

SC5172&1
WASSCE 2018
INTEGRATED
SCIENCE 2&1
Essay and Objective
2½ hours

2&1

THE WEST AFRICAN EXAMINATIONS COUNCIL
West African Senior School Certificate Examination
for School Candidates

SC 2018

INTEGRATED SCIENCE 2&1

2½ 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 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 1½ hours after which the answer booklet will be collected. Do not start Paper 1 until you are told to do so. Paper 1 will last 1 hour.

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.

$$E = I(\Omega + r)$$

1. (a) (i) What is meant by the term *modern technology*?
(ii) Give **three** reasons for the lack of improvement of technology in Ghana. [5 marks]
- (b) (i) Explain the term *convection* as used in heat energy.
(ii) Explain why convection **cannot** take place in solids. [5 marks]
- (c) (i) Differentiate between *soil erosion* and *soil depletion*.
(ii) Give **three** effects of soil erosion on agricultural productivity. [5 marks]
- (d) (i) List **three** causes of indigestion in humans.
(ii) State **two** ways of preventing tooth decay. [5 marks]
2. (a) A man with normal red blood cells is married to a woman who is a sickle cell carrier. With the aid of a genetic diagram, explain the genetic constitution of their children. [4 marks]
- (b) (i) Explain the term *sublimation*.
(ii) Name **three** substances that can sublime. [5marks]
- (c) Two lamps, **each** of resistance 3Ω , are connected in parallel. The arrangement is then connected across a 4.5 V battery.
(i) Draw a circuit diagram for the arrangement.
(ii) Calculate the effective resistance of the lamps.
(iii) Calculate the total current in the circuit. [6 marks]
- (d) (i) Distinguish between *green manure* and *farmyard manure*.
(ii) State **three** ways in which organic fertilizers are important to the soil. [5 marks]
3. (a) (i) Explain the term *identification* as used in animal production.
(ii) Describe **two** methods of identifying farm animals. [6 marks]
- (b) (i) What is a *reflex action*?
(ii) Distinguish between *excretion* and *egestion*. [4 marks]
- (c) (i) List **two** groups of hydrocarbons.
(ii) A group of hydrocarbons has the general formula C_nH_{2n} .
(α) Name the **first two** members of the group.
(β) State the **main** reaction that members of this group undergo. [5 marks]

- (d) State the class of lever to which **each** of the following simple machines belongs:
- (i) broom;
 - (ii) claw hammer; *Tatton*
 - (iii) fishing rod; *Tatton*
 - (iv) secateurs;
 - (v) bottle top opener.
- [5 marks]
4. (a) (i) Define the term *pressure*.
- (ii) A regular concrete block weighing 5 kg, has dimensions 8 cm x 20 cm x 50 cm. Calculate the **greatest** possible pressure the block will exert on the ground. [$g = 10 \text{ m s}^{-2}$] [6 marks]
- (b) (i) Give **three** reasons why poultry farms should be distanced from residential areas.
- (ii) Mention **two** methods of preserving poultry eggs.
- [5 marks]
- (c) State **two** causes **each** of the following problems associated with reproduction in humans:
- (i) ectopic pregnancy;
 - (ii) infertility in men.
- [4 marks]
- (d) Indicate whether **each** of the following substances is an element, a compound or a mixture:
- (i) water;
 - (ii) iron filings;
 - (iii) glass;
 - (iv) milk of magnesia;
 - (v) iodine crystals.
- [5 marks]
5. (a) A 0.04 g of copper metal reacts completely with 25 cm^3 of $0.5 \text{ mol dm}^{-3} \text{ H}_2\text{SO}_4$.
- (i) Write a balanced chemical equation for the reaction.
 - (ii) Calculate the molar mass of the copper metal.
- [6 marks]
- (b) (i) Give **two** functions of the human ear.
- (ii) Arrange the following media in order of **increasing** speed of sound in **each** of them: solids, liquids, and gases.
- [5 marks]
- (c) (i) Give **two** advantages of clayey soil over sandy soil.
- (ii) State **three** symptoms of nitrogen deficiency in maize.
- [5 marks]
- (d) State **four** ways in which biotic factors are useful in an ecosystem. [4 marks]

Turn over

6. (a) (i) State **three** ways through which AIDS is transmitted. [6 marks]
(ii) List **three** effects of drug abuse on the user. [4 marks]
- (b) Name **four** endocrine glands found in humans. [4 marks]
- (c) (i) What is a *shadow*?
(ii) Draw a ray diagram to illustrate a ray of light travelling from glass to air. [5 marks]
- (d) (i) Explain the term *artificial insemination* as used in animal production.
(ii) State **three** advantages of artificial insemination in animal production. [5 marks]

END OF ESSAY TEST

Spillage

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.**

**WHILE YOU ARE WAITING, READ THE FOLLOWING
INSTRUCTIONS CAREFULLY.**

PAPER 1
OBJECTIVE TEST
[50 marks]

1 hour

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 2018', '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 female candidate whose *name* is *Aba Kokui USMAN*. Her *index number* is 7102143958 and she is offering *Integrated Science*1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS		GHA
Name: USMAN ABA KOKUI		
Examination: WASSCE	Year: SC2018	
Subject: INTEGRATED SCIENCE	Paper: 1	

INSTRUCTIONS TO CANDIDATES	
1. Use grade 2B pencil throughout. 2. Answer each question by choosing one letter and shading it like this: <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E 3. Erase completely any answer you wish to change. 4. Leave extra spaces blank if the answer spaces provided are more than you need.	

