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THE WEST AFRICAN EXAMINATIONS COUNCIL

WEST AFRICAN SENIOR SCHOOL CERTIFICATE
EXAMINATION FOR SCHOOL CANDIDATES
WASSCE (SC) - 2020

FINAL MARKING SCHEME

INTEGRATED SCIENCE 2

2020 SC

1. (a) (i) Major types of weathering

- Physical/mechanical weathering
- Chemical weathering
- Biological weathering

3 x 1 = 3 marks

(ii) Explanation of the role of temperature in weathering

When temperature rises, rocks expand and when temperature falls, rocks contract (1). The continuous expansion and contraction of rocks, cause cracks and eventual breakdown of the rocks to smaller pieces (1).

2 x 1 = 2 marks

(b) (i) Calculation of current drawn

$$P = IV \quad (1)$$

$$I = \frac{P}{V} = \frac{100}{240} / 0.417 \text{ A} \quad (1) \quad \text{Wrong / No units} \quad \rightarrow \text{subtract } 1/2$$

2 x 1 = 2 marks

(ii) Calculation of the resistance of heater

$$P = I^2 R \quad (1)$$

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

$$R = \frac{P}{I^2} = \frac{100}{0.417^2} / 575 / 575.5 \Omega \quad (1) \quad \text{OR} \quad R = \frac{V}{I} = \frac{240}{0.416} / 575 / 575.5 \Omega$$

Ω (1)

Wrong / No units (- 1/2)

2 x 1 = 2 marks

(c) (i) Compounds which have electrovalent bond

- Sodium chloride / NaCl
- Magnesium Chloride / MgCl_2
- Calcium Chloride / CaCl_2
- Sodium Hydroxide / NaOH
- etc and any other

Any 3 x 1 = 3 marks

(ii) Characteristics of electrovalent compounds

- Hard / Crystalline / solid
- Soluble in water / insoluble in organic solvent / Kerosene etc
- High boiling / melting point / heat of fusion / Vaporization
- Conduct electricity in solution / molten state

Any 2 x 1 = 2 marks

- (d) (i) Rhesus factor
It is a type of / inherited protein / antigen (1) that may be present on the surface of a red blood cell. (1)

2 x 1 = 2 marks

- (ii) Explanation of how the rhesus factor could result in miscarriage

- The problem arises when an Rh⁺ man marries a woman who is Rh⁻ and their baby would be Rh⁺.
- In the event of leakage of blood during the pregnancy / birth from the mother to the foetus
- The Rh antibodies of the mother get into contact with the Rh⁺ blood of the foetus
- resulting in antibody-antigen reaction.
- This destroys the foetus / causes miscarriage.

Any 4 x 1

4 marks

QUESTION 1 TOTAL = 5 + 4 + 5 + 6 = 20 MARKS

2. (a) (i) Explanation of how solar energy is used to generate electricity

- A photovoltaic cell / solar cell collects the sun's energy
- The energy removes an electron from the cell / causes photoelectric effect
- The electron then moves and this movement of electrons constitute electric current

3 x 1

3 marks

- (ii) Other uses of solar energy

- Heating water / Homes / Environment
- Lighting homes / places
- Drying clothes / fish / baked pots / earthen ware / seeds
- Stimulates the skin to produce Vitamin D
- Use in hydrological / water cycles
- For photosynthesis in plants

Any 2 x 1

2 marks

- (b) (i) Ways of conserving water in the home

- turn off tap intermittently while brushing teeth so as to have the water running only when washing
- fix leaks / leakages in pipe line / performing routine maintenance
- re-use of waste water for flushing toilet / watering plants where possible
- avoid using treated water for car washing
- flush toilet only when necessary
- lawn should be made of succulent/other plants that thrive under drought etc

Any 5 x 1

5 2 marks

(c) (i) Management practices to ensure high yield in maize production

- Fertilizer application (at the right time)
- Controlling of weeds
- Controlling of pests / diseases
- Harvesting / planting at the right time/early harvesting
- Application of lime to increase soil pH
- Using viable seeds
- Ensure correct spacing / planting density / rotation with other crops

