Solution
MOCK EXAM - PAPER 2
Class 10 - Science
Section A

1.

(c) excretion
Explanation:
Excretion is the process by which metabolic wastes and other non-useful materials are eliminated from an organism. In Human beings, kidneys are the organs that filter waste products from the blood. Therefore, Kidneys are the part of the excretory system.

2.

(c) 30
Explanation:
30

3.

(d) Producers
Explanation:
Producers use solar energy to synthesize food from water and carbon-di-oxide. Plants and few micro-organisms are the producers.
Organisms that decompose organic material are called decomposers.
Herbivores are the organisms that feed on plant and its products.
Carnivore are the ones which feed on other organisms.

4.

(b) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
Explanation:

- The central nervous system (CNS) is made up of the brain, the spinal cord, and the optic nerves.
- The nervous system outside the brain and spinal cord.
- The part of the nervous system responsible for the control of the bodily functions not consciously directed, such as breathing, the heartbeat, and digestive processes.
- Reflex action is an involuntary and nearly instantaneous movement in response to a stimulus. It is made possible by neural pathways called the reflex arc.

5. **(a)** Decrease in energy at each trophic level
Explanation:
There is a decrease in energy as the energy is transferred from a lower trophic level to a higher trophic level. The energy available to each successive trophic level is 10% of the previous trophic level. This limits the number of trophic levels in a food-chain. The food chains generally consist of only three or four steps since very little usable energy is left after four trophic levels.

6. **(a)** Movement of molecules does not take place among cells
Explanation:
The movement of molecules is a vital process. Movement of molecules in cells takes place in active and passive modes such as diffusion, osmosis, facilitated diffusion, etc.

7.

(b) It detaches from the parent body as soon as it is produced.
Explanation:
It detaches from the parent body as soon as it is produced.

8. **(c)** A is true but R is false.
Explanation:
Grafting is a method in which the cut stems of two different plants (one with roots and other without roots) are joined together in such a way that the two stems join and grow as a single plant. Stock is the lower part of a plant (or tree) having the roots. Scion is the upper part of a plant which may have leaves on it (but no roots).

9. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
Both A and R are true but R is not the correct explanation of A.
As these chemicals are not degradable, these get accumulated progressively at each trophic level. As human beings occupy the top level in any food chain, the maximum concentration of these chemicals gets accumulated in their bodies.

10. Pollen grain is a microscope unicellular structure. It is covered by two layered walls - the inner intine and the outer thick exine. At certain places the exine has pores called germ pores. It contains two nuclei - a generative nucleus and a tube nucleus.
11. A - Phytoplankton; C - Small fish D - Secondary carnivores; B - Herbivores

OR

Ozone is formed in upper atmosphere by the reaction of ultraviolet UV radiations on oxygen O_2 molecule. The damage to ozone layer is a cause of concern to us as due to its damage more ultraviolet rays reach the earth's surface causing various health hazards.

12. Cerebellum is the part of the brain that maintains balance and posture. After consumption of alcohol the cerebellum gets affected by the alcohol for which it cannot maintain balance and posture properly and hence walk clumsily.
13. a. All plants were purple flowered/ No mixed coloured flowers were observed/No white flowered plants were observed/Only dominant parental trait was observed.
    b. i. 25%
    ii. $1:2:1/1WW:2Ww:1ww$
    c.

Dominant Trait	Recessive Trait
A trait that can express itself in the presence of its unexpressed contrasting trait/Trait express itself always	A trait that remains unexpressed in the presence of its contrasting

14.
- Kidney has large number of filtration units called nephrons.
- Blood enters kidney and is filtered through a cluster of capillaries(glomerulus) and the filtrate is collected by a cup shaped structure (Bowman's capsule)
- Some substances as glucose, amino acids, salt and a major amount of water are selectively re-absorbed as the urine flows along the tube of nephron.

15. i. They will be Tall with round seeds (TtRr) because tall and round seeds are dominant genes.
ii. Short plant and wrinkled seeds are recessive traits.
iii. The different types of progeny obtained with the ratio is as follows:
9 round and yellow : 3 wrinkled and yellow : 3 round and green : 1 wrinkled and green.

OR

1600 plants will be obtained as 9 : 3 : 3 : 1

So, $\frac{1600}{16} = 100$

9 = 9 $\times$ 100 = 900 = Tall with round seeds.

3 = 3 $\times$ 100 = 300 = Tall with wrinkled seeds.

3 = 3 $\times$ 100 = 300 = short with round seeds.

1 = 1 $\times$ 100 = 100 = short with wrinkled seeds.

