

**Solution**  
**SCIENCE**  
**Class 10 - Science**  
**Section A**

1.  
**(d) Rancidity**  
**Explanation:**  
Rancidity spoils the food materials prepared in fats and oils which have been kept for a considerable time and makes them unfit for eating. Hence, the cheese shown in the image becomes unfit for eating due to rancidity.
  
2.  
**(d) Blue**  
**Explanation:**  
When water is added to white coloured anhydrous copper sulphate, its colour changes to blue, indicating that the blue coloured copper sulphate pentahydrate is regenerated.  
$$\text{CuSO}_4(\text{s}) \xrightarrow{\text{Heat}} \text{CuO}(\text{s}) + \text{SO}_3(\text{g})$$
  
3. **(a) Al<sub>2</sub>O<sub>3</sub>**  
**Explanation:**  
The oxide that can react with both HCl (hydrochloric acid) and KOH (potassium hydroxide) to form a salt and water is aluminum oxide (Al<sub>2</sub>O<sub>3</sub>), as it is considered an amphoteric oxide, meaning it can act as both a base and an acid depending on the reactant it encounters
  
4.  
**(c) 4**  
**Explanation:**  
4
  
5.  
**(b) Student C**  
**Explanation:**  
Fe + ZnSO<sub>4</sub> → No reaction  
It is because iron is less reactive than Zinc.  
Zn + FeSO<sub>4</sub> → ZnSO<sub>4</sub> + Fe  
The solution becomes colourless and black iron gets deposited.
  
6. **(a) Carbon, oxygen, nitrogen and sulphur**  
**Explanation:**  
Carbon, oxygen, nitrogen and sulphur
  
7.  
**(d) Isomerism**  
**Explanation:**  
Isomerism
  
8.  
**(b) She had taken the correct surface for leaf peel**  
**Explanation:**  
She had taken the correct surface for leaf peel
  
9.  
**(b) two individuals of a species**  
**Explanation:**  
species is the lowest level of classification and shows the high level of similarities among the organisms. so two individuals of a species have the maximum common characteristics.
  
10.  
**(c) anther and ovary**

**Explanation:**

- The anther is part of the stamen (male sex organ) that produce pollen (male gamete).
- The ovary is an inferior part of the pistil (female sex organ) which contains ovule. Female gametophyte develops in the ovule.

11.

**(b)** 1 : 1

**Explanation:**

When purebred tall plant with the phenotype (TT) crossed with a short plant with the phenotype (tt), the possible progeny in F<sub>2</sub> generation: TT(1), tt(1), and Tt(2). Thus the ratio of pure tall (TT) to pure short (tt) is 1:1.

12. **(a)** Movement of water in and out of the guard cells.

**Explanation:**

They swell up when enters guard cells due to water movement. The pore at the stomata is now open. The stomata close when they dry out and become flaccid.

13. **(a)** move towards the side AB of the loop.

**Explanation:**

move towards the side AB of the loop.

When a current flows through a conductor, it creates a magnetic field around it. The direction of this magnetic field can be determined using the right-hand rule

14.

**(c)**  $x \times z \times y^2$

**Explanation:**

$x \times z \times y^2$

15. **(a)** Jute bag, Mouldy bread, Newspaper

**Explanation:**

Biodegradable wastes are waste materials that can be easily decomposed by microorganisms. Organic wastes like orange peel, roti, cotton cloth, mango fruit, jute bag, mouldy bread, newspaper, etc., are biodegradable.

16.

**(d)** All of these

**Explanation:**

All the given practices are environment-friendly practices. Carrying cloth-bag for shopping purchases is an alternative to polythene (which is a non-biodegradable plastic). Switching off lights and fans, when not in use, saves energy and helps to reduce carbon emissions. Reducing automobile emissions is another way to reduce carbon dioxide emissions.

17.

**(c)** A is true but R is false.

**Explanation:**

Iron articles are painted because it prevents them from rusting. When painted, the contact of iron articles from moisture and air is cut off. Hence, rusting is prevented their presence is essential for rusting to take place. Thus, the assertion is correct and reason is not the correct explanation of the assertion.

