4.7 GENERAL SCIENCE (237)

4.7.1 General Science Paper 1 (237/1)

SECTION A : BIOLOGY

1. (a) Avoid spilling chemicals / acids which corrode bench tops;
Avoid cutting specimens on bench tops because they scratch bench surfaces;
Avoid placing hot objects on bench tops which may burn the tops.
(1 mark)

(b) Distribution of nutrients / transport of nutrients only;
Availability of raw materials for photosynthesis;
Cooling effect to the plant;
(3 marks)

2. (a) Dicotyledonae; (1 mark)

(b) Leaves have net venation;
Have tap root system;
(1 mark)

3. (a) There was movement of water molecules from the beaker into the strip of pawpaw by osmosis;
because the strip tissue fluid was hypertonic / water in the beaker was hypotonic;
(2 marks)

(b) The strip became rigid / hard / stiff / turgid / firm;
The strip bent / curved;
(1 mark)

4. (a) Peripheral nucleus; Large central vacuole;

Cell wall present; Has regular shape ; /chloroplast present
(3 marks)

(b) Chloroplast; (1 mark)

5. (a) (i) Control reaction rates; (1 mark)

(ii) They are protein in nature; (1 mark)

(b) In low temperature the rate of photosynthesis is slow / rate increased with increase in temperature upto to optimum; beyond optimum temperature, rate decreases and eventually photosynthesis stops;
(2 marks)

6. (a) To prevent the spread of immunizable diseases;
Enables the individual to develop immunity/to boost/increase immune system;
against immunizable infections;

(2 marks)

(b) Unusual response by the body cells to a foreign substance; (1 mark)

7. (a) Metabolism is slower in older people; because of low oxygen demand;
leading to lower rate of breathing. (vice versa)

(2 marks)

(b) *Micobacterium tuberculosis;* (1 mark)

8. (a) (i) To find out if heat if produced by germinating seeds; as they respire.

(1 mark)

(ii) To kill bacteria that would respire producing heat;

(1 mark)

(b) Glucose; Amino acids; (2 marks)

9. (a) Excretion of excess salts / water / waste products;

Cooling of the body; by evaporating sweat.

(2 marks)

(b) Excess water collects in contractile vacuoles;
which discharge the contents to the exterior;

(2 marks)

10. Liver has many metabolic activities which release heat; which is
distributed by blood to maintain body temperature;
When it is cold the liver metabolic activities increase /
when it is hot the liver metabolic activities decrease;

(3 marks)

SECTION B : CHEMISTRY (33 marks)

11. (a) (i) - White ½ anydrous copper (II) Sulphate turns blue ½ (1 mark)

(ii) - Anhydrous copper (II) Sulphate combines with the water produced to form blue hydrated copper (II) Sulphate. √(1) / anhydrous Copper (II) Sulphate becomes hydrated.

(1 mark)

(b) It causes global warming / greenhouse effect. √(1) (1 mark)

12. (a) Q - Manganese (IV) oxide (MnO_2). √(1) (1 mark)

(b) $2H_2O_{2(aq)} \xrightarrow[\text{catalyst}]{MnO_{2(s)}} 2H_2O_{(l)} + O_{2(g)}$ √(1) (1 mark)

Penalise ½ mark for absence or wrong symbols

(c) Sodium peroxide and water

OR

Na_2O_2 and H_2O

(1 mark)

(d) Oxygen relights / rekindles a glowing splint. √(1) (1 mark)

13. (a) Solution O; √(1) (1 mark)

(b) Salt / sodium salt, carbon (IV) oxide and water √(1) (1 mark)

1 mark - 3 correct
1/2 mark - 2 correct
0 mark - 1 correct

14. (a) (i) Hygroscopic salt refers to a salt that absorbs water from the atmosphere but does not form a solution. √(1) (1 mark)

(ii) KNO_3, anhydrous copper (II) sulphate ($CuSO_4$)/anhydrous magnesium chloride and anhydrous calcium chloride. √(1) (1 mark)

(b) - Manufacture of chlorine
- Manufacture of Sodium carbonate √(1)
- Extraction of sodium metal

(1 mark)

15. (a) Absence of source of heat √(1) / solid $PbBr_2$ instead of molten lead (II) bromide.

(1 mark)

(b) Bromine gas / fumes √(1) (1 mark)

16. (a) - It provides calcium and magnesium ions $\surd(\frac{1}{2})$ used by animals in formation $\surd(\frac{1}{2})$ of strong bones, teeth and shells.

