03301/2&1 BECE
June 2021
INTEGRATED
SCIENCE 2&1
Essay and Objective
2 hours

2&1

Name .....

Index Number .....

THE WEST AFRICAN EXAMINATIONS COUNCIL

GHANA

Basic Education Certificate Examination

June 2021 | INTEGRATED SCIENCE 2&1 Essay and Objective | 2 hours

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 **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.

PAPER 2 1¼ hours
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**.

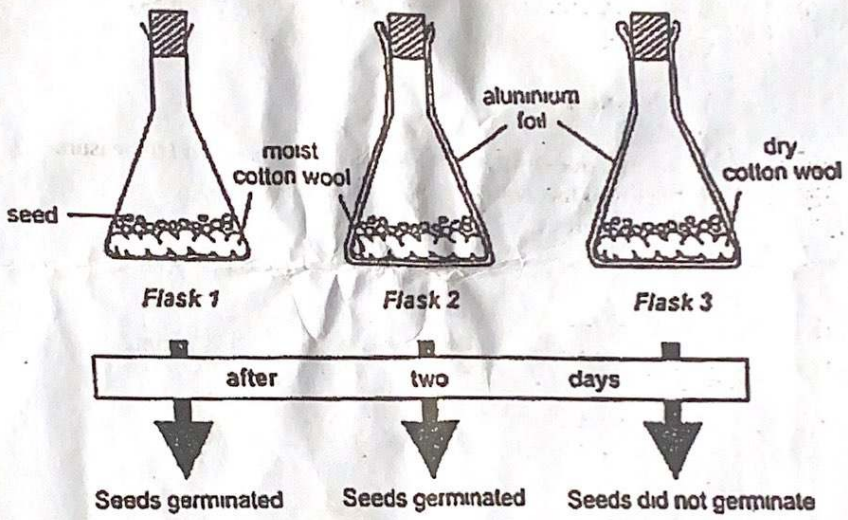
Answer **all** *the questions in your answer booklet.*

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

SECTION A
[40 marks]

Answer **all** *of* Question **1**.

1. (*a*) The diagrams below are illustrations of a set-up used to study the conditions for seed germination. The flasks were kept at 25 °C during the experiment. *Study the diagrams carefully and answer the questions that follow.*



(i) What conclusion can be drawn from the results of flask **1** and flask **2**? [2 marks]

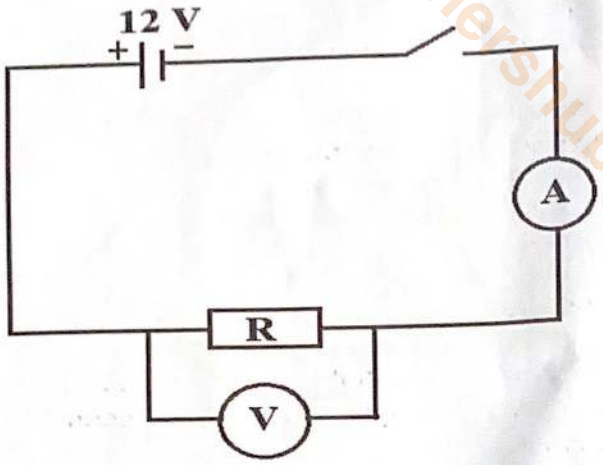
(ii) What conclusion can be drawn from the results of flask **2** and flask **3**? [2 marks]

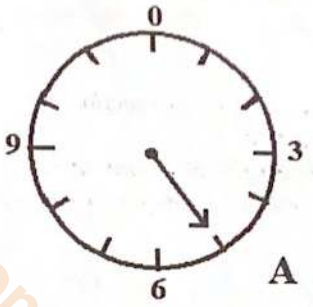
(iii) The seedlings in flask **2** died after two weeks. What can be the reasons for this occurrence? [2 marks]

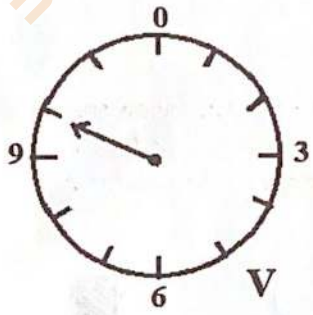
(iv) A candidate concluded that light was an important factor for the germination. Did the candidate make a **correct** conclusion? [1 mark]

(v) Give a reason for the answer stated in (iv) and state which of the flasks in the experiment could be used to support your answer. [3 marks]

(*b*) The diagrams below are illustrations of an experimental set-up. *Study the diagrams carefully and answer the questions that follow.*







(i) Name the measuring instrument that is in:
- (α) parallel;
- (β) series;

with the resistor **R**. [2 marks]

(ii) What quantity does **each** of the named instruments in (i) measure? [2 marks]

