
- B. Ammonia
- C. Oxygen
- D. Sodium

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

A  B  C  D

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

Do all rough work on this question paper.

Now answer the following questions.

1. Which of the following sources of energy is non-renewable?
  - I Coal ✓
  - II Solar ✓
  - III Wind
  - IV Uranium-236
  - A. I, II and III only
  - B. II, III and IV only
  - C. I and IV only
  - D. II and III only
  
2. The building block of a material with the **smallest** unit of matter that retains the properties of an element is
  - A. an ion.
  - B. an atom.
  - C. a molecule.
  - D. a proton.
  
3. Oil from a mechanic workshop accidentally spilled into a pool of water which was breeding mosquitoes. After sometime, the pool of water was no longer breeding mosquitoes. Which control method may have been deployed?
  - A. Biological control
  - B. Chemical control
  - C. Environmental control
  - D. Genetic control
  
4. Grasshopper management is crucial because of all the following reasons **except**
  - A. damage to crops.
  - B. incomplete metamorphosis.
  - C. ecosystem disruption.
  - D. livestock harm.

5. A hunter experiences a backward force upon firing a gun. Which of the Newton's laws of motion is demonstrated in the situation?
- First law
  - Second law.
  - Third law
  - Law of inertia
6. Which of the following sets of devices operate on the principle of magnetism?
- Loudspeakers, compass, alarms
  - Loudspeakers, alarms, LCD TV
  - Compass, alarms, LCD TV
  - Compass, loudspeakers, LCD TV
7. Which of the following elements has four electron shells?
- ${}_{19}\text{K}$
  - ${}_{13}\text{Al}$
  - ${}_{15}\text{P}$
  - ${}_{5}\text{B}$
8. A livestock farmer wants to achieve good health for the animals being reared. Which of the following activities should be undertaken by the farmer?
- Have vaccination schedules for the animals
  - Provide balanced ration to the animals
  - Provide good sanitation for the animals
- I and II only
  - II and III only
  - I and III only
  - I, II and III
9. Canned foods and drinks have expiry dates on them. The hazard involved in taking an expired drink is
- food poisoning.
  - impaired hearing.
  - poor circulation of blood.
  - suffocation.
10. Two unknown solutions labelled **A** and **B** were brought to a JHS 3 class. It was observed that in solution **A**, red litmus paper changed colour to blue, while in solution **B**, red litmus paper retained its colour. What could be the content of solution **A**?
- Car battery fluid
  - Salt solution
  - Baking soda
  - Orange juice
11. A student who complained of stomach upset was given first aid with  $\text{Mg}(\text{OH})_2$  boldly written on it. What could be the **common** name of the first aid the student was given?
- Milk of aluminium
  - Milk of magnesia
  - Trisilicate
  - Martins liver salt

12. A bowl of water on a gas stove was initially cold. It became warm after sometime. What was the mode of heat transfer in the water?
- A. Convection
  - B. Radiation
  - C. Emission
  - D. Conduction
13. The portion of air which acts as a solvent is
- A. oxygen.
  - B. carbon (IV) oxide.
  - C. nitrogen.
  - D. an inert gas.
14. A natural phenomenon that illustrates the dispersal of light is
- A. a rainbow.
  - B. an eclipse.
  - C. a rainfall.
  - D. an echo.
15. When a stick is dipped into a pool of water, it appears to
- A. be longer than its length.
  - B. bend away from the surface.
  - C. be seen straight in the water.
  - D. bend towards the surface.
16. Which of the following electrical appliances can convert electrical energy to heat energy?
- I Electric iron
  - II Kettle
  - III Water heater
- A. I, II and III
  - B. I and III only
  - C. II and III only
  - D. I and II only
17. The consequences of the greenhouse effect on humans include
- I flooding of coastal cities,
  - II desertification of fertile areas,
  - III increased number of storms,
  - IV increased use of fossil fuels.
- A. I, II, III and IV
  - B. II and III only
  - C. I, II and III only
  - D. I and II only
18. Cockroaches in a cupboard were killed after an insecticide had been sprayed. The insecticide reached the cockroaches by the process of
- A. osmosis.
  - B. absorption.
  - C. diffusion.
  - D. radiation.