We can conclude that F_1 progeny has same type of plants, whereas F_2 has 3 different types of plants.

16. i. Testis produces sperms as well as secretes a hormone in human males. The hormone secreted by testes is testosterone and its functions are as follows:
    a. It stimulates sperm production.
    b. It stimulates the development of secondary sexual characters in males.
    c. It involves the development, maturation and functioning of male accessory sex organs.

    ii. Fallopian tubes are the site where fertilisation takes place in the human female.

    iii. A specialised tissue called placenta connects developing foetus with uterine wall of mother that provides nutrients from mother to child. Placenta is formed by the interlocking of finger-like projections called villi which provides a large surface area for diffusion of nutrients and respiratory gases from the mother. Carbon dioxide gas and metabolic wastes released by foetus is removed by placenta.

    OR

    i. Nerve impulses travel from one neuron to the other neuron in the following way:
    Dendrites $\rightarrow$ Cell body $\rightarrow$ Axon $\rightarrow$ Nerve endings at the tip of axon $\rightarrow$ Synapse $\rightarrow$ Dendrite of next neuron

    ii. The synapse between two neurons acts as a one-way valve that allows electrical impulses to pass in one direction only.

    iii. A chemical substance called a neurotransmitter is released when an electrical impulse coming from the receptor reaches the end of the axon of sensory neurons.

    iv. The neurotransmitter crosses the synapse and starts a similar electrical impulse in the dendrite of the next neuron. In this way, the electrical impulses pass from one neuron to the next across the synapse.

    v. Axon has a swollen structure at its end called synaptic knob or bouton. It is also termed as the nerve fibre.

Section B

17.

(c) Statement (b) is incorrect.

Explanation:

Atmosphere of Venus is made up of thick white and yellowish clouds of sulphuric acid.

18.

(c) Both the statements A and B are false

Explanation:

Valeric acid is another name for pentanoic acid. **Soaps** are sodium or potassium salts of long-chain fatty acids. When triglycerides in fat/oil react with aqueous NaOH or KOH, they are converted into **soap** and glycerol.

19.

(b) Ag_2S

Explanation:

The silver particles react with atmospheric sulphur compounds like H_2S gas and form a black coating of Ag_2S over the surface.

20.

(b) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)

Explanation:

- **NaCl** has **ionic bonds** between the sodium ion and the chloride ion.
- **Ammonia** has **polar covalent bonds** between the nitrogen atom and hydrogen atoms.
- **Nitrogen** molecule has **non-polar covalent bonds** between the two nitrogen atoms since the two atoms are alike.
- **C_{60}** is a member of **fullerenes** (Allotropes of carbon). Buckminsterfullerene contains a cluster of 60 carbon atoms joined together to form spherical molecules.

21.

(c) On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte.

Explanation:

When current is passed through the electrolyte, the impure metal from the anode is dissolved in the electrolyte and an equal amount of pure metal from the electrolyte is deposited on the cathode.

22.

(b) carbon

Explanation:

Carbon is capable of forming many allotropes due to its valency. Sixty carbon atoms form the shape of a ball like a football with a carbon atom at each corner of the 20 hexagons and 12 pentagons. The buckminsterfullerenes are also called fullerenes, Fullerenes are molecules of varying sizes composed entirely of carbon, which take the form of a hollow sphere, ellipsoid, or tube.

23.

(c) NaCl, $CaCO_3$, NH_3

Explanation:

In this process a concentrated solution of sodium chloride (brine) is saturated with ammonia, carbon dioxide is passed through it, and the product is calcined by calcium carbonate.

24.

(b) Both A and R are true but R is not the correct explanation of A.

Explanation:

The reaction involved is,

$CaOCl_2 + H_2SO_{4(dilute)} \longrightarrow CaSO_4 + H_2O + Cl_2\uparrow$

25. a. Reaction of metal carbonate with dilute acid gives salt , water and carbondioxide thus, dilute hydrochloric acid with sodium carbonate, gives sodium chloride, carbon dioxide and water.
    $Na_2CO_3(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$
    b. Carbon dioxide gas is liberated above reaction, which, turns lime water milky. If we continue passing carbon dioxide gas ithrough the milky lime water, the solution becomes clear again. This confirms the presence of carbon dioxide gas.
26. Displacement reaction is a type of reaction in which a more reactive element displaces another less reactive element. The reactivity series of metals can be used to find out the displacement reaction.
    Chemical equation for a displacement reaction in which Iron is a reactant:
    $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

    One more element whose behaviour is similar to that of iron in such reaction is Zn.
    $Zn + 2HCl \rightarrow ZnCl_2 + H_2\uparrow$

    This is not shown by Gold as it is the least reactive element.

