SC5172&1
WASSCE 2020
INTEGRATED
SCIENCE 2&1
2&1
Essay and Objective
2½ hours

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination for School Candidates

SC 2020 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.

PAPER 2 1½ hours
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) List **three major** types of weathering.
(ii) Explain the role of temperature in weathering of rocks. [5 marks]

(*b*) A 100 W heater is connected to a 240 V mains supply. Calculate the:
(i) current drawn;
(ii) resistance of the heater. [4 marks]

(*c*) (i) List **three** compounds which have electrovalent bond.
(ii) Give **two** characteristics of electrovalent compounds. [5 marks]

(*d*) (i) What is *rhesus factor*?
(ii) Explain **briefly** how the rhesus factor in humans could result in miscarriage. [6 marks]

2. (*a*) (i) Explain **briefly** how solar energy is used to generate electricity.
(ii) State **two** other uses of solar energy. [5 marks]

(*b*) (i) State **five** ways of conserving water in the home. [5marks]

(*c*) (i) State **three** management practices to ensure high yield in maize production.
(ii) Explain how **two** of the management practices stated in (i) help in ensuring high yield of maize. [5 marks]

(*d*) State
(i) **two** effects of air masses on the environment.
(ii) **three** ways by which global warming can be reduced. [5 marks]

3. (*a*) (i) Explain why aluminium resists corrosion but iron does not.
(ii) State **two** methods of preventing iron from rusting. [4 marks]

(*b*) (i) Explain the term *culling* as used in livestock management.
(ii) State **three** benefits of practising culling. [5 marks]

(c) (i) Distinguish between *grafting* and *budding*.
(ii) Give **three** reasons for grafting and budding.

[5 marks]

(d) (i) State the principle of conservation of energy.
(ii) State the energy transformations that occur in **each** of the following devices:
(α) a moving motorcycle;
(β) a television set in operation.

[6 marks]

4. (a) (i) What are *secondary colours* of light?
(ii) Name the colour that results from the combination of **each** of the following pairs of colour of light:
(α) red and green;
(β) blue and green;
(γ) red and blue.

[5 marks]

(b) (i) Define the *mole of a substance*.
(ii) Calculate the number of atoms in 18 g of magnesium metal.
[Mg = 24, Avogadro number = 6.023×10^{23}]

[5 marks]

(c) (i) Differentiate between *bone* and *cartilage*.
(ii) Name **three** parts of the human body where cartilages are found.

[5 marks]

(d) (i) Explain the term *deep litter system* as used in poultry.
(ii) Give **three** advantages of the deep litter system.

[5 marks]

5. (a) Explain how **each** of the following actions causes loss of soil nutrients:
(i) crop removal;
(ii) continuous cropping;
(iii) drainage.

[6 marks]

(b) (i) Give the reason for using **each** of the following devices in household wiring:
(α) earthing;
(β) stabilizer;
(γ) fuse.
(ii) Explain the behaviour of a *p-n* junction diode when it is forward biased.

[5 marks]

(c) State in which way **each** of the following factors is important in the germination of seeds:
(i) water;
(ii) oxygen;
(iii) warmth;
(iv) sunlight.

[4 marks]

(*d*) The table below shows a list of some chemical substances and the sources from which they are obtained but **not** correctly matched . In a tabular form, match **each** chemical substance with its **correct** source.

	Substance	*Source*
(i)	Ammonia	lime water
(ii)	Potassium hydroxide	sour palm wine
(iii)	Calcium oxide	green vegetables
(iv)	Ethanoic acid	ashes of plants
(v)	Ascobic acid	decomposed organic matter

[5 marks]

6. (*a*) (i) What is meant by *insanitary condition*?

(ii) State **three** ways by which fire from electrical causes could be prevented.

[5 marks]

(*b*) (i) Give **three** effects of ecto-parasites on cattle.

(ii) List **four** methods of controlling ecto-parasites of livestock.

[5 marks]

(*c*) Describe **briefly** how a standard solution of sodium hydroxide is prepared in the laboratory.

[5 marks]

(*d*) (i) Define *displacement*.

(ii) A bird flies with a constant velocity of 100 m s^{-1} for 10 minutes. Calculate the magnitude of its displacement.

