

**INTEGRATED SCIENCE**

**Essay and Objective**  
2 Hours

**2&1**

Name.....

Index Number.....

Date: .....



## **PASSPORT TO SUCCESS EXAMINATION CENTRE**

**Mock Examinations for BECE Candidates**

**INTEGRATED SCIENCE**

**All answers must be provided on clean sheet of papers (Answer booklet).**

Write your name and index number on the sheets.

This booklet consists of two papers. Answer Paper **2** which comes first in your answer booklet and Paper **1** on your Objective Answer Sheet. Paper **2** will last for **1 Hour 15 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**.

Answer all questions in your answer booklet.

**PASSPORT TO SUCCESS EXAMINATION CENTRE**

PAPER 2

Essay

[100 Marks]

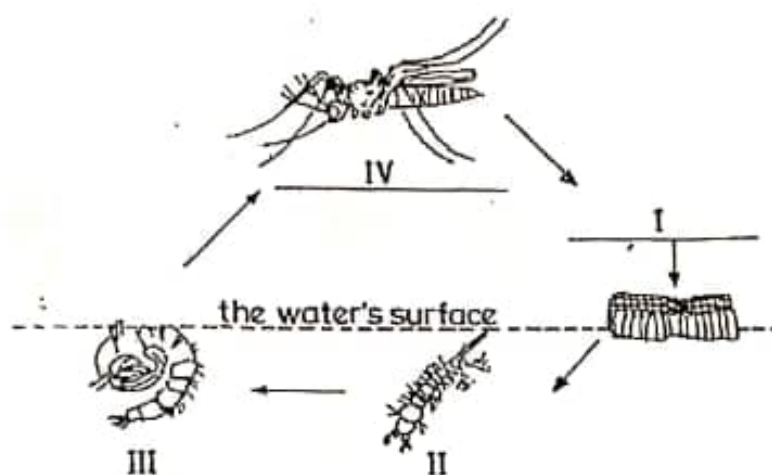
This paper is in two sections A and B. Answer Question 1 in section A and any other four questions in Section B.

SECTION A

[40 marks]

Answer all of Question 1

1. (a) The diagrams below represent the stages in the life cycle of a mosquito. Study the diagrams carefully and answer the questions that follow

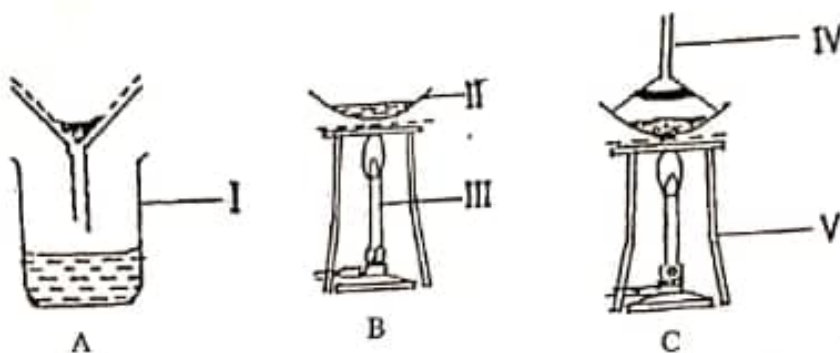


- (i) Name each of the stages labeled I, II, III and IV. 4 marks
- (ii) State how stage II obtains oxygen. 2 marks
- (iii) State two methods of controlling each of the stages labeled III and IV. 4 marks
- (b) In an experiment, red and blue litmus papers were dipped separately into three test tubes each containing one of the test substances listed in the table below.

