

Solution

PRELIMS 1

Class 10 - Science

Section A

1. **(b)** III and IV
Explanation:
The colour change will take place in III and IV as zinc is more reactive than iron as well as copper.

$$\text{Zn} + \underset{\text{Pale Green}}{\text{FeSO}_4} \rightarrow \underset{\text{Colorless}}{\text{ZnSO}_4} + \text{Fe}$$
$$\text{Zn} + \underset{\text{Blue}}{\text{CuSO}_4} \rightarrow \underset{\text{Colorless}}{\text{ZnSO}_4} + \text{Cu}$$
2. **(b)** substitution reaction
Explanation:
substitution reaction
3. **(a)** Option (b)
Explanation:
Option (b) is correct as Sodium carbonate contain acid and base which forms basic salt.
4. **(c)** $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$
Explanation:
 $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$
5. **(c)** Tube A
Explanation:
Iron nails get rusted in test tube A because both air and water are present in it. Iron nails do not get rusted in B because there is water but no air. In C, rusting will not take place because there is neither air nor water.
6. **(d)** Bronze
Explanation:
The alloy of copper and tin is bronze which is used in various utensils.
7. **(d)** the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.
Explanation:
The non-polar hydrophobic tails of soap are oil or grease-loving and so will embed into the grease and oils that help dirt and stains adhere to surfaces. The hydrophilic heads, however, remain surrounded by the water molecules to which they are attracted. In soap micelles, the ionic end of soap is on the surface of the cluster while the hydrocarbon chain is in the interior of the cluster.
8. **(b)** The uncovered part of the leaf became blue-black.
Explanation:
The uncovered part of the leaf became blue-black.

9. (a) Tt and Tt

Explanation:

Tt and Tt

10.

(d) breaking up of filaments into smaller bits

Explanation:

In Spirogyra, reproduction takes place by the fragmentation that involves breaking down of the filaments into smaller bits.

11.

(d) Alleles

Explanation:

An alternative form of a gene is known as an allele. Alleles vary in their sequence which may or may not result in a variant phenotype of a particular trait. Alleles represent variations of a gene that is responsible for a particular trait.

12.

(b) a fungi, Rhizopus

Explanation:

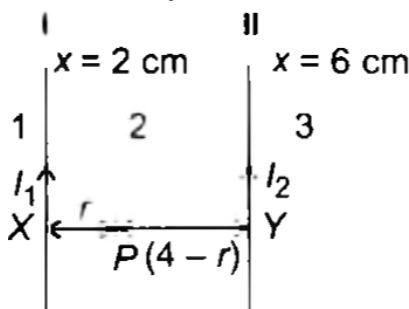
a fungi, Rhizopus breakdown food outside body.

13.

(b) 3 cm mark

Explanation:

Current carrying wires are shown in the figure. In region 1 and 3 magnetic fields produced by both the conductors have same direction so they will add on.



In region 2, magnetic fields produced by both the conductors are not same, so there is possibility to get a point where net magnetic field is zero.

Let P be the point where net magnetic field will be zero.

Here, XP = r and YP = (4 - r)

$I_1 = 1 \text{ A}$, $I_2 = 3 \text{ A}$

Magnetic field produced by a current carrying conductor at a distance r from it,

$$B = \frac{\mu_0 I}{2\pi r}$$

For conductor I, $B_I = \frac{\mu_0 I_1}{2\pi r}$

For conductor II, $B_{II} = \frac{\mu_0 I_2}{2\pi(4-r)}$

Net magnetic field at P is zero. So, $B_I = B_{II}$

$$\frac{\mu_0 I_1}{2\pi r} = \frac{\mu_0 I_2}{2\pi(4-r)}$$

$$\Rightarrow (4 - r) I_1 = I_2 r$$

$$\Rightarrow 1(4 - r) = 3 r$$

$$\Rightarrow 4r = 4 \therefore r = 1 \text{ cm}$$

Position of the point P on the scale = 2 + 1 = 3 cm

14.

(b) 0.005A

Explanation:

The current in a circuit made up of a series of resistors is the same in every area of the circuit or is the same current flowing through every resistor.

15.

(c) (i), (iii) and (iv) only

Explanation:

A food chain does not show branching lines. It is always straight and proceeds in a progressive straight line. It shows unidirectional flow of energy.

16.

(c) 2 trophic levels

Explanation:

2 trophic levels

17.

(c) A is true but R is false.

Explanation:

Silver's reactivity according to the reactivity series is lesser than that of copper (Cu). So, we cannot stir the solution as the solution would be displaced by copper. We should instead use a glass rod for this. Thus assertion is true, but reason is false.

18.

(c) A is true but R is false.

Explanation:

A is true but R is false.