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

**Explanation:**

Sexual reproduction involves two parents that result in offspring that are not identical to the parents. It causes variations; which are essential for evolution as well as the survival of species under unfavorable conditions.

19.

**(d)** A is false but R is true.

**Explanation:**

A is false but R is true.

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

**Explanation:**

Both A and R are true and R is the correct explanation of A.

**Section B**

i. Structure of ethanoic acid (CH<sub>3</sub>COOH)

21.	$\begin{array}{c} \text{H} \quad \text{O} \\   \quad    \\ \text{H} - \text{C} - \text{C} - \text{OH} \\   \\ \text{H} \end{array}$
ii. Structure of bromopentane (C <sub>5</sub> H <sub>11</sub> Br)	$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{Br}$
iii. Structure of butanone (CH <sub>3</sub> COC <sub>2</sub> H <sub>5</sub> )	$\begin{array}{c} \text{O} \\    \\ \text{H}_3\text{C} - \text{C} - \text{CH}_2 - \text{CH}_3 \end{array}$

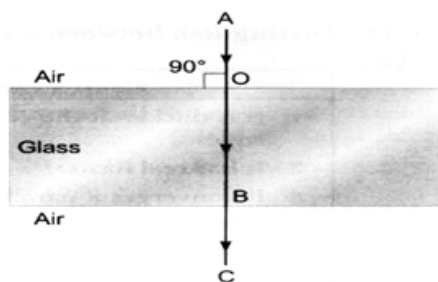
22. There are two types of reproduction-sexual and asexual. Sexual reproduction is responsible for bringing in more variations in its progeny as it involves fusion of male and female gametes from two different organisms which leads to more diversity of characters in offsprings. Gametes are formed by meiosis process which brings new combinations of genes due to crossing over and homologous recombination. Due to all these factors sexual reproduction is responsible for bringing in more variations in its progeny.
23. Glucose, urea, water and different salts are the substances found in glomerular filtrate in the kidneys of mammals. Red blood cells and proteins can't pass through it.

OR

**Hypertension:** It is the high blood pressure which is caused due to emotions such as worry, excitement, fear etc.

**Hypotension:** It is the low blood pressure when it falls below the normal level.

24. When a ray of light falls normally on the surface of a medium, then, no bending of light ray occurs. It means the light ray goes straight from one medium to another.



25. Plastic bags are non-biodegradable wastes. When burnt they release very poisonous gases which have serious effects on our body. Plastic bags block drainage system leading to overflow of drainage. When buried in soil, the fertility of soil is reduced. So the use of plastic bags is banned in many places. Instead of plastic bags we can use paper bags or jute bags for shopping.

OR

Decomposers include micro-organisms such as bacteria and fungi that obtain nutrients by breaking down the remains of dead plants and animals. They help in the breakdown of organic matter or biomass from the body of dead plants and animals into simple inorganic raw materials, such as CO<sub>2</sub>, H<sub>2</sub>O, and some nutrients.

26. Focal length of convex lens,  $f = 5$  cm

For the closest distance,  $v = -25$  cm

Using the formula,  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$$\begin{aligned} -\frac{1}{u} &= \frac{1}{f} - \frac{1}{v} \\ &= \frac{1}{5} + \frac{1}{25} = \frac{6}{25} \\ u &= \frac{-25}{6} \text{ cm} = -4.17 \text{ cm} \end{aligned}$$

The closest distance at which Parthiv can read the book is -4.17 cm.

For the farthest distance,  $v' = \infty$

Using the formula,  $\frac{1}{v'} - \frac{1}{u'} = \frac{1}{f}$

$$\begin{aligned} -\frac{1}{u'} &= \frac{1}{f} - \frac{1}{v'} \\ &= \frac{1}{5} - \frac{1}{\infty} = \frac{1}{5} \\ u' &= -5 \text{ cm} \end{aligned}$$

The farthest distance at which Parthiv can read the book is -5 cm.

### Section C

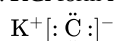
27. C displaces B from its oxide, therefore, C is more reactive than B.