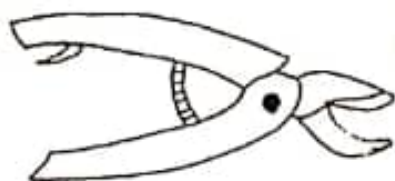
Test substances	Observations		Conclusion
	Red litmus paper	Blue litmus paper	
Lemon juice			
Calcium hydroxide solution			
Dilute hydrochloric acid			

- (i) Copy and complete the table by making the necessary **observation** and **conclusion** for each substance.
- (ii) Name **two** of the test substances that would react with each other to produce salt and water.
- (iii) Write down a balanced chemical equation for the reaction in (ii) above.
- [10 marks]

- (c) The diagrams below are different laboratory set-ups used in the separation of mixtures. Study the diagrams carefully and answer the questions that follow



- (i) Name **each** of the parts labeled I, II, III, IV and V. 5 marks
- (ii) Name the separation method represented by **each** diagram. 3 marks
- (iii) Which of the set-ups is used to obtain clear water from muddy water? 1 mark
- (iv) Which of the set-ups is used to obtain salt from salt solution? 1 mark
- (d) The diagram below is an illustration of a simple farm tool. Study it carefully and use it to answer the questions that follow:



- (i) Identify the tool. 3 marks
- (ii) State **three** uses of the tool. 3 marks
- (iii) Mention **four** ways of maintaining the tool 4 marks

### SECTION B [60 marks]

*Answer four questions only from this section*

2. (a) An atom Y has atomic number 12. It loses two electrons in order to be stable.
- i. State the proton number of the atom before it loses electrons. 1 mark
- ii. State the electron number of the atom:
- (α) before it loses electrons. 2 marks
- (β) after losing electrons. 1 mark
- iii. Name the type of ion formed by the atom when it loses **two** electrons. 1 mark

- (b) Name four farming systems used in crop production. 4 marks
- (c) (i) What is *dispersal of seeds*? 2 marks  
(ii) State two characteristics of seeds dispersed by wind. 2 marks
- (d) Explain the term *forward bias* of a p-n junction diode. 3 marks
3. (a) (i) What is an acid? ✓ 2 marks  
(ii) Give two differences between an *acid* and a *base*, in terms of taste and feel. ✓ 2 marks
- (b) (i) Define *pressure*. ✓ 2  
(ii) A force of 200 N is exerted on an area of 50 m<sup>2</sup>. 3  
Calculate the pressure exerted by the force. 3 marks
- (c) Explain the following terms as associated with living organisms:  
(i) unicellular;  
(ii) multicellular. 4 marks
4. (a) (i) What is a *disease vector*? ✓  
(ii) Mention two methods of controlling each of the following types of pests of farm animals:  
(α) ectoparasites  
(β) endoparasites 6 marks
- (b) (i) State two symptoms of nitrogen deficiency in a tomato plant. (2)  
(ii) Describe *side dressing* as a method of fertilizer application. (2) 5 marks
- (c) (i) Define *power* ✓  
(ii) State the S.I. unit of power. ✓ 2 marks
- (d) Draw the electronic structure of sulphur  
{Atomic number of sulphur = 16} (2) 2 marks
5. (a) (i) What is *respiration*? (2)  
(ii) Name the types of respiration that occur in humans (2) 4 marks
- (b) List three ways of maintaining soil fertility. (3) 3 marks
- (c) (i) Write the systematic name of each of the following chemical compounds:  
(α) FeS; |  
(β) SO<sub>2</sub> |  
(γ) CO<sub>2</sub> |  
(ii) Give one reason why copper, silver and gold are mostly used in making ornaments and jewellery. (1) 4 marks
- (d) (i) What is a *fuse*? (2)  
(ii) Explain why a fuse is used in an electrical circuit. (2) 4 marks
6. (a) (i) What is the difference between *unicellular organism* and *multicellular organism*? (2)  
(ii) State two reasons why vegetable crops are important to humans. (2) 4 marks
- (b) (i) State two elements of climate (2)  
(ii) What is the difference between *climate* and *weather*? (2) 4 marks
- (c) Mention three advantages of staking in crop production. (3) 3 marks
- (d) Explain each of the following processes:  
(i) corrosion; ✓  
(ii) sublimation ✓ 4 marks