Any 3 x 1 = 3 marks

Platenny / Irrigation

(ii) Explanation of how management practices help in ensuring high yield of maize

- Fertilizer: provides sufficient nutrients
- Controlling of weeds: Minimize / reduces competition for resources
- Controlling of pests / diseases: Keeps the crops healthy
- Harvesting at the right time: prevents invasion of pest in the field
- Application of lime: to give the required pH of the soil for maximum growth
- Using viable seeds: to ensure maximum germination
- Ensure correct spacing: to reduce / minimize competition for resources

2 x 1

- to maintain good soil temperature
- to help dissolve the nutrients

→ 2 marks

(d) (i) Effects of air masses on the environment

- Destruction of biodiversity
- Destruction of the ozone layer
- Makes environment dry / moist / influences humidity
- Can create storm where two air masses of different temperatures meet
- Can change the weather / climate
- Makes environment hot / cold / vary environmental temperature
- Causes acid rain, etc

Any 2 x 1 = 2 marks

(ii) Ways by which global warming can be reduced

- Afforestation / planting of trees
- Use of LPG (instead of wood for domestic fire) / reduce use of fossil fuels / Using renewable energy / Using solar energy to produce electricity
- Use of HFCs instead of CFCs
- avoid / reduce bush burning

- avoid using driers to dry clothes / Use open air
- reduce the use of processed foods / eating plant rich diet
- Using energy efficient appliances
- Minimizing the use of cars / vehicles / automobiles
- replacing filters in air conditioners

3 x 1

3 marks

QUESTION 2 TOTAL = 5 + 5 + 5 + 5 = 20 MARKS

3. (a) (i) Explanation of why aluminium resists corrosion but iron does not

The Aluminium oxide layer formed protects the aluminium from further oxidation. (1)

Iron does not form any layer which protects it from oxidation / Oxide formed by Iron flakes off exposing the iron for further oxidation. (1)

2 x 1

2 marks

- (ii) Methods of preventing iron from rusting

- Painting
- oiling/greasing
- Electroplating
- Galvanizing
- Alloying
- Organic / Powder coating
- Sacrificial protection / *Cathodic*
- Keep the iron dry and clean

Any 2 x 1

2 marks

- (b) (i) Explanation of the term culling

It is the practice of removing all diseased / unproductive animals (1) from the flock. (1)

2 x 1 = 2 marks

- (ii) Benefits of practicing culling

- prevention of spread of diseases / promoting healthy growth of livestock / eradicating / eliminating hosts species / *helps birds stay healthy*
- reducing overcrowding / creation of space
- unproductive animals are gotten rid of
- reduction in losses that could have ^{been} incurred feeding unproductive animals / Economic gain
- improves growth rate of animals

Any 3 x 1 = 3 marks

- (c) (i) Distinction between grafting and budding
 In grafting, the upper part (scion) of one plant is transferred to grow on the root system (stock) of another plant (of the same species), whereas, in budding, a bud from one plant is transferred and allowed to grow on another plant.

2 marks or zero

- (ii) Reasons for grafting and budding plants

- to change varieties
- to take advantage of a particular root stock
- to perpetuate clones
- to produce certain plant forms / it enables effective use of a specific characteristic of plant
- to repair damaged plants
- to increase growth rate of seedlings / early production of fruits
- it enables one plant which cannot produce viable seeds to be propagated
- to produce plants more resistant to adverse conditions / diseases
- ~~etc~~

Any 3 x 1

3 marks

- (d) (i) The principle of conservation of energy

States that energy is neither created nor destroyed but can be changed from one form to another (transfer) or (transform) ✓

OR

In a closed system, the total energy is constant.

2 marks or zero

- (ii) Energy transformation in

- (α) a moving motorcycle

Chemical energy (1) to kinetic energy (1) / (sound energy) / heat energy

NB: Start with Chemical energy to score

2 x 1 = 2 marks

- (β) a television set in operation

Electrical energy (1) to light energy (1) / sound energy / heat energy

NB: Start with Electrical energy to score

2 x 1 = 2 marks

QUESTION 3 TOTAL = 4 + 5 + 5 + 6 = 20 MARKS

4. (a) (i) Secondary colours of light

Are colours obtained by mixing (1) two primary colours of light (1).
2 x 1 = 2 marks

- (ii) Secondary colours formed from the mixture of

(α) Red and green

Yellow (1)

Spelling is score.