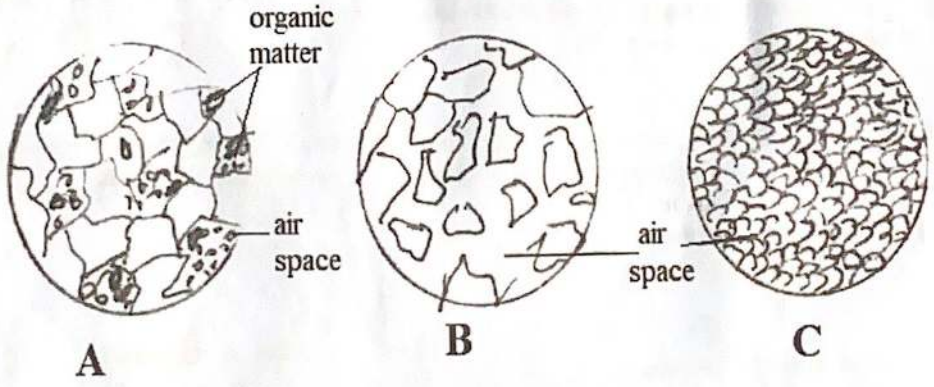
(iii) Read and record the values as indicated on:
- (α) A in amperes;
- (β) V in volts.

[2 marks]

(iv) Use the values read in (iii) to calculate the value of **R**. [3 marks]

(v) State **one** precaution to be taken in performing this experiment. [1 mark]

(*c*) The diagrams below are illustrations of different types of soil. *Study the illustrations carefully and answer the questions that follow.*



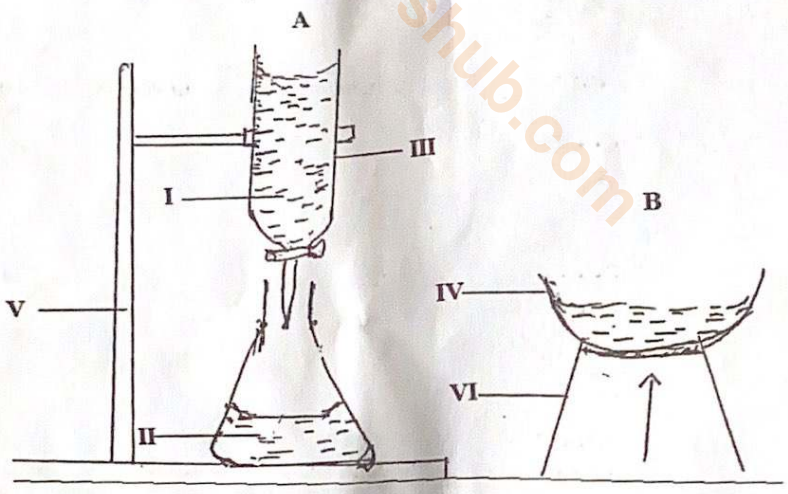
(i) Identify **each** of the soil types labelled **A**, **B** and **C**. [3 marks]

(ii) Describe **each** of the soils under the following properties:
- (α) particle size;
- (β) air space.

[6 marks]

(iii) Suggest **two** ways of improving soil type **B** for vegetable cultivation. [2 marks]

(*d*) The diagrams below is a set-up for preparation of common salt in the laboratory. *Study the diagrams carefully and answer the questions that follow.*



(i) Name **each** of the parts labelled **IV**, **V** and **VI**. [3 marks]
(ii) Name **two** possible solutions that can react to produce salt. [2 marks]
(iii) Name the process that takes place when the **two** solutions named in (ii) react. [1 mark]
(iv) Name the process that takes place in the set-up **B**. [1 mark]
(v) Write a balanced chemical equation for the reaction between the **two** solutions named in (ii). [2 marks]

SECTION B
[60 marks]

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

2. (*a*) (i) State what happens when photosynthesis occurs in a leaf.
(ii) What is *pollination*? [3 marks]

(*b*) Explain **briefly** why the mass of lumpy charcoal remains unchanged when ground into powder but the mass of the same lump changes when heated to burn. [4 marks]

(*c*) (i) What is a *physical quantity*?
(ii) State **two** physical quantities. [4 marks]

(*d*) State **two** importance **each** of:
(i) light;
(ii) temperature;
in crop production. [4 marks]

3. (*a*) (i) What is *hardness of water*?
(ii) Give **one** example **each** of a natural source of water that is:
(α) hard water;
(β) soft water. [4 marks]

(*b*) What is the end-product of digestion of **each** of the following food substances?
(i) Meat;
(ii) Cassava;
(iii) Palm-oil.

[3 marks]

(*c*) Give **one** effect of **each** of the following factors considered in vegetable crop production:
(i) soil type;
(ii) nearness to market;
(iii) nearness to source of water.