OR

Magnesium, on reaction with oxygen, forms Magnesium oxide which is a white powder and is basic in nature.

Metal A - Magnesium (Mg) ; White powder B - Magnesium oxide (MgO)

$2Mg + O_2 \rightarrow 2MgO$

27. Aluminium is more reactive than zinc hence it displaces zinc from zinc sulphate solution and forms silvery white zinc metal. The reaction is as follows:

$$\underset{Zinc\ sulphate}{3ZnSO_4(aq)} + \underset{Aluminium}{2Al(s)} \rightarrow \underset{Aluminium\ sulphate}{Al_2(SO_4)_3(aq)} + 3Zn(s)$$

28. i. Double displacement reaction

ii. $2KClO_3 \xrightarrow[Catalyst]{Heat} 2KCl\ (s) + 3O_2\ (g)$

It is a decomposition reaction and endothermic in nature.

iii. Barium Sulphate, Sodium Chloride

OR

Ca elements displace aluminium from its salt.

29. a. **Functional group:** The element replacing hydrogen in a carbon compound is called heteroatom. These heteroatoms confer special properties to the compound are known as functional groups.

i. Functional group present in propanol - OH/Alcohol

ii. Functional group present in propanone - $-\overset{\overset{O}{\|}}{C}-$ /Ketone

b. i. Dehydration

$$\underset{(ethanol)}{C_2H_5OH} \xrightarrow[\underset{(excess)}{Conc.\ H_2SO_4}]{443K} \underset{(ethene)}{C_2H_4} + H_2O$$

ii. Oxidation

$$C_2H_5OH \xrightarrow[heat]{Alkaline\ KMnO_4} \underset{Ethanoic\ Acid}{CH_3COOH}$$

OR

Soaps	Synthetic detergents
1) Soaps are sodium or potassium salts of higher fatty acids e.g. sodium stearate.	1) Synthetic detergents are sodium alkyl sulphates or sodium alkyl benzene sulphonates e.g. sodium n-dodecylsulphate.
2) Soaps are prepared from vegetable oils animal and fats.	2) Synthetic detergents are prepared from the hydrocarbons obtained from petroleum.
3) Soaps have relatively weak cleansing action.	3) They have strong cleansing action.
4) Soaps form curdy white precipitate with calcium and magnesium salts present in hard water and hence, are not used in hard water.	4) Calcium and magnesium salts of detergents are soluble in water and therefore, no curdy white precipitates are obtained in hard water and hence synthetic detergents can be used even in hard water.
5) Soaps cannot be used in acidic medium as they are decomposed into carboxylic acids in acidic medium.	5) They can be used in acidic medium as they are the salts of strong acids and are not decomposed in acidic medium.
6) Soaps do not cause water pollution.	6) Synthetic detergents cause water pollution.
7) Soaps are biodegradable.	7) Some of the synthetic detergents are not biodegradable.

Section C

30.

(b) B and C

Explanation:
A ray of light passing from an optically denser medium to an optically rarer medium bends away from the normal, and a ray of light passing from an optically rarer medium to an optically denser medium bends toward the normal.

31.

(b) ∠r, ∠A and ∠D
Explanation:
∠r, ∠A and ∠D

32.

(b) Both A and R are true but R is not the correct explanation of A.
Explanation:
Both A and R are true but R is not the correct explanation of A.

33. The person is suffering from an eye defect called myopia. In this defect, the image is formed in front of the retina. Hence, a concave lens is used to correct this defect of vision.
Here Distance of object, u = infinity
Distance of image, v = -80 cm
Let the focal length = f.
Therefore, by the lens formula we have,
$-\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
$\frac{1}{-\infty} + \frac{1}{-80} = \frac{1}{f}$
$\Rightarrow f = -80cm = -0.8m$
Now, Power of lens, P = $\frac{1}{f} = \frac{1}{-0.8\ in\ m} = -1.25D$
Since, The power of lens= -1.25D. Therefore a concave lens of power -1.25D is required by the person to correct this defect.

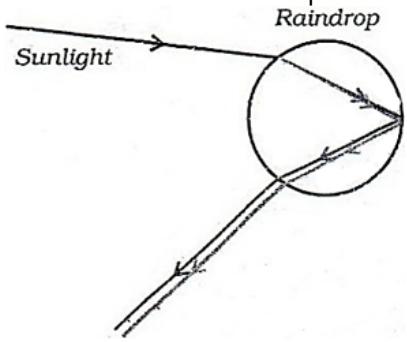
34. Here, the potential difference, V = 2 + 2 + 2 = 6V and charge, Q = 1 C
We know that, Work done, W = $\frac{V}{Q}$
Substituting the value, we get
W = $\frac{6}{1}$ = 6 J.

