

THE WEST AFRICAN EXAMINATIONS COUNCIL
BASIC EDUCATION CERTIFICATE EXAMINATION FOR SCHOOL
CANDIDATES, 2021

FINAL MARKING SCHEME
INTEGRATED SCIENCE 2

Section A
[40 marks]

Rubrics: Answer all the questions in this section

Question 1

- (a) (i) Conclusion drawn from results of flask 1 and flask 2

Light is not necessary for germination

(2 marks)

- (ii) Conclusion drawn from results of flask 2 and flask 3

Water is necessary for germination

(2 marks)

- (iii) Reasons for dead seedlings

- the food stored in the seed is used up / the seedlings cannot carry out photosynthesis / no sunlight
- lack of water / moisture

Any 2 x 1 = (2 marks)

- (iv) No / the candidate made a wrong conclusion

(1 mark)

- (v) because light is not necessary for the germination of seed (1), the seed in flask 2 (1) germinated even though the flask was lined with the aluminium foil. (1)

[3 marks]

- (b) (i) Name of measuring instruments

(α) In parallel - is the voltmeter (1)

(β) In series - is the ammeter (1)

Correct spelling to score
(2 marks)

(ii) Quantities named instruments measure

(α) voltmeter measures the potential difference / voltage

1 mark

(β) ammeter measures (electric) current

1 mark

[2 marks]

(iii) Values read on instruments

(α) A = 5(A) (1)

(β) V = 10(V) (1)

[2 marks]

(iv) Calculation of R

$$V = IR \quad (1)$$

$$R = \frac{V}{I}$$

$$= \frac{10}{5} \quad (1)$$

$$= 2 \Omega \quad (1)$$

Accept unit in words (Ohm)

Wrong / no unit - ½

[3 marks]

(v) Precaution

- all the electrical connections must be tight
- voltmeter and ammeter must be of proper range / proper calibration
- the key should be inserted only while taking readings

[Any 1 x 1 = 1 mark]

(c) (i) Identification of labelled soil types

A - loamy soil / loam (1)

B - sandy soil / sand (1)

C - clayey soil / clay (1)

Check spelling.

(ii) Description of soils

| Soil type | (α) Particle size | (β) Air space |
|-----------|----------------------|------------------|
| A | Medium / large (1) | Moderate (1) |
| B | Large / medium (1) | Large (1) |
| C | Small (1) | Small (1) |

[6 marks]

(iii) Ways of improving soil type B for vegetable cultivation

- Planting cover crops
- application of organic manure / compost / farm yard manure / fertilizer / *manure*
- mulching the soil

Any 2 x 1 = 2 marks

(d) (i) Name of labelled parts

- IV - evaporating dish
- V - clamp stand / retort stand
- VI - tripod stand

Correct spelling to score
[3 marks]

(ii) Possible solution that can react

- sodium hydroxide (1)
- hydrochloric acid (1)

No chemical formula

[2 marks]

(iii) Name of process

Neutralization

spelling

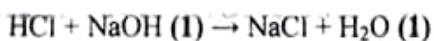
[1 mark]

(iv) Process that takes place in set-up B

Evaporation / boiling / heating

[1 mark]

(v) Balanced equation



[2 marks]

QUESTION 1 TOTAL = [40 MARKS]

SECTION B

Answer four (4) questions only from this section

Question 2

(a) (i) What happens when photosynthesis occurs in a leaf

- glucose / starch is produced / oxygen is given out / carbon dioxide is used / water is used / light / light is absorbed by chlorophyll energy

Any 1 x 1 = (1 mark)

(ii) Explanation of pollination

Is the transfer of pollen, from the anther of a flower (1) to the stigma (1) of the same flower / another flower of the same type

(2 marks)

[3 marks]

(b) Explanation of why lumpy charcoal remains unchanged

- grinding lumpy charcoal is a physical change (1) and the components remain unchanged (1), but burning charcoal is a chemical change (1) and some of the components are lost / released into the atmosphere (1)

[4 marks]

(c) (i) Explanation of physical quantity

Is a property of a substance (1) that can be measured (1)