There is no reaction when C is treated with oxide of A or C does not displace A from its oxide. So, A is more reactive than C. Thus, the reactivity order is  $\text{B} < \text{C} < \text{A}$ .

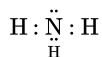
28. i. Magnesium (Mg) is the most reactive of all the metals.  
ii. Copper (Cu) is the least reactive of all the metals.  
iii. Decreasing order of reactivity :  $\text{Mg} > \text{Cr} > \text{Co} > \text{Cu}$ .

OR

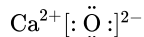
- i. KCl form ionic bond



ii.  $\text{NH}_3$  forms covalent bond



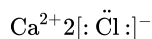
iii.  $\text{CaO}$  form ionic bond



iv.  $\text{N}_2$  form covalent bond



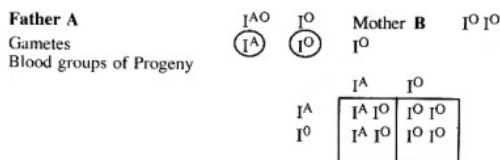
v.  $\text{CaCl}_2$  form ionic bond



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. Blood groups being a hereditary character, the knowledge of blood groups of parents can give information about the possible blood groups of children and vice-versa.

In this case illustration is as follow:



In the above cross 50 per cent of progeny will have A blood group and 50 per cent O blood group.

At the same time this data is insufficient. It is not mentioned father has homozygous or heterozygous A blood group. If it is homozygous A then 100 per cent of progeny will have A blood group as Gene  $I^A$  is dominant over Gene  $I^O$ .

31. Let us assume that the window pane is between  $F_2$  and infinity from this lens and this is a convex lens. We know that when the object is between infinity and  $F_2$ , its inverted and real images is formed between  $2F$  and  $2F_2$ .

Now, the distant building is at infinity from the lens. Its image would be formed at  $2F$ . So, the screen needs to be moved towards the lens in order to get a sharp image. Its approximate focal length is 10 cm (less than image distance in earlier case).

32.  $1\text{kwh} = 1000 \text{ watt} \times 3600 \text{ seconds}$

$$= 3.6 \times 10^6 \text{ wattsecond}$$

$$= 3.6 \times 10^6 \text{ joule (J)}$$

The SI unit of energy is joules (J).

33. i. Let current through each bulb be I.

$$P = VI, 10 = 220 I$$

$$I = \frac{1}{22} \text{ A}$$

Let n such bulbs be connected in series.

$$\text{Current through n bulbs} = 5\text{A}$$

$$n (\text{current in 1 bulb}) = 5$$

$$n \frac{1}{22} = 5$$

$$n = 110$$

110 such bulbs can be lighted within allowable limit of 5A.

ii. Wattage of colour T.V. = 60 W

$$\text{Number of hours for which colour T.V. is on during September} = 2 \times 2\frac{1}{2} \times 30 = 150 \text{ h}$$

$$\text{Energy consumed} = \frac{\text{watt} \times \text{hour}}{1000} = \frac{60 \times 150}{1000} = 9\text{kWh}$$

$$\text{Cost of seeing 2 movies per day for 30 days} = 9 \times 4 = \text{Rs. } 36 \text{ only}$$

**Section D**

34. i. Element A: Carbon

ii. Gas B: Carbon dioxide

iii. Allotrope C: Diamond

iv. Allotrope C is used for making jewellery

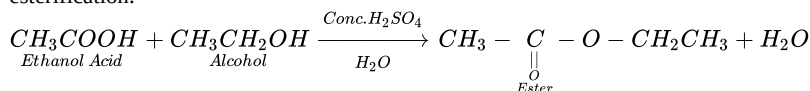
v. Buckminsterfullerene

vi. Graphite

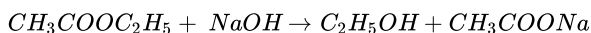
OR

i. Alcohols and carboxylic acids can be distinguished by litmus test. Alcohol will have no effect on the litmus paper. Carboxylic acid will change blue litmus paper into red.

ii. When ethanol (an alcohol) reacts with acetic acid (a carboxylic acid), a fruity smelling liquid called ester is obtained. This reaction is called esterification.