19. (a) Both A and R are true and R is the correct explanation of A.

Explanation:

Both A and R is correct statement and R is correct explanation of A.

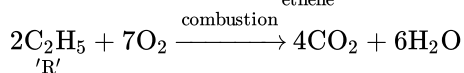
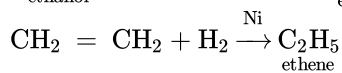
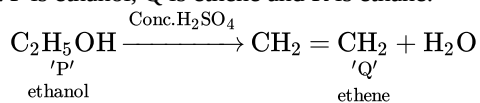
20. (a) Both A and R are true and R is the correct explanation of A.

Explanation:

Decomposers keep the environment clean by decomposing or consuming the dead remains of other organisms.

Section B

21. P is ethanol, Q is ethene and R is ethane.



22. A. Stigma

Function: Pollen lands and germination starts

B. Pollen tube

Function: It carries the pollen to the egg cell for fertilisation.

C. Egg cell

Function: It fuses with the male gamete to form a zygote.

23. Every living organisms take food, derive energy, remove waste materials from their bodies and respond to changes in their environment. These activities are called life processes. Various functions carried out by living beings; which are necessary to maintain and continue life are called life process. In all living organisms there occur the basic life processes such as nutrition, respiration, transportation, excretion and reproduction, which are necessary for survival.

OR

In human beings, a pigment haemoglobin is present in RBC which has high affinity for oxygen, takes up the oxygen from the air in the lungs and carry it to tissues which are deficient in oxygen. Some oxygen is carried in dissolved state in blood plasma. Carbon dioxide is more soluble in water than oxygen is mostly transported in the dissolved form in our blood.

24. The expression relating the distance of object 'u', distance of image 'v' and focal length 'f' for a spherical mirror, is called the spherical mirror formula. It is represented as:

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

25. Producers	Consumers
(i) They prepare their own food.	(i) They depend on producers for their food.
(ii) They prepare food from inorganic material by the process of photosynthesis.	(ii) They depend on readymade food.
(iii) They always constitute the first trophic level	(iii) They are placed at second or higher trophic levels.
(iv) They possess chlorophyll which helps them in synthesising their own food.	(iv) They do not possess chlorophyll pigments.
(v) They have the capacity to trap solar energy and convert them to chemical energy in the form of carbohydrates. Examples - Green plants, algae etc.	(v) They cannot trap solar energy and convert to chemical energy. They eat producers to get chemical energy. Examples - Humans, other animals like goats, rabbits, lions, tigers etc.

OR

- a.
 - i. Artificial ecosystems are man made systems where biotic and abiotic components are brought together so that they can interact with each other and live naturally.
 - ii. It is not self dependent and can lost without human help.
- b. Ponds and lakes are an example of natural ecosystem whereas the aquarium is an example of artificial ecosystem. Ponds do not need to be cleaned because it has microorganisms, like bacteria and fungi that break-down the dead remains and waste products of organisms and clean the pond naturally. The aquarium does not contain soil or decomposing bacteria or fungi which helps in degrading complex organic substance into simple inorganic substance, so it needs to be cleaned from time to time.

26. Given, far point, $x = 100\text{cm}$

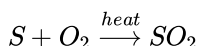
To see the Moon clearly, he should use spectacles with concave lens of focal length, $f = -x = -100\text{cm}$.

Section C

27. The gas is sulphur-dioxide (SO_2)

- i. It will not react with dry litmus paper.
- ii. The gas will bleach moist litmus paper.

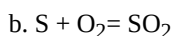
The balanced chemical equation is



28.
 - i. Qualities exhibited by Ankit are scientific knowledge, awareness, helpfulness etc.
 - ii. The container becomes porous when blue vitriol, i.e. CuSO_4 solution is kept into it because iron being more reactive displaces copper from copper sulphate (blue vitriol) solution and itself forms green coloured ferrous sulphate.

OR

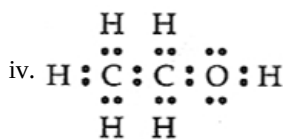
- a.
 - i. No action.
 - ii. it turns moist litmus paper red and then bleaches it.



29. In the fig (b) the water level in the bent delivery tube has risen up. It is because of absorption of carbon dioxide by KOH pellets in the tube, the air from bent tube moves into the conical flask, resulting in rising of the water level.

30.
 - a. The **dominant trait** is identified by observing its expression in the F1 generation.
 - b. The **recessive trait** is the one that is masked in the presence of the dominant trait and only expressed in the homozygous recessive state.