2 marks

(ii) Physical quantities

- | | |
|-----------------------|--------------------|
| - length | - mass |
| - time | - temperature |
| - luminous intensity | - velocity |
| - amount of substance | - force |
| - density | - electric current |
| - etc | |

Any 2 x 1 = 2 marks

[4 marks]

(d) Importance of the following properties in crop production

- (i) light: - it is needed by plants for photosynthesis / energy / starch / carbohydrate formation
- affects the development of fruits / growth of vegetative parts of crops
- absence of light results in soft / weak stem

Any 2 x 1 = 2 marks

- (ii) temperature: - high temperatures can scorch the leaves of crops
- vegetables such as cabbage / carrot / tomato prefer warm days / cool nights / promotes growth in some crops
- when the temperature is low it delays ripening of fruits
- high temperatures can cause evaporation from the soil causing water deficit for crops / wilting of crops
- required for photosynthesis / growth and development of plants
- required for germination of seeds

Any 2 x 1 = 2 marks

[4 marks]

QUESTION 2 TOTAL = [15 MARKS]

Question 3

(a) (i) Explanation of hardness of water

- Is the ease (1) with which water can lather with soap (1) /
- Amount of dissolved Ca / Mg / Fe(II) ion (1) in water (1)

(2 marks)

(ii) Natural source of water

- (α) hard water - sea / ocean / lagoon / well / ground-water / canal water

Any 1 x 1 = 1 mark

- (β) soft water - rain / snow / dew / lake / river / pond

Any 1 x 1 = 1 mark

[4 marks]

(b) end-product of digestion

- (i) meat - amino acids (1)
(ii) cassava - glucose (1)
(iii) palm-oil - fatty acids / glycerol (1)

[3 marks]

(c) Effects of factors considered in vegetable crop production

- (i) soil type: - makes the farmer know the type of vegetable crop to grow
- to ensure adequate growth of crops
- to enhance yield of crops
- to ensure adequate retention of water

Any 1 x 1 = 1 mark

- (ii) nearness to market: - for easy sale of vegetable crops
- to avoid rotting of crop through long distance travels

for easy purchase of farm inputs

Any 1 x 1 = 1 mark

- (iii) nearness to source of water: - for easy supply of water to crops (irrigation)
- to process crops through washing
- to apply fertilizer in solution to crops
- to dilute pesticides for spraying

Any 1 x 1 = 1 mark

[3 marks]

(d) (i) Explanation of occurrence of eclipse

- the sun produces light (but the earth and moon does not)
- the earth and moon are opaque / can block sunlight, when the moon comes between the earth and the sun, the sunlight is blocked from reaching the earth
- when the earth comes between the sun and the moon, the sunlight is blocked from reaching the moon

OR

an eclipse occurs when light from the sun (1) is blocked by an opaque object (1) to produce a shadow (1)

3 x 1 = 3 marks

(ii) Types of eclipse

- solar or eclipse of the sun (1)
- lunar or eclipse of the moon (1)

(2 marks)

[5 marks]

QUESTION 3 TOTAL = [15 MARKS]

Question 4

(a) (i) Explanation of the term convection

- a mode of heat transfer in which warm / heated fluid become less dense and moves up (1) and cold and denser fluid moves down (1)

Any 2 x 1 = 2 marks

(ii) Reasons why convection does not occur in solids

- particles in a solid are held by strong bonds (1)
- particles are fixed in position / cannot move about (1)

2 x 1 = 2 marks

[4 marks]

(b) Effects of soil physical properties on maize cultivation

- (i) texture:-
- determines variety of maize to grow
 - supply minerals nutrients to crop
 - supports activities of soil organisms
 - determines the movement of air / water in the soil
 - determines tillage practices to adopt

Any 2 x 1 = 2 marks

(ii) water holding capacity

- determines varieties of maize to grow
- determines time of planting of crop
- determines growth and yield of crops

Any 2 x 1 = 2 marks

[4 marks]

(c) Construction of food chain

- Grass → grasshopper → toad
- Grass → grasscutter → man
- Grass → grasshopper → man

Correct sequence (1)

Correct direction of arrow (1)

Any 1 x 2 = 2 marks

(d) (i) Elements that are metal(s)

- ${}_{11}\text{Na}$ (1)
- ${}_{3}\text{Li}$ (1)