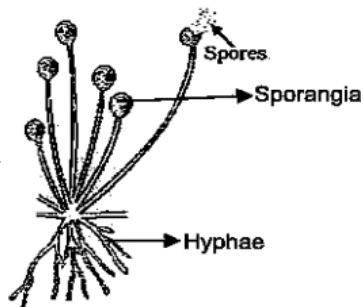


iii. The reverse of esterification is saponification. In this, ester is converted back to alcohol and salt of carboxylic acid by treating the ester with an alkali.



The above reaction is used in the preparation of soap.

35. i.



- a. Reproductive part – Sporangia
- b. Non-reproductive part – Hypha/Hyphae.

Rhizopus does not grow on dry slice bread because dry slice of bread does not provide moisture and nutrients necessary for the germination and multiplication of Rhizopus

ii. Budding occur in Hydra.

Hydra uses regenerative cells for reproduction. A bud develops as an outgrowth due to repeated cell division at one specific site and develop into tiny individuals. On maturation, these buds detach from the parent and become new individuals.

OR

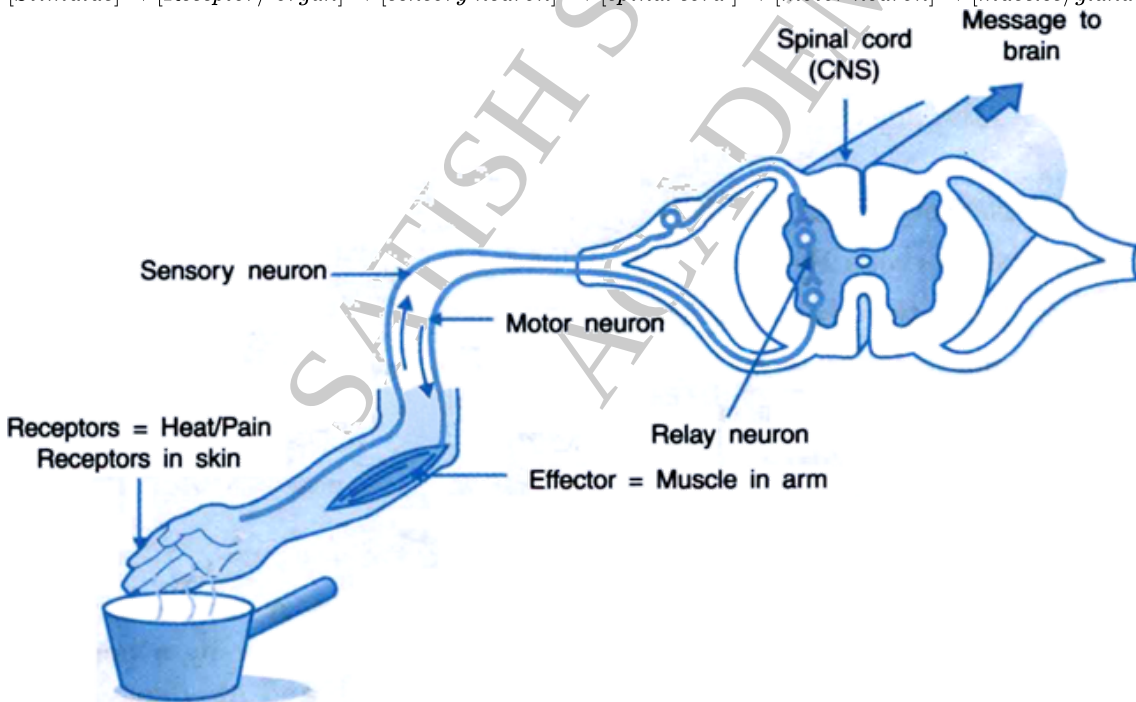
**Reflex action** is a rapid (unconscious), automatic and involuntary response of effectors, i.e. muscles and glands, to a stimulus, which is monitored through the spinal cord. It is a simple form of behavior in which the same stimulus produces the same response every time, e.g.