# INTEGRATED SCIENCE 1

## OBJECTIVE TEST

45 MINUTES

1. Steel is an alloy of iron and  
A. aluminium  
B. carbon  
C. silicon  
D. gold
2. An atom that has lost one or more electron(s) is called  
A. a molecule  
B. a proton  
C. an ion  
D. a negative particle
3. In all machines, the efficiency is  
A. always 100 %  
B. less than 100%  
C. more than 100%  
D. always 0%
4. In electronic circuits, LEDs are used to indicate the absence or presence of  
A. voltage source  
B. p-n junction  
C. electric current  
D. emitter and collector
5. Which of the following statements about the scientific method is/ are correct? It provides  
 I. logical procedure for arriving at knowledge  
 II. knowledge that can be verified  
III. knowledge that can never be changed  
A. I only  
B. I and II only  
C. I and III only  
D. II and III only
6. Which of the following substances is a compound?  
A. Hydrogen  
B. Nitrogen  
C. Oxygen  
D. Water
7. Which of the following source(s) of energy is/are renewable?  
 I. Solar  
 II. Crude oil.  
 III. Wind,  
A. I only  
B. I and II only  
 C. I and III only  
D. I, II and III
8. The pressure in fluids  
A. increases with depth ✓  
B. decreases with depth  
C. acts upwards at any point  
 D. acts differently in all directions
9. Which of the following chemical equations is balanced?  
A.  $N_2 + H_2 \rightarrow NH_3$   
B.  $N_2 + 3H_2 \rightarrow NH_3$   
C.  $N_2 + 3H_2 \rightarrow 2NH_3$   
D.  $N_2 + 3H_2 \rightarrow NH_3$
10. Lime juice tastes sour because it is  
A. acidic  
B. alkaline  
C. basic  
D. salty
11. A metal block has a mass of 1.0 kg. What is the volume of the block if its density is  $10 \text{ kgm}^{-3}$ ?  
A.  $0.01 \text{ m}^3$   
B.  $0.10 \text{ m}^3$   
C.  $1.00 \text{ m}^3$   
D.  $10.00 \text{ m}^3$
12. It is easier to move a heavy load with a crowbar when th
- Handwritten notes:*  
For Q9:  $N_2 + 3H_2 \rightarrow 2NH_3$  is balanced.  $2 \times 14 = 28$ ,  $3 \times 2 = 6$ ,  $2 \times 17 = 34$ .  
For Q11:  $V = \frac{m}{\rho} = \frac{1.0}{10} = 0.1 \text{ m}^3$ .

- A. effort distance is shorter than the load distance
- B. effort distance is longer than the load distance
- C. effort distance of distance equal to the load distance
- D. effort is equal to the load

13. Benedict's solution was added to a mixture in a test tube and it turned brick red when heated. The mixture is likely to contain

- A. glucose
- B. vitamin
- C. can start a motion
- D. can change the direction of a moving

14. Chlorine gas is an example of

- A. an atom
- B. an element
- C. a compound
- D. a molecule

15. Which of the following statements about a force are correct? It

- I. is measured in newtons
- ✓ II. is measured in newton-metre
- ✓ III. can start a motion
- ✓ IV. can change the direction of a moving body

- A. I and II only
- B. I and III only
- ✓ C. I, III and IV only
- D. I, II, III and IV

16. Kerosene is able to reach the other end of a wick by

- A. diffusion
- B. suction pressure
- C. capillary action
- D. osmosis

17. Which of the following processes is used to separate insoluble solids from liquids?

- A. Sublimation
- B. Filtration ✓
- C. Evaporation
- D. Crystallization

18. Which of the following chemical compounds is used in removing hardness in water?

- A. NaCl
- B. NaOH
- C.  $\text{NaHCO}_3$
- D.  $\text{Na}_2\text{CO}_3$

19. When a thermometer is put in hot water, the mercury level rises because the mercury increases in

- A. density
- B. mass
- C. volume ✓
- D. weight

20. The workdone when a force moves a body through a distance of 12 m is 720 J. The force applied is

- A. 8640 N
- B. 732 N
- C. 708 N
- D. 60 N

$$W = f \times d$$

$$720 = f \times 12$$

21. Which of the following methods of treating water makes it soft?

- A. Addition of alum
- B. Addition of sodium carbonate
- C. Chlorination
- D. Filtration