(2 marks)

(ii) Observation when metals are dropped into the solutions

(α) colourless gas evolves / effervescence occurs

(2 marks or zero)

(β) no (observable) reaction occurs

(1 mark)

[5 marks]

QUESTION 4 TOTAL = [15 MARKS]

Question 5

(a) Important components of soil that helps

- (i) crop to grow well
- nutrients / humus
 - air / living organisms
 - water

Any 2 x 1 = 2 marks

(ii) to maintain good soil structure

- living organisms
- soil particles
- organic matter / humus

Any 2 x 1 = 2 marks

[4 marks]

(b) (i) How energy in a windmill is obtained

When the wind blows, a windmill ~~is~~ turns (1) the windmill is connected to a turbine (1) and this produces the energy (1)

(3 marks)

(ii) Source of renewable energy

- sun
- wind
- water / hydropower

- geothermal source / heat from the ground
- biomass
- tides
- etc

Any 1 x 1 = 1 mark

[4 marks]

(c) (i) Explanation why steel is preferred to iron

- Steel is preferred because it has a high tensile strength (1) and it is lighter than iron / resistance to corrosion (1)

Any 2 x 1 = (2 marks)

(ii) Ways of preventing rusting

- oiling / greasing
- painting
- zinc coating / galvanising
- cathodic protection
- alloying
- keeping metal at dry place
- electroplating

Any 2 x 1 = 2 marks

[4 marks]

(d) Ways of preventing indigestion

- avoid eating acidic foods
- avoid taking too much alcohol
- avoid sleeping immediately after eating
- eating properly cooked foods
- chewing food properly
- avoid eating too quickly / eat slowly
- avoid eating too much food / eat small amount of food at a time
- avoid eating at irregular intervals
- avoid swallowing air while eating / do not chew with mouth open / do not talk while chewing
- avoid eating late
- avoid spicy foods
- limit fried / greasy foods
- limit food / drinks that contain caffeine
- quit smoking
- drink beverages after meals not during meals

Any 3 x 1 = 3 marks

[3 marks]

QUESTION 5 TOTAL = [15 MARKS]

Question 6

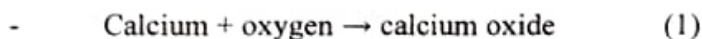
(a) Ways the atmosphere in an industrial area is polluted

- release of smoke / soot into the atmosphere
- release of exhaust fumes from vehicles / engines
- release of dust from factories / roads
- release of carbon dioxide from engines
- release of carbon monoxide from engines
- emission of radiations
- emission of heat
- release of poisonous / acidic gases / nitrogen oxide / hydrogen sulphide
- etc

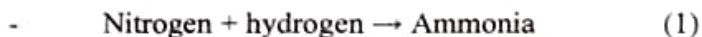
Any 3 x 1 = 3 marks
[3 marks]

(b) (i) Word equation

(α) Calcium and oxygen



(β) Nitrogen and hydrogen



(ii) Hazard that is prevented in wearing the following protective materials

(α) gas mask:- Inhaling toxic / poisonous gases (1)

(β) goggles:- injury to the eye (1)

[4 marks]

(c) (i) Calculation of area of Cuboid

Area = length x breadth / } (1)

= 5 x 10

= 50 cm²

(1) Wrong or no unit - 1/2
(2 marks)

(ii) Calculation of pressure

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} \quad (1)$$

$$= \frac{100}{50}$$

$$= 2 \text{ Ncm}^{-2} \quad (1)$$

Wrong as no unit -1/2
(2 marks)

[4 marks]

(d) (i) Explanation of the term

Mixed farming: It is the cultivation of crops and rearing of animals (1) on the same piece of land at the same time. (1)

Underlined words should appear to
score 1 (2 marks)

(ii) Advantages of mixed farming

- land is effectively used
- labour is effectively used throughout the year
- it reduces risk of losing everything in times of diseases and bad weather
- brings reliable sources of income
- animals may provide power on the farm
- crops residue is used as feed for animal
- animal droppings are used as manure for cultivating crops
- etc

Any 2 x 1 = 2 marks

QUESTION 6 TOTAL = [15 MARKS]