- i. If we unknowingly touch a hot plate, we immediately move our hand away from it.
- ii. Moving our foot away on stepping something sharp.

Other examples are knee jerk, coughing, yawning, sneezing, etc.

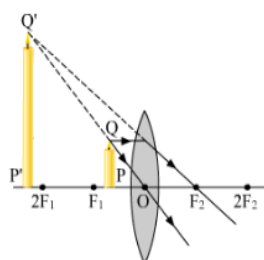
The pathway taken by nerve impulse in a reflex action (called the reflex arc) is given as follows:

[Stimulus] → [Receptor/ organ] → [sensory neuron] → [spinal cord] → [motor neuron] → [muscles/glands] → [Action/response]



Reflex arcs have evolved in animals because the thinking process of the brain was not fast enough during the early stages of evolution. However, even after complex neuron networks have come into existence, reflex arc continues to be more efficient for quick responses.

36. i.



ii. U is -ve, V is -ve. By lens formula:

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$
$$\Rightarrow \frac{-1}{v} - \left(-\frac{1}{u}\right) = \frac{1}{f} \Rightarrow \frac{-1}{v} + \frac{1}{u} = \frac{1}{f}$$
$$\Rightarrow \frac{-u+v}{uv} = \frac{1}{f} \Rightarrow f = \frac{uv}{v-u}$$

This is a required relation between u, v and f in the case when object is placed between optical centre and principal focus of convex lens

iii. Given,  $m = -1$

$$u = -20 \text{ cm}$$

$$\therefore m = \frac{v}{u} \Rightarrow -1 = \frac{v}{-20}$$

$$\Rightarrow v = 20 \text{ cm}$$

By lens formula,  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$$\Rightarrow \frac{1}{20} - \left(\frac{-1}{20}\right) = \frac{1}{f} \Rightarrow \frac{1}{20} + \frac{1}{20} = \frac{1}{f}$$

$$\Rightarrow \frac{1}{10} = \frac{1}{f} \Rightarrow f = 10 \text{ cm}$$

$$\therefore \text{Power, } p = \frac{1}{f} = \frac{1}{10 \times 10^{-2}} = 10D$$

$$\Rightarrow P = 10 D$$

OR

i. The angle of incidence is equal to the angle of reflection.

The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.

ii.  $u = -15 \text{ cm}$ ,  $f = -10 \text{ cm}$  (concave mirror)

$$h = 5.0 \text{ cm}$$

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

$$\frac{1}{v} = \frac{-1}{10 \text{ cm}} + \frac{1}{15 \text{ cm}} = \frac{-1}{30 \text{ cm}}$$

or  $v = -30 \text{ cm}$ . The screen must be placed at a distance of 30 cm from the mirror in front of it

$$(m) = \frac{h'}{h} = -\frac{v}{u}$$

$$h = -\frac{v}{u} \times h' = -\frac{-30 \text{ cm}}{-15 \text{ cm}} \times 5 \text{ cm} = -10 \text{ cm}$$

### Section E

37. i. If the crystal is moistened with water, then the blue colour of the crystal reappears.

ii. The commercial name of calcium sulphate hemihydrate is Plaster of Paris.

iii. Five water molecules are present in one formula unit of copper sulphate.

OR

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.

38. i. There are two types of movement:

- dependent on growth
- independent on growth.

ii. Auxin is a plant hormone that promotes growth.

iii. The function of the nervous system is to control and coordinate the activities of the body.

OR

The movements of the leaves of the sensitive plant are touch sensitive and independent of growth while the movement of the shoot towards light is growth related and known as phototropism.

39. i. No two magnetic field lines are found to cross each other. If two field lines crossed each other, it would mean that at the point of intersection, the compass needle would point in two directions at the same time, which is not possible.

ii. The magnetic field and hence the magnetic line of force exist in all the planes all around the magnet.

iii. The magnetic lines of force are uniform and strong at point C and they diverge as they move towards points A and B and the distance between the lines increases. Eventually, the strength of the magnetic field is strong where the lines are closer and they weaken as the closeness decreases i.e., at point C.

OR