(1 mark)

(b) Hard water is passed $\surd(1)$through a column packed with a compound of sodium permuttit which exchanges Ca^{2+} $\surd(1)$ and Mg^{2+} ions for Na^{+} ions. (2 marks)

17. (a) Red and blue $\surd(1)$ (1 mark)

(b) Brown ink $\surd(1)$ (1 mark)

18. - Add water to the mixture, sodium chloride dissolves $\surd(1)$

- Filter to obtain sulphur $\surd(1)$

- Evaporate filtrate to obtain sodium chloride. $\surd(1)$

(3 marks)

19. (a) Ionization energy is the minimum energy required to completely remove the outermost electron from an atom in the gaseous state. $\surd(1)$ (w.t.t.e) (1 mark)

(b) (i) The atomic size decrease from P to W because of increase in the effective nuclear charge $\surd(1)$ hence the removal of the outermost electron across the period requires more energy $\surd(1)$ as the atomic size decreases.

(2 marks)

(ii) (I) R - Amphoteric oxide $\surd(\frac{1}{2})$

(II) U - Acidic oxide $\surd(\frac{1}{2})$

(1 mark)

20. (a) A $\surd(\frac{1}{2})$ and F $\surd(\frac{1}{2})$ (1 mark)

(b) H_2C_3 $\surd(1)$ OR Al_2O_3 (1 mark)

(c) E $\surd(1)$ (1 mark)

(d) G $\surd(1)$ (1 mark)

21. (a) - Covalent bonds $\surd(\frac{1}{2})$
- Coordinate / dative bond $\surd(\frac{1}{2})$

($\surd(\frac{1}{2})$ mark for the structure only)

(1 mark)

(b) Graphite exist in hexagonal layers which are held together by weak van der waals forces of attraction $\surd(1)$. These layers slip/slide over each other when compressed hence this makes it a good lubricant. $\surd(1)$ (2 marks)

SECTION C : PHYSICS

22. Time of fall = 3.68 - 0.05 ; 1

= 3.63s ; 1

23. Mass per unit volume / density $\frac{\text{mass}}{\text{volume}}$ / $d = \frac{m}{v}$ / $\delta = \frac{m}{v}$; 1

24.

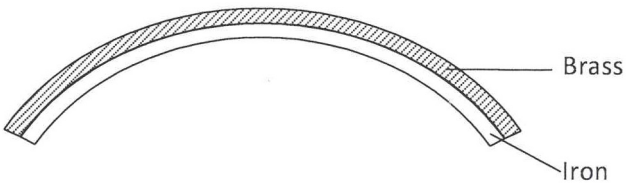
W	=	mg	;	1
12.5	=	m × 10	;	1
m	=	1.25 kg	;	1

25. On sucking at the open end of the straw, the air inside is removed/sucked out; 1
This lowers/reduces/decreases the pressure inside the straw; 1
The atmospheric pressure now being higher than the pressure inside the straw; 1
forces the liquid up the straw.

26. The intermolecular distances in gases are larger/greater/higher/larger/more than/bigger than in liquids; 1

27. (a) This is to allow for contraction ; during cold weather, 1
If this is not done the wires would break ; causing alot of damage. 1

(b)



28. Heat is energy transferred from place to place; 1
as a result of temperature difference; 1

Form of energy; when absorbed/taken in, temperature rises; or when lost/given out, temperature f---

.

29. Sum of anticlockwise moments = Sum of clockwise moments/$F_1d_1 = F_2d_2$

Let weight of rule be x ; 1

$x \times 30 = 20 \times 4.5$; 1

$x = \frac{20 \times 4.5}{30}$

= 3 N ; 1

30. (a) Stable ; 1

(b) If the cone is slightly displaced, the position
of the centre of gravity rises and falls /broad base/larger base/bigger base; 1
back to he same position when the
displacing force is removed/vertical line passing through the c.o.g. falls within the base.

31. (a) The body undergoes uniform/steady/constant acceleration /velocity increasing at uniform rate; 1

(b) The body moves with constant/steady/uniform velocity; 1
zero acceleration.

(c) The body moves with a uniform/steady/constant deceleration / velocity decreasing at uniform rate; 1
uniform negative acceleration.

32. Extension = 20.8 - 20 = 0.8 cm ; 1

F = Ke

$\frac{400}{1000} \times 10 = K \times \frac{0.8}{100}$; 1

$K = \frac{4 \times 100}{0.8} = 500 \text{ Nm}^{-1}$; 1

33. This is caused by the tendency of the body to remain stationery (inertia); 1
since the body was initially at rest, it tends ; 1
to remain at rest as the truck moves forward.