22. Dehusking and shelling are both activities carried out in the processing of

- A. cowpea
- B. groundnut
- C. maize
- D. sorghum

23. Typhoid fever is transmitted through

- A. contact with contaminated skin wounds
- B. eating contaminated food
- C. eating uncooked food
- D. drinking treated water

24. One advantage of friction is that it

- A. enables cutting tools to be sharpened
- B. increases the efficiency of machines
- C. produces a lot of heat in machines
- D. wears off the soles of shoes

25. Sickle is a farm tool used for

- A. harvesting rice
- B. trimming hedges
- C. transplanting seedlings
- D. watering crops

26. One characteristic of the image formed in a pin-hole camera is that the image is

- A. diminished ✓
- B. magnified

- C. upright
- D. virtual

27. Transplanting of seedlings is usually done in the evening because

- A. darkness promotes rapid growth
- B. pest attack is minimal
- C. transpiration is minimal
- D. seedlings require less nutrients

28. Which of the following statements about molecules is/ are correct? Molecules

- I. are chemically combined group of atoms
- II. are physically combined group of atoms
- III. can exist on their own

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

29. Fruits which are dispersed by wind are likely to be

- A. dry
- B. hairy
- C. juicy
- D. sticky

30. Which of the following materials allows electric current to pass through easily?

- A. Aluminium
- B. Carbon
- C. Glass
- D. Water

31. Water contains two elements, hydrogen and oxygen, in the ratio of

- A. 1:2
- B. 1:3
- C. 2:1
- D. 3:1

$H_2O$

32. In the digestive system of ruminants, vitamins are synthesized in the

- A. abomasum
- B. omasum
- C. reticulum
- D. rumen

33. The best way of protecting oneself from high blood pressure is to

- A. consume alcoholic drinks
- B. eat high carbohydrate diets
- C. engage in smoking
- D. exercise regularly

34. The property of metals which makes them to be easily drawn into thin wires is known as

- A. conductivity
- B. ductility
- C. malleability
- D. resistivity

35. An atom of an element is represented as . How many neutrons are in the nucleus of the atom?

- A. 13
- B. 14
- C. 27
- D. 40

27

36. Viable seeds are ones that

- A. are able to germinate under suitable conditions
- B. are eaten by animals after planting
- C. contain a lot of oil
- D. have hard seed coat

37. Which of the following processes can occur at all temperatures?

- A. Boiling
- B. Evaporation
- C. Melting
- D. Sublimation

38. Which of the following human activities maintains the carbon cycle?

- A. Bush burning
- B. Felling of trees
- C. Release of fumes from factories
- D. Replanting of trees felled as timber

39. The farming system which involves the growing of one type of crop on the same piece of land every season is known as

- A. mixed cropping
- B. mixed farming
- C. mono-cropping
- D. monoculture

40. The presence of chlorophyll in green plants is a necessary condition for photosynthesis because it

- A. absorbs oxygen
- B. absorbs solar energy
- C. produces carbon dioxide
- D. produces water vapour

INTEGRATED SCIENCE Marking Scheme

OBJECTIVE TEST (40 MARKS)

PAPER ONE

1. B	6. B	11. <del>CB</del>	16. <del>XC</del>	21. <del>DB</del>	26. <del>EA</del>	31. <del>EC</del>	36. <del>EA</del>
2. C	7. <del>DC</del>	12. B	17. <del>EB</del>	22. <del>BC</del>	27. <del>EC</del>	32. D	37. <del>BD</del>
3. B	8. <del>DA</del>	13. <del>EA</del>	18. <del>ED</del>	23. <del>DB</del>	28. <del>BC</del>	33. D	38. <del>DB</del>
4. C	9. <del>AC</del>	14. <del>ED</del>	19. <del>XC</del>	24. <del>EA</del>	29. <del>DB</del>	34. <del>BB</del>	39. B <del>EC</del>
5. B	10. <del>BA</del>	15. <del>XC</del>	20. <del>ED</del>	25. <del>BA</del>	30. <del>DB</del>	35. <del>EC</del>	40. <del>EB</del>

PAPER 2

PART I [40 MARKS]

I. (a)

(i) Name of each stage

- I. Egg
- II. Larva
- III. Pupa
- IV. Adult / Imago

(ii) How stage II obtains oxygen

The larva comes to the surface of the water body to obtain oxygen from the air through a structure called the siphon.