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9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If candidate is absent shade this space <input type="checkbox"/>									
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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 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 E

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

Do all rough work on this question paper.

Now answer the following questions

1. The component of white light which is **most** deviated when light is dispersed is
 - A. blue.
 - B. red.
 - C. violet.
 - D. yellow.

2. Which of the following characters in humans is sex-linked?
 - A. Baldness
 - B. Skin colour
 - C. Eye colour
 - D. Sickle cell

3. An example of an abiotic factor in an ecosystem is
 - A. altitude.
 - B. grazing.
 - C. predation.
 - D. shading.

4. Alkanoic acids contain
 - A. carbon atoms and hydrogen atoms only.
 - B. carbon atoms and oxygen atoms only.
 - C. carbon atoms, hydrogen atoms and oxygen atoms only.
 - D. carbon atoms, hydrogen atoms and nitrogen atoms only.



5. Which of the following minerals is **not** needed by crops in large quantities?
- A. Calcium
 - B. Iron
 - C. Nitrogen
 - D. Phosphorus
6. A rigid bar that is supported at a point about which turning occurs is
- A. lever.
 - B. pulley.
 - C. wheel and axle.
 - D. inclined plane.
7. One criterion used in the classification of domestic rabbit is the
- A. age.
 - B. eye colour.
 - C. height.
 - D. size.
8. Which of the following chemical substances is toxic?
- A. Potassium cyanide
 - B. Sodium hydroxide
 - C. Hydrogen peroxide
 - D. Calcium oxide
9. The unit of heredity found in the chromosomes is
- A. centriole.
 - B. deoxyribonucleic acid.
 - C. mitochondrion.
 - D. endoplasmic reticulum.
10. Which of the following elements is a constituent of brass?
- A. Iron
 - B. Magnesium
 - C. Tin
 - D. Zinc
11. The process in the hydrological cycle which results in water vapour condensing and falling on the earth surface is
- A. evaporation.
 - B. infiltration.
 - C. precipitation.
 - D. sublimation.

12. The centre of gravity of a body is
- A. always at its centre.
 - B. a point where its total mass is always concentrated.
 - C. always at its end.
 - D. a point where it can be supported to be in equilibrium.
13. Which of the following crops is a root vegetable?
- A. Carrot
 - B. Ginger
 - C. Lettuce
 - D. Onion
14. The aim of the ring experiment in a flowering plant is to demonstrate that
- A. water is transported by the xylem.
 - B. food substances are transported by the phloem.
 - C. food substances are formed in the stem.
 - D. water is excreted from the stem.
15. Which of the following properties is associated with ionic compounds? They
- A. are soluble in organic solvents.
 - B. conduct electricity in the molten state.
 - C. have low melting and boiling points.
 - D. consist of molecules.
16. The sedimentary rock is also referred to as
- A. stratified rock.
 - B. slated rock.
 - C. silical rock.
 - D. separated rock.
17. One similarity of arteries and capillaries is that **both** have
- A. permeable walls.
 - B. muscular walls.
 - C. no valves.
 - D. large lumens.
18. Which of the following instruments is **most** suitable for measuring the thickness of razor blade?
- A. Metre rule
 - B. Micrometer screw gauge
 - C. Vernier callipers
 - D. Surveyor's tape

19. The chemical which is **most** likely to have **highly inflammable** hazard symbol in its container is on
- ethanol.
 - mercury.
 - ammonium hydroxide.
 - sodium hydroxide.
20. The part of the maize grain which grows into the shoot is the
- cotyledon.
 - endosperm.
 - plumule.
 - radicle.
21. An effort of 120 N was used to overcome a load of 80 N. What is the mechanical advantage of the system?
- 0.67
 - 1.50
 - 40.00
 - 200.00
22. Which of the following reactions can produce salt and water **only**?
- $\text{NaOH}_{(\text{aq})} + \text{CH}_3\text{COOH}_{(\text{aq})}$
 - $\text{NaOH}_{(\text{aq})} + \text{NH}_3_{(\text{aq})}$
 - $\text{NH}_3_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$
 - $\text{NaCl}_{(\text{aq})} + \text{AgNO}_3_{(\text{aq})}$
23. The **best** way of harvesting hot pepper is by
- shaking the plant.
 - handpicking the fruits.
 - allowing the fruits to drop naturally.
 - cutting the fruit with a sharp knife.
24. The area occupied by a box placed on a table is 2.0 m^2 . If the box exerts a pressure of 50 Pa on the table, calculate the mass of the box. [$g = 10 \text{ ms}^{-2}$]
- 2.5 kg
 - 10.0 kg
 - 100.0 kg
 - 1000.0 kg
25. Which of the following substances would have a pH below 7?
- Pure water
 - Milk of magnesia
 - Wood ash
 - Lemon juice

Turn over

Consider the food chain below and use it to answer questions 26 and 27.