[3 marks]

(*d*) (i) Explain **briefly** why an eclipse occurs.
(ii) Name the **two** types of eclipse.

[5 marks]

4. (*a*) (i) Explain the term *convection* as applied to heat transfer.
(ii) Give **two** reasons why convection does **not** occur in solids.

[4 marks]

(*b*) Give **two** effects of **each** of the following soil physical properties on maize cultivation:
(i) texture;
(ii) water holding capacity.

[4 marks]

(*c*) Use any **three** of the following organisms to construct a food chain:
Hawk, grasshopper, man, grass, toad, grasscutter. [2 marks]

(*d*) (i) Consider the following elements and state which element(s) is/are metals:

$_{11}Na$, $_{7}N$, $_{6}C$, $_{3}Li$.

(ii) Explain **briefly** what is observed when pieces of **each** of the following metals are dropped into **two** separate test tubes **each** containing dilute hydrochloric acid:
(α) magnesium;
(β) silver.

[5 marks]

5. (*a*) State **two** important components **each** of the soil that helps:
(i) crops to grow well;
(ii) to maintain good soil structure.

[4 marks]

(*b*) (i) Explain how energy in a windmill is obtained.
(ii) State **one** source of renewable energy.

[4 marks]

(*c*) (i) Explain why steel is preferred to iron in building construction.
(ii) State **two** ways of preventing rusting.

[4 marks]

(*d*) State **three** ways of preventing indigestion. [3 marks]

6. (*a*) State **three** ways by which the atmosphere in an industrial area is polluted. *[3 marks]*

(*b*) (i) Write word equation for **each** of the following reactions between:
(α) calcium and oxygen;
(β) nitrogen and hydrogen.

(ii) State the hazard that could be prevented when **each** of the following protective materials are used in the laboratory:
(α) gas mask;
(β) goggles.

[4 marks]

(*c*) If a cuboid of weight 100 N, has sides 5 cm by 10 cm, calculate the:
(i) area of the cuboid;
(ii) pressure exerted by the cuboid when it lies on its side.

[4 marks]

(*d*) (i) Explain the term *mixed farming*.
(ii) State **two** advantages of mixed farming.

[4 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.

June 2021 | INTEGRATED SCIENCE 1 [40 marks] | 45 minutes

While you are waiting, read and observe the following instructions.
Answer Paper **1** *on your Objective Test answer sheet. Do* **not** *start Paper* **1** *until you are told to do so. Paper* **1** *will last* **45** *minutes.*

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 candidate whose name is Abena Aku DERY. Her *index number* is 772384188 and she is writing the examination at *Centre Number* 77234. She is offering *Integrated Science* 1 and the *Paper Code is* 0331.

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

CANDIDATE NAME:	SUBJECT:
DERY ABENA AKU	INTEGRATED SCIENCE 1

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

CANDIDATE NUMBER	CENTRE NUMBER	PAPER CODE
7 7 2 3 8 4 1 8 8	7 7 2 3 4	0 3 3 1

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 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⊐ ⊏E⊐

Think carefully before you shade the answer 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 instruments is connected in parallel across a resistor in an electrical circuit?
   A. Ammeter
   B. Voltmeter
   C. Ohmmeter
   D. Galvanometer

2. Which of the following diseases is **not** a deficiency disease?
   A. Scurvy
   B. Cholera
   C. Beriberi
   D. Goitre

3. Which of the following fruits is dispersed by water?
   A. Coconut
   B. Mango
   C. Maize
   D. Cocoa

4. Which of the following methods can be used to prevent iron from rusting?
   I. Painting
   II. Alloying
   III. Keeping the iron in a desiccator
   IV Keeping iron in a moist environment

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

5. An aluminium cube of side 2 m has mass 24 kg. Determine the density of aluminium.
   A. 3 kg m^{-3}
   B. 12 kg m^{-3}
   C. 24 kg m^{-3}
   D. 48 kg m^{-3}

6. An atom has 20 nucleons and 9 protons. What is its neutron number?
   A. 9
   B. 10
   C. 11
   D. 12

7. Which of the following activities are cultural practices in vegetable production?
   I. Application of fertilizer
   II. Harvesting
   III. Mulching

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

8. What is the systematic name of the compound CO?
   A. Carbon(I) oxide
   B. Carbon(II) oxide
   C. Carbon dioxide
   D. Carbon(IV) oxide

9. Which of the following organisms is an ecto-parasite of animals?
   A. Fleas
   B. Tapeworm
   C. Liver fluke
   D. Roundworm

10. In an experiment to determine the various particle sizes of soil by sedimentation, the particles above clay suspension are
   A. loam.
   B. organic matter.
   C. gravels.
   D. silt.