[5 marks]

END OF ESSAY TEST

check your toilets for leaks
Take shorter showers
Turn off the water while shaving

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 — 1 hour

OBJECTIVE TEST

[50 marks]

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 2020', '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 Elliot Kofi AGBANA.
   His *index number* is 7102143958 and he is offering *Integrated Science*1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS

Name: AGBANA ELLIOT KOFI — GHA

Examination: WASSCE — Year: SC2020

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: ⊏A⊐ ▬ ⊏C⊐ ⊏D⊐ ⊏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

INDEX NUMBER

	0	1	2	3	4	5	6	7	8	9
7								▬		
1		▬								
0	▬									
2			▬							
1		▬								
4					▬					
3				▬						
9									▬	
5						▬				
8								▬		

SUBJECT CODE

	0	1	2	3	4	5	6	7	8	9
5						▬				
1		▬								
7							▬			
1		▬								
1		▬								
3				▬						

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⊐ ⊏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. Ozone layer depletion results in
   A. melting of ice at the poles.
   B. increase in number of storms.
   C. skin cancer in humans.
   D. loss of productive farmland.

2. Which of the following factors can affect the boiling and freezing points of water?
   A. Surface tension
   B. Adhesive forces
   C. Impurities
   D. Density

3. Purple-leaf colouration in plants is a symptom of deficiency in
   A. magnesium.
   B. nitrogen.
   C. phosphorus.
   D. potassium.

4. Which of the following diseases in humans is caused by bacteria?
   A. Hepatitis B
   B. Herpes
   C. Chlamydia
   D. Prostrate

5. The part of the human ear responsible for amplification of sound is
   A. cochlea.
   B. ossicles.
   C. sacculus.
   D. utriculus.

6. The general formula of alkyne is
   A. C_nH_{2n+2}.
   B. C_nH_{2n}.
   C. C_nH_{2n-2}.
   D. C_nH_n.

7. Which of the following bones is present in the forelimb of man?
   A. Femur
   B. Radius
   C. Ribs
   D. Sternum

8. Minerals included in the layer ration for egg shell formation are calcium and
   A. magnesium.
   B. nitrogen.
   C. phosphorus.
   D. potassium.

9. Carrot is a good source of which of the following vitamins?
   A. Vitamin A
   B. Vitamin B complex
   C. Vitamin C
   D. Vitamin D

10. The **major** reason why relative atomic mass of some elements is **not** a whole number is the existence of
   A. isomerism.
   B. allotropy.
   C. isotopy.
   D. isotonism.

11. Which energy transformation occurs in a light emitting diode?
   A. Light energy to chemical energy
   B. Chemical energy to heat energy
   C. Electrical energy to heat energy
   D. Electrical energy to light energy

Turn over

12. Which of the following characteristics are associated with local breeds of fowl?

I. Resistant to diseases
II. High foraging ability
III. Susceptible to adverse weather conditions

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

13. Temporary hardness of water is removed by heating because

A. it is caused by insoluble salts.
B. the salts causing the hardness become soluble.
C. calcium hydrogen trioxocarbonate (IV) in water is decomposed by heat.
D. calcium trioxocarbonate (IV) is produced.

14. Examples of continuous variation include:

I. weight,
II. rhesus factor,
III. sickle cell.

Which of the statement(s) above is/are **correct**?

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

15. The number of protons in an ion with a charge of +3 is 13. How many electrons are present in the neutral atom.

A. 10
B. 13
C. 16
D. 20

16. Metals are normally used as electrical wires because they are

A. brittle.
B. ductile.
C. elastic.
D. malleable.

17. One advantage of male circumcision is that, it

A. allows for easy penetration in the vagina.
B. keeps the penis free from germs.
C. makes the man sexually active.
D. makes the man sexually inactive.

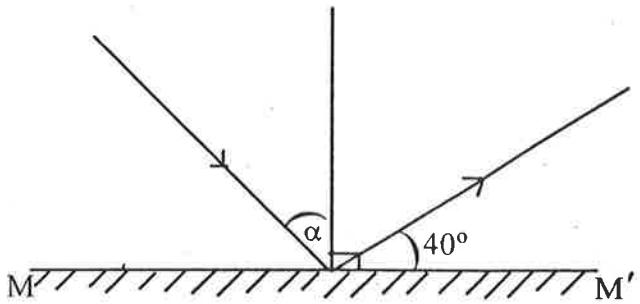
18. Organic manures are preferred to inorganic manures because, they are

A. easy to apply.
B. readily available to plants.
C. relatively cheap.
D. toxic to plants.

19. Calculate the number of moles in 5.85 g of NaCl. [Na = 23 ; Cl = 35.5]

A. 0.01
B. 0.10
C. 1.00
D. 10.00

20. The diagram below illustrates a ray of light incident on a plane mirror MM′.



The value of α is

A. 40°.
B. 50°.
C. 80°.
D. 100°.

21. A respiratory surface must have

I. rich supply of blood capillaries.
II. thin wall.
III. large surface area.

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

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

22. In which of the following processes is plant nutrient in the soil lost through gravity?

A. Capillarity
B. Erosion
C. Evaporation
D. Leaching

23. A body of mass 20 kg falls from a height of 10 m. If $g = 10.0\ m\ s^{-2}$, calculate the velocity of the body just before it touches the ground.
A. $10.0\ m\ s^{-1}$
B. $14.0\ m\ s^{-1}$
C. $20.0\ m\ s^{-1}$
D. $24.3\ m\ s^{-1}$