(iii) Methods of controlling each of the stages labeled III and IV

**Controlling stage III**

- Adding oil to cover the water surface
- Introduction of fish into the water body
- Spraying the water body with pesticides
- Adding kerosene to cover the water surface

**Controlling stage IV**

- The use of lethal ovitraps
- The use of mosquito spray / insecticide
- The use of mosquito coil
- Clearing mosquito breeding grounds such as choked gutters, stagnant pools of water, etc

10 marks

(b)

(i) Name of the part labeled

- I. Beaker
- II. Evaporating disc
- III. Candle

10



- IV. Inverted funnel
- V. Tripod stand

(ii) Name the separation method represented by each diagram.

- A- Filtration
- B- Evaporation
- C- sublimation

(iii) The set-up used to obtain clear water from muddy water  
Set up A

(iv) The set-up used to obtain salt from salt solution?  
Set-up B

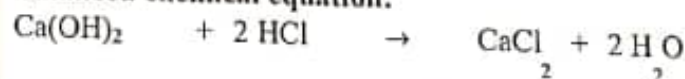
(b) (i)

Test substances	Observations		Conclusion
	Red litmus paper	Blue litmus paper	
Lemon juice	Remains red or: no colour change	Turns red	Acidic substance or: Contains acid
Calcium hydroxide solution	Turns blue	Remains blue or: no colour change	Basic substance or: Contains base
Dilute hydrochloric acid	Remains red or: no colour change	Turns red	Acidic substance Contains acid

(ii) Reactants to form salt and water:

Calcium hydroxide solution and dilute hydrochloric acid

(iii) Balanced chemical equation:



(c)

(i) Name of the part labeled

- I. Beaker
- II. Evaporating disc
- III. Candle
- IV. Inverted funnel
- V. Tripod stand

(ii) Name the separation method represented by each diagram.

- D- Filtration
- E- Evaporation
- F- sublimation

(iii) The set-up used to obtain clear water from muddy water  
Set up A

- (iv) The set-up used to obtain salt from salt solution?  
Set-up B

- (d) (i) The Tool - Secateurs or a pair of secateurs  
(ii) Uses of the tool  
 Trimming  
 Cutting  
 Pruning  
(iii) Ways of maintaining the tool  
 Oiling or greasing metal parts  
 Washing and drying after use  
 Tightening bolts and nuts when loose  
 Sharpening cutting edges when blunt

**SECTION B**  
**[60 marks]**

*Answer four questions only from this section*

1. (a) An atom Y has atomic number 12. It loses two electrons in order to be stable. [1 mark]  
(i) State the proton number of the atom before it loses electrons. [1 mark]  
12  
(ii) State the electron number of the atom: [2 marks]  
(α) before it loses electrons.  
12  
(β) after losing electrons.  
10  
(iii) Name the type of ion formed by the atom when it loses two electrons. [1 mark]  
Cation / positively charged ion  
(b) Name four farming systems used in crop production. [4 marks]  
 Land rotation  
 Crop rotation  
 Mixed cropping  
 Mixed farming  
 Organic farming  
 Monoculture  
 Mono cropping  
 Shifting cultivation  
 Ecological farming / Eco-farming  
(c) (i) What is *dispersal of seeds*? [2 marks]

It is a process by which seeds are carried away from the parent plant

- (ii) State two characteristics of seeds dispersed by wind. [2 marks]

- ┆ seeds are very small
- ┆ they are very light
- ┆ they have hair
- ┆ they have wing-like structures / parachutes

- (d) Explain the term *forward bias* of a p-n junction diode. [3 marks]

It is when the positive terminal of an electric source is connected to the p-type of the diode and the negative terminal of the source is connected to the n-type of the diode, resulting in the flow of charges / current.