19. Which of the following nursery beds is suitable for a flood prone area?
- Plain bed
  - Sunken bed
  - Raised bed
  - Flat bed
20. Which of the following natural cycles directly involves the sun?
- Carbon cycle
  - Water cycle
  - Nitrogen cycle
- I, II and III
  - I and II only
  - II and III only
  - I only
21. The primary purpose of respiration in man is to
- take in oxygen.
  - release carbon dioxide.
  - regulate body temperature.
- I, II and III
  - I and III only
  - II and III only
  - I and II only
22. Nitrogen deficiency in soils causes
- poor seed formation.
  - yellowing of leaves.
  - purple colouration.
  - fruit drop.
23. An electric bulb is rated 0.5 A, 120 V. Determine the power produced when the bulb is turned on.
- 60 kW
  - 60 W
  - 30 kW
  - 30 W
24. The following processes are chemical changes **except**
- crumpling of paper.
  - burning of wood.
  - mixing of an acid and a base.
  - rusting of iron.
25. Which of the following statements **best** describes the term *green economy*? It includes
- reduced ecological services.
  - loss of biodiversity.
  - reduced carbon emissions.
  - degrading the environment.
26. The energy transformation that occurs when sodium hydroxide is dissolved in water is
- heat to potential energy.
  - chemical to light energy.
  - chemical to heat energy.
  - heat to kinetic energy.

27. Digestion of rice in humans starts from the
- A. stomach.
  - B. gullet.
  - C. mouth.
  - D. colon.
28. A substance that could be used in large scale treatment of domestic water is
- A. Nitrogen.
  - B. Hydrogen sulphide.
  - C. Carbon dioxide.
  - D. Chlorine.
29. Chlorophyll helps plants absorb energy from the sun as they undergo the process of photosynthesis. It is located in a structure called
- A. chloroplast.
  - B. mitochondrion.
  - C. vacuole.
  - D. nucleus.

An electrical engineer was in your school to replace a 20 W bulb with a 50 W bulb.  
*Use this information to answer questions 30 and 31.*

30. The unit inscribed on the bulb measures its
- A. energy.
  - B. workdone.
  - C. power.
  - D. electricity.
31. The 50 W bulb is likely to
- I increase the brightness in the room.
  - II increase the amount of electricity consumed.
  - III destroy the habitat of pests.
- A. I, II and III
  - B. I and III only
  - C. II and III only
  - D. I and II only
32. The following devices work based on the principle of pressure in fluids **except**
- A. siphons.
  - B. flutes.
  - C. drinking straws.
  - D. water pumps.
33. In making ornaments and jewellery, non-reactive metals are preferred because they
- A. are corrosive.
  - B. are attractive.
  - C. do not retain their lustre.
  - D. do not react with atmospheric oxygen.
34. A metallic ladle was left in a boiling soup. After sometime, the handle became hot. This is because the particles in the ladle
- A. undergo rapid, random motion.
  - B. contain free electrons which are able to transfer heat energy.
  - C. are separated by large distances.
  - D. circulate as a result of the temperature differences.

35. The **simplest** way of making well water suitable for laundry is by
- A. adding copper sulphate.
  - B. filtering.
  - C. boiling.
  - D. adding chlorine.

A poultry farmer observed that the layers were producing thin-shelled eggs.  
*Use this information to answer questions 36 and 37.*

36. The defect identified is **mostly** caused by a deficiency in
- A. zinc.
  - B. phosphorus.
  - C. magnesium.
  - D. calcium.
37. What ingredient could be added to the feed to correct the defect?
- A. Maize
  - B. Soya bean meal
  - C. Cowpea
  - D. Oyster shell meal
38. Which of the following pairs of energy sources is environmentally friendly?
- A. Coal and thermal energy
  - B. Wind and biogas
  - C. Wind and coal
  - D. Biogas and thermal energy
39. A student is to measure 20 cm<sup>3</sup> of a sodium hydroxide solution. What instrument could be used?
- A. Measuring tape
  - B. Hygrometer
  - C. Measuring cylinder
  - D. Hydrometer
40. A mother took her child to the hospital and upon investigation, it was noticed that the child's diet was lacking in zinc. What could this result in?
- I Decreased growth in the child
  - II Anaemia and constipation
  - III Inability of the body to fight infection
- A. I, II and III
  - B. I and III only
  - C. II and III only
  - D. I and II only

**END OF PAPER**