24. A solution of 250 cm^3 HCl has a concentration of 2 mol dm^{-3}. Determine the number of moles of the acid.
A. 0.25 moles
B. 0.50 moles
C. 1.00 moles
D. 1.50 moles

25. In which of the following blood vessels in the mammalian body would high levels of urea be found?
A. Hepatic artery
B. Hepatic vein
C. Pulmonary artery
D. Pulmonary vein

26. Land breeze occurs when
A. cool wind blows across the land during the day.
B. warm air rises up from the sea during the day.
C. cool wind blows across the sea at night.
D. warm air rises up from the land during the day.

27. The following statements are characteristics of large-scale industries **except**
A. volumes of products turned out are large.
B. many people are involved in its operations.
C. capital investment is large.
D. space of operation is limited.

28. Muscles are **mostly** made up of
A. proteins.
B. starch.
C. fibre.
D. cellulose.

29. Determine the volume of water required to change the concentration of 100 cm^3 HCl from 0.5 mol dm^{-3} to 0.1 mol dm^{-3}.
A. 100 cm^3
B. 200 cm^3
C. 400 cm^3
D. 500 cm^3

30. A force moves a body through a distance 15 m in the direction of the force. If the work done by the force is 45.0 J, determine the magnitude of the force.

A. 3.00 N
B. 3.15 N
C. 6.00 N
D. 6.75 N

31. Which of the following statements are functions of soil air?

I. It is for respiration of plant roots.
II. It is for respiration of soil fauna.
III. It is for seed germination.

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

32. Digestion of food is completed in the

A. small intestine.
B. large intestine.
C. stomach.
D. rectum.

33. Transistors can be used as

I. amplifiers.
II. switches.
III. temperature controls.

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

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

34. Sedimentary rocks are **not** resistant to weathering because, they

A. are formed from molten matter.
B. formed from other rocks.
C. have lines of weakness between mineral aggregates.
D. have lines of weakness between strata.

35. The reaction represented by the equation

$RCOOH + R'OH \rightleftharpoons RCOOR' + H_2O$ is an example of

A. esterification.
B. hydrolysis.
C. neutralization.
D. oxidation.

36. All the following crops require staking as a cultural practice **except**

A. cowpea.
B. cucumber.
C. tomato.
D. yam.

37. Which of the following lights will combine with red light to **give white light?**

A. Cyan
B. Green
C. Magenta
D. Yellow

38. Which of the following organelles is called the *power house of the cell*?

A. Golgi complex
B. Mitochondrion
C. Nucleus
D. Endoplasmic reticulum

39. The IUPAC name of the compound $Mg(HCO_3)_2$ is

A. magnesium hydrogen trioxocarbonate (III).
B. magnesium hydrogen trioxocarbonate (IV).
C. magnesium hydrogen trioxocarbonate (V).
D. magnesium hydrogen trioxocarbonate (II).

40. Which of the following brooder house equipment confines day-old chicks?

A. Feed trough
B. Chick guard
C. Hover
D. Litter

41. Symbiotic association in the root nodules occurs in

A. cocoyam.
B. millet.
C. rice.
D. soya bean.

42. The method of fertilizer application which is **most** labour intensive and time-consuming is the
A. broadcasting method.
B. drilling method.
C. foliar method.
D. ring method.

43. An electric kettle rated 1.5 kW operates at 200 V. Determine the current passing through the kettle.
A. 7.5 A
B. 133.3 A
C. 201.5 A
D. 300.0 A

44. The **best** way of storing yam tubers is
A. burying them in the soil.
B. keeping them in silos.
C. packing them on wooden platforms and in barns.
D. leaving them in the mounds for long periods.

45. Blood pressure is **highest** at
A. pulmonary veins.
B. vena cava.
C. aorta.
D. ventricular diastole.

46. The **main** constituent of natural gas is
A. ethane.
B. helium.
C. methane.
D. nitrogen.

47. The SI unit of light intensity is
A. ampere.
B. candela.
C. kilogram.
D. kelvin.

48. A 250 cm^3 of 0.10 mol dm^{-3} of KOH is to be prepared. Calculate the mass of KOH required.
[K = 39, O = 16, H = 1]
A. 1.0 g
B. 1.4 g
C. 7.0 g
D. 14.0 g

49. The male and female sex cells are collectively called
A. foetus.
B. gamete.
C. seed.
D. zygote.

Turn over

50. A characteristic of sound that differentiates the same note played on different instruments

A. frequency.
B. loudness.
C. pitch.
D. quality.

END OF PAPER