(β) Blue and green

Cyan (1)

(γ) Red and Blue

Magenta (1)

3 marks

- (b) (i) Definition of the mole of a substance

It is the amount of substance which contains ^{same} ~~some~~ number of chemical units / atoms, molecules etc. as there are carbon atoms in 12 g of carbon-12 isotopes

OR

It is the amount of substance which contains one Avogadro number of particles

2 marks or zero

- (ii) Calculation of the number of atoms in 18 g of magnesium metal

$$\text{Number of moles of Mg} = \frac{18}{24} / 0.75 \quad (1)$$

1 mole of Mg contains 6.02×10^{23} atoms

0.75 mole of Mg contains $6.02 \times 10^{23} \times 0.75$ (1)

$$= 4.5 \times 10^{23} \text{ atoms} \quad (1)$$

3 x 1 = 3 marks

- (c) (i) Distinction between bone and cartilage

Bone is a hard / in elastic / tough / rigid connective tissue forming part of the skeleton. Cartilage is a soft / elastic / flexible connective tissue that protects the bone from robbing against each other.

2 marks or zero

(ii) Name of part of the human body where cartilages are found

- Joint / Elbow / ~~knee~~ / Ankle etc / any correct named joint
- End of Ribs / *Ribs*
- In between vertebrae
- Nose
- Trachea / Bronchial tubes / Air ways / *Bronchus / Bronchial*
- Larynx
- External ear / Pinna *or Ear Correct spelling to score.*
- Epiglottis

Any 3 x 1

3 marks

(d) (i) Explanation of deep litter system

It is a management practice in poultry where large number of birds ~~(1)~~ are kept in large room / enclosure covered with thick layers of wood shavings/straw *(1) grass/foreign materials.*

2 x 1

2 marks

(ii) Advantages of the deep litter system

- It makes management of large birds ^{number} easy
- birds are protected from harsh weather conditions
- There is less risk of predation and theft
- It requires small space of land to operate / effective use of land space /
- It ensures effective use of labour / economical
- It is good for commercial egg production
- It is hygienic / safe to birds *- any condition do health.*
- It controls diseases
- It increases efficiency of production

Any 3 x 1

3 marks

QUESTION 4 TOTAL = 5 + 5 + 5 + 5 = 20 MARKS

5. (a) Explanation of loss of soil nutrients through

(i) crop removal

Harvesting by taking the entire crop plant from the farm (1) denies the land of organic matter that would have resulted from the decay of the plant. (1)

OR

Leaves the ground bare (1) leading to loss of nutrients by erosion (1)

2 x 1 = 2 marks

(ii) continuous cropping

It leads to constant removal of nutrients from the land by plants (1). The land is not allowed to rest in order to regain fertility (1).

erosion or leaching
2 x 1 = 2 marks

(iii) drainage

Nutrients that dissolved in the soil water are removed together with the excess water / water washes away the top soil (humus) (1) thereby depriving the soil of its nutrients (1)

2 x 1 = 2 marks

(b) (i) Reason for using device in household wiring

(α) Earthing

To conduct excess charges / current on an appliance safely to earth
OR

To prevent the user of the appliance from getting electric shock when-
from charges on the casing of the appliance.