- ii. In the case of carbon, it has four electrons in its outermost shell and needs to gain or lose four electrons to attain noble gas configuration. If it were to gain or lose electrons:
- It could gain four electrons forming C^{4-} anion. But it would be difficult for the nucleus with six protons to hold on to ten electrons.
 - It could lose four electrons forming C^{4+} cation. But it would require a large amount of energy to remove four electrons leaving behind a carbon cation with six protons in its nucleus holding on to just two electrons.
- iii. Electron dot structure of ethanol is as follows:



- v. Heteroatom in following compound is
- Oxygen
 - Chlorine

35. a. Categories of Contraceptive methods:

- Mechanical Barrier - The sperm does not reach the egg.
- Contraceptive Pills - Change the hormonal balance so that the eggs are not released.
- Contraceptive devices - Placed in the uterus to prevent pregnancy.
- Surgical methods- Blocking / cutting of vas deferens/ fallopian tube.

b. Two bacterial infections:

- Gonorrhoea
- Syphilis

Two viral infections:

- AIDS
- Warts

- c. **Protection against Sexually Transmitted Infections (STIs):** Condoms act as a barrier, preventing direct contact between bodily fluids, thereby reducing the risk of transmitting or acquiring STIs, including HIV, chlamydia, gonorrhoea, and HPV.
Prevention of Unintended Pregnancy: Condoms are an effective method of contraception when used correctly and consistently.

OR

i. Nerve impulses travel from one neuron to the other neuron in the following way:

Dendrites → Cell body → Axon → Nerve endings at the tip of axon → Synapse → Dendrite of next neuron

- The synapse between two neurons acts as a one-way valve that allows electrical impulses to pass in one direction only.
- 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.
- 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.
- Axon has a swollen structure at its end called synaptic knob or bouton. It is also termed as the nerve fibre.

36. a.



b. Virtual, erect and magnified

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

$v = 30 \text{ cm}$

$m = \frac{-v}{u} = \frac{-30}{-15} = 2$

OR

- Palmists use a convex lens because it shows an enlarged, virtual and erect image when the object is between F and O of a convex lens.

ii. If the palmist wants a real and magnified image, he should put an object between F_1 and F_2 or on F . But in that case, he will have to use a screen to see the image. So, for convenience, palmists.

iii. Given, $f = 10$ cm, $u = -5$ cm

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

$$\text{Or } \frac{1}{v} + \frac{1}{5} = \frac{1}{10}$$

$$\text{Or, } \frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$

$$\text{Or } \frac{1}{v} = \frac{1-2}{10} = -\frac{1}{10}$$

$$\text{Or, } v = -10 \text{ cm}$$

The image is formed at 10 cm on the same side of the lens. It is erect and virtual.

$$\text{Image size} = \frac{v}{u} = \frac{10}{5} = 2$$

Image is twice as big as object.

Section E

37. i. The pH range of the Human Body is 7 to 7.8.

ii. The strength of acids and bases depends on the number of H^+ ions produced and the number of OH^- ions produced.

iii. Soil Y is acidic. Hence, it should be treated with powdered chalk to reduce its acidity.

OR

When the pH in the mouth falls below 5.5, tooth decay starts. Bacteria present in the mouth produce acid by degradation of sugar and food particles which remain in the mouth after eating.

38. i. In animals, chemical coordination is achieved through the agency of hormones which function as chemical messengers.

Different plant hormones help to coordinate growth, development, and responses to the environment.

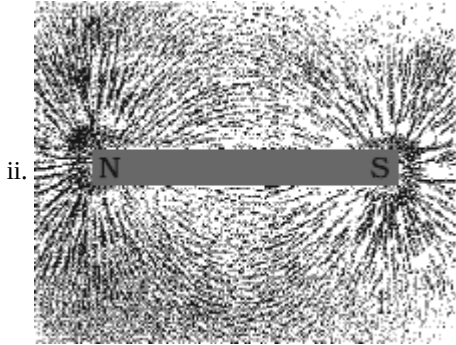
ii. Adrenaline hormone is called an emergency hormone. Adrenaline hormone is released into the blood from the adrenal gland during stimulation of the nervous system.

iii. The adrenal gland is present on the upper side of each kidney in our body.

OR

Adrenaline hormone is secreted in small amounts all the time. But in large amounts, it is secreted when a person is frightened. It increases the rate of heartbeat and breathing, raises blood pressure and allows more glucose go into the blood to give us a lot of energy so as to quickly fight or run away from the frightening situation.

39. i. This pattern of iron filings demonstrate the magnetic field lines.



ii.

iii. The direction of a magnetic field at a point is determined by placing a small compass needle. The N - pole of compass indicates the direction of magnetic field at that point.

Two magnetic field lines do not intersect each other because if there was point of intersection, The compass needle would point towards 2 directions.

OR