34. - Weight/mg/gravitational ; 1
- Upthrust ; 1
- Tension ; 1

35. Chemical to electrical ; 1
Electrical to light / heat ; 1

4.7.2 General Science Paper 2 (237/2)

SECTION A : BIOLOGY

1. Ecology is the study of interaction of organisms with one another and with their physical environment while Ecosystem is the sum total of the interactions linking organisms in a community with one another and with their environment.

(2 marks)

2. (a) Carbon (II) Oxide;
Carbon (IV) Oxide;
Carbon particles / soot;

(3 marks)

(b) *Entamoeba histolytica*;

(1 mark)

3. (a) (i) K - Prostate gland; L - Epididymis;

(2 marks)

(ii) Controls development of secondary sexual characteristics;
leads to formation of spermatozoa/sperms;

(1 mark)

(b) It is a type of cell division giving rise to two identical diploid daughter cells;

(1 mark)

4. (a) The time between implantation and birth.

(1 mark)

(b) Genital sores /painless sores;
Ulcers in affected areas;

(2 marks)

(c) It is the genetic constitution / make up of an organisms;

(1 mark)

5. (a) Ability of a seed to germinate; (1 mark)

(b) It softens the seed coat;
It hydrolyses stored food;
It is a medium for enzyme activity / activates enzymes / transports dissolved nutrients;

(2 marks)

6. (a) In continuous growth, the animal grows all the way from fertilization till maturity; e.g. height in humans;

(2 marks)

(b) Homozygosity is a condition in which the gene pairs are similar / same / identical while Heterozygosity is a condition in which the gene pairs are different.

(2 marks)

7. (a) It is a theory on the origin of life; that suggests that life began from simple elements through complex compounds;

(2 marks)

(b) Meiosis leads to the formation of the gametes which are haploid;
Meiosis ensures that the chromosomal constitution of offspring is the same as that of parents;

(2 marks)

8. (a) Irritability - ability to detect and respond to changes in the environment; (1 mark)

(b) Stimulus - A detectable change in the environment capable of producing a response;

(1 mark)

(c) Response - the change in activity by the organism due to a stimulus.

(1 mark)

9. Semicircular canals;
Utriculus;
Sacculus;

(3 marks)

10. Give the body its shape;
Protects delicate internal organs;
Provides surface for attachment of muscles;
Produces / manufacture blood cells;
Stores calcium and phosphate ions;
Enables/allows movement;
Gives body balance and posture;
Supports the body wight.

(3 marks)

SECTION B : CHEMISTRY (33 marks)

11. (a) Chlorine gas is slightly soluble in water √(½) hence water rises to occupy √(½) the space which was occupied by the dissolved gas. (1 mark)

(b) (i) Turns red √(½) then bleached √(½)
OR
decolourised / turned white √(1) (1 mark)

(ii) Chlorine gas dissolves in water to form acidic solution which turns blue to red. √(1)
The red litmus paper is further decolourised / bleached due to presence of hypochlorous acid or chloric (I) acid. √(1)
(2 marks)
4 marks

12. Formula mass of KNO_3 √(½) = 39 + 14 + 3 (16)
= 53 + 48
= 101 g √(½)

Number of moles in 30 g = 30/101 √(½)

= 0.2970 moles √(½) (2 marks)
2 marks

13. (a) The balloon increased / expanded in size/volume. √(1)
(1 mark)

(b) Rise in temperature increases kinetic energy of air molecules in the balloon hence increased collisions / bombardments against the walls of the balloon, √(1) causing the balloon to expand. (2 marks)
3 marks

14. (a) A process where a solvent is increased/water is added/increased √(1) while the amount of solute remains constant in a given solution. (1 mark)

(b) Formula mass of NaOH = 23 + 16 + 1 = 40 g

Moles in $25cm^3$ = $\frac{0.2 \times 25}{1000}$ √(½)

Mass in $25cm^3$ of NaOH = $\frac{0.2 \times 25}{1000} \times 40$ √(½)

= 0.2 g √(½)
(2 marks)
3 marks

15. (a) Natural polymers

Cellulose / proteins / natural rubber/silk/wool. √(½)

Uses

Used for paper manufacturing, textiles

- Rubber used in tyres, tubes √(½)
- Proteins / cellulose in textiles.

(1 mark)

(b) Advantages of synthetic polymer

- Cheap / long lasting / moulded into many shapes. √(½)
- Prevent / safe destruction of plants and animals.
- Some are heat resistant / good insulators / non corrosive to acids / alkalis.