Grass → Earthworm → Frog → Hawk

26. Which of the organisms is the primary consumer?
- A. Earthworm
 - B. Frog
 - C. Grass
 - D. Hawk
27. The organism which obtains the **least** energy is
- A. earthworm.
 - B. frog.
 - C. grass.
 - D. hawk.
28. In cattle, anaemia, damaged skin and heart-water disease are caused by
- A. liver-fluke.
 - B. roundworm.
 - C. tapeworm.
 - D. tick.
29. In a simple machine, the force that overcomes the resistance is
- A. effort.
 - B. lever.
 - C. load.
 - D. pivot.
30. A molar solution of KHSO_4 contains [K = 39, H = 1, S = 32, O = 16]
- A. 80 g of KHSO_4 in 1 dm^3 of solution.
 - B. 100 g of KHSO_4 in 100 cm^3 of solution.
 - C. 120 g of KHSO_4 in 1000 cm^3 of solution.
 - D. 136 g of KHSO_4 in 1 dm^3 of solution.
31. Which of the following functions are associated with mammalian skeleton? It
- I. stores calcium and phosphates.
 - II. protects vital internal organs.
 - III. produces red blood cells.
 - IV. stores proteins.
- A. I and II only
 - B. III and IV only
 - C. I, II and III only
 - D. II, III and IV only

32. The **most** appropriate time to transplant vegetable seedlings is
- dawn.
 - mid day.
 - sunrise.
 - sunset.
33. Rainbow formation is a practical illustration of the light phenomenon known as
- dispersion.
 - interference.
 - mirage.
 - reflection.
34. An example of a metalloid is
- magnesium.
 - potassium.
 - phosphorus.
 - silicon.
35. Which of the following statements about animals are **correct**?
- Movement is quick and visible
 - Chloroplast is absent
 - They have thick cellulose cell wall
- I and II only
 - I and III only
 - II and III only
 - I, II and III
36. The **main** reason for trimming the sides of a vegetable bed is to control
- run-off water.
 - leaching of nutrients.
 - breaking of bed.
 - soil erosion.
37. Which of the following observations is a direct consequence of thermal expansion?
- Cracks in concrete slabs
 - Sagging of electric cables
 - Buckling in railway lines
 - Crackling noise from roofing sheets
- I, II and IV only
 - I, III and IV only
 - II, III and IV only
 - I, II, III and IV

38. A solution of volume 500 cm^3 contains 9.80 g of H_2SO_4 . Determine its molar concentration.
[S = 32, O = 16, H = 1]
- A. 0.10 M
 - B. 0.20 M
 - C. 0.40 M
 - D. 0.50 M
39. A ball and socket joint in the human body does **not** allow
- A. circular movement.
 - B. side to side movement.
 - C. up and down movement.
 - D. gliding movement.
40. The **best** way of controlling endoparasites in cattle is through
- A. rotational grazing.
 - B. early morning grazing.
 - C. dipping the animals.
 - D. spraying the animal with recommended pesticides.
41. An electrical circuit consists of a 2 V cell connected to a 5Ω resistor. Determine the amount of current through the resistor when the circuit is closed.
- A. 0.4 A
 - B. 1.0 A
 - C. 2.5 A
 - D. 4.0 A
42. Which of the following hydrocarbons is an alkyne?
- A. C_2H_2
 - B. C_2H_4
 - C. C_3H_6
 - D. C_3H_8
43. An example of multicellular organism is
- A. Amoeba.
 - B. Euglena.
 - C. Paramecium.
 - D. Rhizopus.

44. Farmers prefer to grow crops on loamy soils because loamy soils
- I. usually contain large amounts of plant nutrients.
 - II. protect the crops from injury.
 - III. have equal amounts of clay and sand.
 - IV. hold plants firmly.

Which of the statements above is/are **correct**?

- A. I only
 - B. I and II only
 - C. I and III only
 - D. I and IV only
45. A precaution that has to be taken when using a liquid-in-glass thermometer is
- A. holding the bulb in hand when in use.
 - B. taking the reading quickly before thermal equilibrium is attained.
 - C. ensuring that the bulb is fully immersed in the substance.
 - D. ensuring that the bulb touches the vessel containing the substance.
46. Soap may itch the skin when it contains excess
- A. acid.
 - B. alkali.
 - C. fat.
 - D. glycerol.
47. The gas in the atmosphere that absorbs ultra violet rays is
- A. carbon (IV) oxide.
 - B. nitrogen.
 - C. oxygen.
 - D. ozone.
48. A soil is considered fertile when it
- A. contains a lot of living organisms.
 - B. is highly aerated.
 - C. has high water retention ability.
 - D. can support adequate crop yield.
49. The energy possessed by a student on top of a building is
- A. chemical energy.
 - B. heat energy.
 - C. kinetic energy.
 - D. potential energy.

Turn over

50. Which of the following statements about water is **correct**? It turns blue anhydrous cobalt (II)

- A. green.
- B. red.
- C. white.
- D. yellow.

END OF PAPER