OR

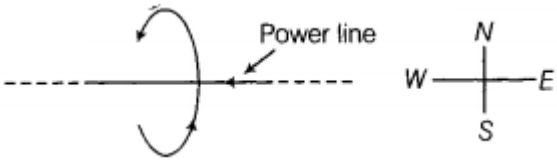
(i) When a 2Ω resistor is joined to a 6 V battery in series with 1Ω and 2Ω resistors. Total resistance (R_S) = 2 + 1 + 2 = 5Ω.
∴ Current (I_1) = 6V/5Ω = 1.2 A
∴Power used in 2 Ωresistor,$P_1 = I_1^2R = (1.2)^2 \times 2$= 2.88 W
(ii) When 2Ω resistor is joined to a 4 V battery in parallel with 12Ω resistor and 2Ω resistors, the current flowing in 2Ω is independent of the other resistors.
∴ Current flowing through 2Ω resistor,I_2= 4 V/ 2Ω = 2 A
Power used in 2Ω resistor,$P_2 = I_2^2R = (2)^2 \times 2$= 8 W
∴ The required ratio,P_1/P_2 = 2.88/8 = 0.36 : 1

35. i. The magnetic field and hence the magnetic line of force exist in all the planes all around the magnet.
ii. The relative strength of the magnetic field is shown by the degree of closeness of the field lines and the direction of the magnetic field is obtained by tangent to the field lines at the point of intersect.

36. A rainbow is a natural spectrum appearing in the sky after a rain shower.



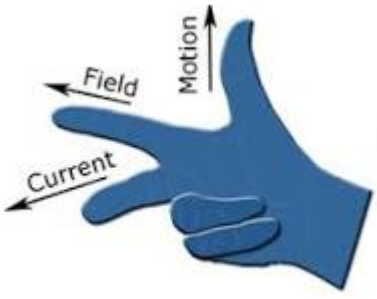
37. i. According to right-hand thumb rule,



a. The direction of magnetic field at a point above the power line. is from South to North.
b. The direction of magnetic field at a point below the power line is from North to South.

ii. a. If the current in the coil X is changed then some current will definitely be induced in the coil Y. When the current in coil X is changed, the magnetic field associated with it also changes. As a result, the magnetic field around coil Y also changes. This change in magnetic field lines around coil Y induces an electric current in it. This process is known electromagnetic induction.

b. **Fleming's Right-hand Rule:** According to Fleming right-hand rule, Adjust your right-hand thumb, forefinger and middle finger in such a way that all are perpendicular to one another. If forefinger shows the direction of magnetic field and Thumb shows the direction of motion of the conductor then middle finger gives the direction of current.



38. i. Live wire is of Red colour.
ii. The fuse is connected in between live wire.
iii. KWh is the commercial unit of power supply.

OR

A fuse wire is a safety device connected in series with the live wire of circuit. It has high resistivity and a low melting point.

39. Object distance, u = - 15 cm
Focal length, = - 10 cm
Object size, h = 1 cm
Image distance, v= ?
(i) Position of image
From mirror formula, $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
We have, $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$
Putting values, we get $\frac{1}{v} = \frac{1}{-10} - \frac{1}{-15}$
$= \frac{-3-(-2)}{3} = -\frac{1}{30}$
The image is formed at a distance 30 cm on the side of the object Negative sign indicates that object and image are on the same side.

(ii)Nature of image: The image is in front of the mirror, its nature is real and inverted.
Size of image: From the expression for magnification,
m = $\frac{h'}{h} = -\frac{v}{u}$
We have h' = $-h \times \frac{v}{u}$
putting values, we get h' = $-1 \times \frac{-30}{-15}$
= -2
The image formed has size 2 cm and negative sign means inverted and real and enlarged.

OR

a. f = 20 cm, u = -30 cm

i. $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

$\frac{1}{v} = \frac{1}{20} + \frac{1}{-30}$

$\frac{1}{v} = \frac{1}{60}$

v = 60 cm

ii. Real, inverted and magnified

iii. m = $\frac{v}{u}$

m = $\frac{60}{-30}$

m = -2

h' = m $\times$ h

h' = -2 $\times$ 5

h' = -10 cm

b.