(any one correct for (½) mark)

(ii) Disadvantage of synthetic polymer √(½)

- Pollutants to the environment √(½)
- Non-biodegradable
- Costly to recycle
- Burn producing poisonous gases. (1 mark)

(any one correct at (½) mark)

2 marks

16. (a) Magnetite / Pyrite. √(1)

OR

$FeCO_3$ / FeS (1 mark)

(b) (i) Coke /Carbon √(1) (1 mark)

(ii) Temperatures at the blast furnace are higher than the melting point of iron metal. √(1) (1 mark)

(c) Use of stainless steel

- Construction of bridges
- In ships
- Pipes, padlocks
- Nails
- Cutlery.

(1 mark)

(any one correct for 1 mark)

Reason: Stainless steel does not rust /is resistant to corrosion. (1 mark)

5 marks

17. (a) (i) The thistle funnel is above the reagents and allows the gas to escape √(½) /
OR
The thistle funnel doesn't have a tap. (½ mark)

(ii) Use a dropping funnel / Dip the thistle funnel into the reagents. √(½)
(½ mark)

(b) (i) Used to dry the sulphur (IV) oxide/as a drying agent. √(1)

(ii) The sulphur (IV) oxide gas would dissolve in the water, hence no gas would be collected in the gas jar.

(c) Uses of sulphur (IV) oxide

- Manufacture of sulphuric (VI) acid √(1) / sulphuric acid/ $H_2SO_{4\,(l)}$
- Bleaching agent
- As a refrigerant
- Fruit preservative
- Infumigation/to kill germs (1 mark)

(any one correct for 1 mark)

4 marks

18. (a) (i) Heat / enthalpy of solution √(1) (1 mark)

(ii) The temperature would drop / boiling tube becomes cold. √(1) (1 mark)

(iii) Endothermic reaction. √(1) (1 mark)

(b)

- Heat value √(1)
- Cost of fuel √(1)
- Availability
- Environmentally friendly/less pollution
- Cost of transporting the fuel/toxicity of fuel (2 marks)

(Any two correct for 2 marks)

5 marks

19. (a) But - 2 - ene √(1) (1 mark)

(b) Addition reaction √(1) (1 mark)

2 marks

20. (a) As the temperature rises, the time taken for the cross to disappear decreases. √(1)
OR
as the temperature decreases, the time taken for the cross to disappear increases.
(1 mark)

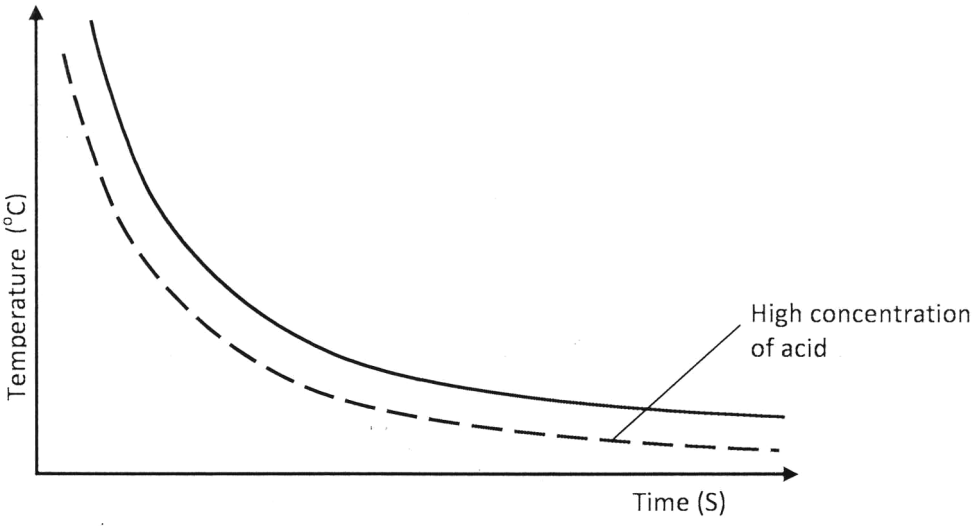
(b) The rate of reaction increases with rise in temperature. √(1)

OR

The rate of reaction decreases with decrease in temperature.

(1 mark)

(c) Diagram.