OR

It protects the circuit breaker / fuse / electrical appliances

1 x 1 = 1 mark

(β) Stabilizer

To keep the voltage through an appliance constant / Regulates the
fluctuating voltage / current

1 x 1 = 1 mark

(γ) Fuse

To cut power supply to an appliance/circuit when the current goes
beyond acceptable level / to protect an appliance from being damaged
by excessive current

1 x 1 = 1 mark

(ii) Explanation of behaviour of a P-N junction diode when it is forward-biased

- the junction narrows (1)
- holes move across the junction to the N-type material / electrons move in the opposite direction into the P-type material (1)
- much more current flows in the circuit

Any 2 x 1 = 2 marks

(c) Importance of factors in the germination of seeds

(i) water -

- enables food materials to dissolve ~~and~~ diffuse into the embryo
- imbibition of water activates the protoplasm of the cells of the seed
- softens the seed coat / makes the seed coat permeable for gaseous exchange
- activates enzymes (which break down food materials)

Any 1 x 1 = 1 mark

(ii) oxygen

Oxidizes food in the seed (to provide the embryo with energy required for its growth)

1 x 1 = 1 mark

(iii) warmth

Provides suitable / adequate temperature for enzymes in the seed to act.

1 x 1 = 1 mark

(iv) sunlight

Stimulate phytochrome (pigment) in seed that promote germination in some seed / a type of light can promote / inhibit germination

1 x 1 = 1 mark

(d) Substances matched with their sources

Substance	Source
Ammonia	Decomposed organic matter
Potassium hydroxide	Ashes of plants
Calcium oxide	Lime water
Ethanoic acid	Sour palm wine
Ascorbic acid	Green vegetables

5 x 1 = 5 marks

QUESTION 5 TOTAL = 6 + 5 + 4 + 5 = 20 MARKS

6. (a) (i)

Insanitary conditions

Refer to the situation/circumstances that might contaminate with dirt/filth (1) that can lead to injury /health problems / spread of diseases (1)

OR

A condition which is dirty / dangerous for one's health (1) due to lack of toilet / drains / water making it difficult to keep things clean (1)

2 x 1 = 2 marks

(ii) Ways of preventing fire from electrical sources

- use only licensed electricians for installation/repair/
- do a thorough check on electrical wiring before cutting through the wall /floor/ceiling
- inspect power tools regularly
- check insulated tools for damage before using them
- never modify electrical plugs
- keep extension cords in a safe place / in where they would not be stepped on/driven over
- ensure that all electrical components are kept dry
- avoid overloading sockets
- keep flammable materials away
- etc

Any 3 x 1 = 3 marks

(b) (i) Effects of ecto-parasites on cattle

- anaemia / loss of blood / weakness
- restlessness
- transmit diseases / health of the animal affected
- poor growth rate
- reduction in production
- reduction in economic value of animal
- damage to skin
- loss of weight / emaciation / animals grow lean / loss of appetite

Any 3 x 1 = 3 marks

(ii) Method of controlling ectoparasites of livestock

- Rotate pasture to help prevent overgrazing to reduce the risk of parasites
- Feed livestock in containers (instead of on the ground)
- Ensure to clean feeders / water buckets / observe farm hygiene - ensure proper sanitation
- Keep young animals in separate pastures from adults livestock
- Dipping / spraying in a proper tank chemical / dusting / spray the rest of the animal.

Any 2 x 1 = 2 marks

(c) Description of preparation of a standard solution of sodium hydroxide in the laboratory

- Weigh a quantity of Sodium hydroxide crystals in a container / beaker
- A small quantity of distilled water is added and the mixture stirred for all the solute to dissolve
- The solution is transferred into a standard volumetric flask (using a filter funnel)
- The beaker and the glass rod are rinsed with distilled water into the volumetric flask
- The volumetric flask is corked and shaken
- More distilled water is added till the solution reaches its calibrated mark and then shaken

Any 5 x 1 = 5 marks

- (d) (i) Definition of displacement
It is the distance moved in a given/specified direction
OR
It is the change in position of a body in a given/specified direction.
2 marks or zero

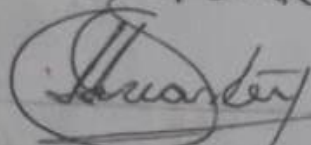
- (ii) Calculation of displacement

$$\begin{aligned}\text{Displacement} &= \text{velocity} \times \text{time} && (1) \\ &= 100 \times 10 \times 60 && (1) \\ &= 60,000 \text{ m} && (1) \\ &3 \times 1 = 3 \text{ marks}\end{aligned}$$

QUESTION 6 TOTAL = 5 + 5 + 5 + 5 = 20 MARKS

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