2. (a) (i) What is an acid? [2 marks]

It is a proton donor

OR

A substance or compound that produces excess hydrogen ion (H<sup>+</sup>) in water

OR

A substance that contains replaceable hydrogen

- (ii) Give two differences between an *acid* and a *base*, in terms of taste and feel. [2 marks]

	Acid	Base
Taste	Sour	Bitter
Feel	Non slippery / stinging	Slippery / soapy

- (b) (i) Define *pressure*.

It is the force acting (normally) per unit area

OR

$$\text{Pressure} = \frac{(\text{Normal})\text{force}}{\text{Area}}$$

- (ii) A force of 200 N is exerted on an area of 50 m<sup>2</sup>. Calculate the pressure exerted by the force. [3 marks]

$$\begin{aligned}\text{Pressure} &= \frac{(\text{Normal})\text{force}}{\text{Area}} \\ &= \frac{200}{50} \\ &= 4 \text{ Pa} \quad \text{OR} \quad 4 \text{ Nm}^{-2}\end{aligned}$$

(c) Explain the following terms as associated with living organisms:

[4 marks]

(i) **Unicellular -**

(Very small) living organisms that consist of only one cell.

(ii) **Multicellular -**

(Large) living organisms that consist of (many) cells

(d) Give two reasons why soil air is important.

[2 marks]

- It enhances the absorption of mineral salts / nutrients by plant roots
- It enhances the absorption of water by plant roots
- It makes oxygen available for seed germination
- Presence of aeration prevents the formation of toxic / acidic substances in the soil by micro organisms.
- Plant roots use soil air for respiration / metabolism / growth
- Soil microorganisms use soil air for respiration
- Air is required for the decomposition of organic matter.
- Aeration is required to prevent development of plant diseases

4. (a) (i) **Disease Vector**

An organism that transmits disease-causing microorganisms from an infected person or animal to another

(ii) **Methods of control**

(α) **ectoparasites**

- Use of pesticides
- Dipping
- Dusting
- Handpicking
- Use of footbath
- Rotational grazing

(β) **endoparasites**

- Drenching
- Deworming
- Vaccination
- Regular change of feed and litter

(b) (i) **Symptoms of nitrogen deficiency in a tomato plant**

- Stunted growth
- Weak stem or branches
- Leaves turn yellowish
- Fruits are smaller and fewer than normal

(ii) **Side dressing (fertilizer application)**

through it exceeds a particular level, thereby breaking the circuit.

(ii) **Why fuse is used in an electrical circuit**

To protect the electrical circuit from damage caused by abnormal power surges or increases

6. (a) (i)

Unicellular organism	Multicellular organism
organism is made up of only one cell	organism is made up of more than one cell

(ii) **Why vegetable crops are important to humans**

- ┆ Good source of vitamins
- ┆ Good source of mineral salts
- ┆ Make food tasty
- ┆ They have high fibre content

(b) (i) **Elements of climate**

- ┆ Rain
- ┆ Temperature
- ┆ Humidity
- ┆ Sunshine
- ┆ Atmospheric pressure
- ┆ Cloud
- ┆ Wind

(ii) **Difference**

Climate	Weather
atmospheric condition of a place over a long period of time	atmospheric condition of a place over a short period of time

(c) **Advantages of *staking* in crop production**

- ┆ Keeps fruits clean
- ┆ Enables easy weeding
- ┆ Enables easy harvesting
- ┆ Prevents early spoilage of fruits
- ┆ Keeps plant from falling during storms
- ┆ Keeps plant from falling under the weight of mature fruits

(d) (i) **Corrosion explanation**

A process by which a substance, especially a metal, is destroyed progressively by chemical action.

Example: the rusting of iron