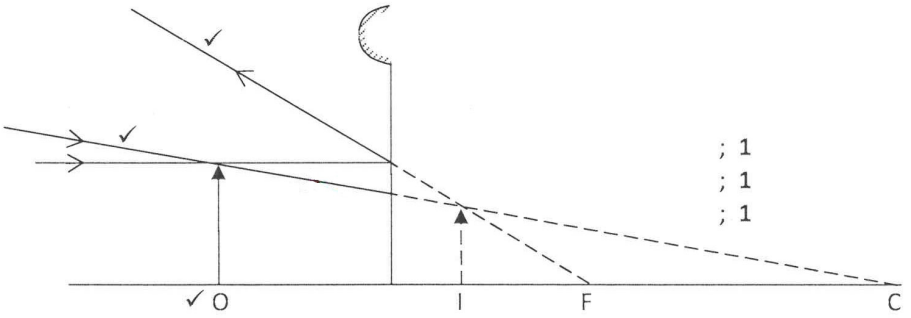


(1 mark)

3 marks

SECTION C : PHYSICS

21.

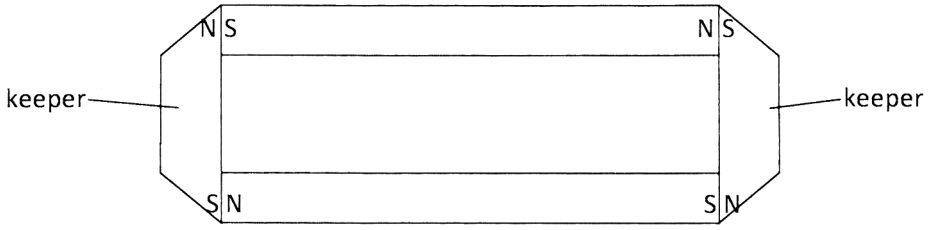


22. When the polythene rod is rubbed it acquires a negative charge; On bringing it near. 1
a negatively charged pith ball the two repel one another; 1

23. (a) Polarization / local action/polarization/accummulation of hydrogen bubbles around the cathode 1

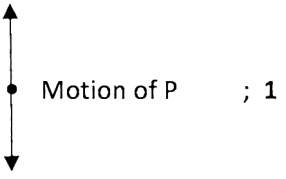
(b) Polarization is minimised by adding depolarizer /pottasium dichromate/ local action/ dissolving of zinc/zinc being eaten / local action is minimised by coating zinc with mercury/amalgamation/using pure zinc. 1

24.



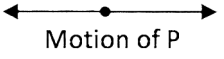
; 1

25. (a)



; 1 Perpendicular oscilation.

(b)



; 1 Parallel along direction of the wave.

26.
- Temperature; 1
- Humidity; 1
- Density of air

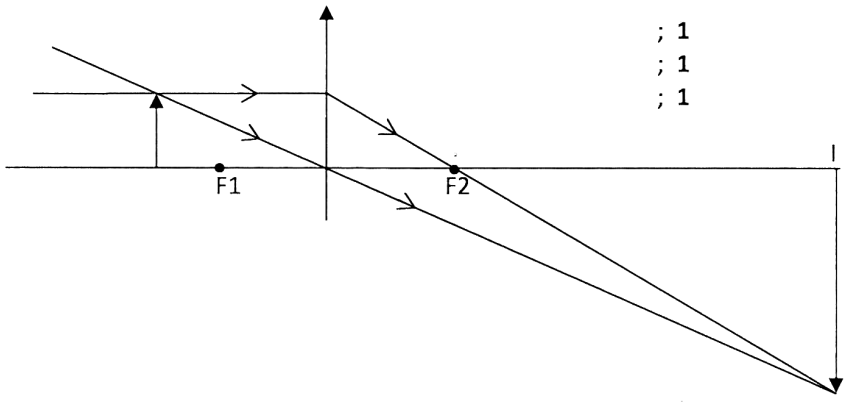
27. Work done in moving a unit charge from one point to another; 1

28. (a) Circuit Y; 1

(b) More current is flowing due to less; 1
resistance in the circuit hence a greater heating effect; 1

29. - Light rays from the bottom of the pool are refracted at the interface; 1
- The ray of light from the bottom is bend away from the normal; 1
- The image of the bottom appears raised; 1

30.



; 1
; 1
; 1

31. a = 4 m; 1

32. 1500 ÷ 1000 = 1.5 kW ; 1

Cost of electricity = 1.5 x 30 x 8; 1

= Ksh.360 ; 1

33. (a) By using a magnetic or electric field ; 1

(b) - By increasing the grid potential so that/making the grid more negative; 1

fewer electrons reach the screen/more electrons are repelled; 1

34. - By raising the temperature of the semiconductor; 1

- By doping the semiconductor ; 1

35. - Radiations have high energy ; 1

which damages the body cells; 1