11. Mosquito pupa breathes through tubes called
   A. trachea.
   B. siphon.
   C. lungs.
   D. gills.

12. The proper way of maintaining soil structure and fertility is termed as soil
A. conservation.
B. depletion.
C. profile.
D. erosion.

13. An atom of an element has neutral charge because the
A. protons and electrons are the same particles.
B. proton number and electron number are the same.
C. neutron number and proton number are equal.
D. electron number and neutron number are equal.

14. An example of the process of osmosis is
A. selective reabsorption of water in kidney.
B. absorption of digested food.
C. the spread of petrol scent.
D. gaseous exchange in living things.

15. Heat from the sun reaches the earth by
I. conduction
II. convection
III. radiation

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

16. Which of the following substances is a compound?
A. Oxygen
B. Magnesium
C. Water
D. Sodium

17. Which of the following chemical symbols is that of an element with seven electrons in the outermost shell?
A. $_{20}Ca$
B. $_{17}Cl$
C. $_{10}Ne$
D. $_{16}S$

18. The current flowing through a resistor of resistance 10 ohms is 2.5 A. What is the potential difference between the terminals of the resistor?
A. 4 V
B. 12.5 V
C. 25 V
D. 50 V

19. Which of the following chemical substances can be used to remove permanent hardness in water?
A. $NaHCO_3$
B. Na_2CO_3
C. $Ca(HCO_3)_2$
D. $CaCO_3$

20. Which of the following organisms attacks crops in storage?
A. Crickets
B. Grasshoppers
C. Millipedes
D. Weevils

21. A person urinates more often in the rainy season than in the dry season because
A. more sweat evaporates from the skin.
B. less sweat evaporates from the skin.
C. his kidneys works faster.
D. he drinks less water.

22. The instrument used to measure potential difference across a resistor is
A. ammeter.
B. barometer.
C. hydrometer.
D. voltmeter.

23. An advantage of practicing organic farming is that it
A. increases soil fertility.
B. reduces pest infestation.
C. reduces toxicity levels in plants.
D. increases resistance to plant disease.

24. If a soil is smooth and sticky, it means that the soil has a large amount of
A. clay.
B. loam.
C. sand.
D. silt.

25. The instrument that can be used to measure accurately the mass of a substance is
A. beam balance.
B. spring balance.
C. eureka can.
D. measuring cylinder.

26. Determine the potential energy of a block of mass 2 kg placed on a building 10 m tall.
[$g = 10\ m\ s^{-2}$]

A. 20 J
B. 50 J
C. 100 J
D. 200 J

A machine lifts a load of 100 N through a vertical distance of 2 m in 10 s.
Use the information to answer questions 27 and 28.

27. What is the work done by the machine?
A. 50 J
B. 100 J
C. 200 J
D. 400 J

28. What is the power of the machine?
A. 50 W
B. 20 W
C. 10 W
D. 2 W

29. The function of the white blood cells in humans is to
A. produce haemoglobin.
B. ensure blood clot during an injury.
C. produce antibodies to engulf disease-causing organisms.
D. produce digestive enzymes.

30. Which of the following elements is a macro-nutrient of plants?
A. Copper
B. Manganese
C. Molybdenum
D. Sulphur

31. Which of the following planets is at the centre of the solar system?
A. Earth
B. Venus
C. Mars
D Sun

32. One of the properties of acids is that they
A. turn wet blue litmus paper red.
B. have no effect on blue litmus paper.
C. turn wet red litmus paper blue
D. are neutral to litmus paper.

33. A farming system which involves the growing of rice and the rearing of fowls is known as
A. crop rotation.
B. mixed farming.
C. mixed cropping.
D. organic farming.

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

35. Purple colouration of leaves of plant is a **major** symptom of deficiency in
    A. calcium.
    B. nitrogen.
    C. potassium.
    D. phosphorus.

36. Which of the following statements about the base of a transistor are **correct**? The base is
    I. made very thin
    II. made very wide
    III. responsible for activating the transistor
    IV. made of n-type semiconductor

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

37. Which of the following machines are complex machines?
    I. Tractor
    II. Mist blower
    III. Sewing machine

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

38. Which of the following statements about aerobic and anaerobic respiration is **not** correct?
    A. Water is produced as a by-product in aerobic respiration.
    B. Alcohol or lactic acid is produced in anaerobic respiration.
    C. No oxygen is required in anaerobic respiration.
    D. Very little energy is released in aerobic respiration.

39. Calcium oxide and water reacts to form calcium hydroxide. The formula for the product is
    A. Ca_2OH.
    B. $Ca(OH)_2$.
    C. CaH_2O.
    D. $Ca(H_2O)_2$.

40. When an atom loses an electron, the ion formed is called
    A. an anion
    B. a cation
    C. a molecule.
    D. a compound.

END OF PAPER