

Answers to RST/Set-1

- (b)
- (b) Aluminium reacts with steam to form aluminium oxide and hydrogen.
$$2\text{Al}(s) + 3\text{H}_2\text{O}(g) \longrightarrow \text{Al}_2\text{O}_3(s) + 3\text{H}_2(g)$$
- (d) strong acid and strong base
- (b)
- (c) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \xrightarrow{\Delta} \text{Cr}_2\text{O}_3 + \text{N}_2 + 4\text{H}_2\text{O}$
- (d) Y can gain electron, Z can lose electrons.
- (a) $2\text{AgCl} \longrightarrow 2\text{Ag}(s) + \text{Cl}_2(g)$
Grey
- (d) S
- (a) Soups and juices only
- (a) Both are placed externally in the body of the animal.
- (b) Receptor → Sensory neuron → Spinal cord → Motor neuron → Eye
- (c) Genetic make-up of the tall plant can be depicted as TtWW.
- (c) When object is placed at 2F, the image formed by concave mirror is also at 2F. So $2f = -30$ or $f = -15$ cm.
- (c) (ii) and (iv)
7 6 5 4 3 2 1
V I B G Y O R
Colour 3 – Yellow that of gold metal
Colour 5 – Blue that of sky.
Colour 1 – Red that of danger signal.
Colour 7 – Violet that of brinjal.
- (b) Newspaper, leather, used clothes
- (a)
- (c) A is true but R is false.
- (c) A is true but R is false.
- (b) Both A and R are true, and R is not the correct explanation of A.
- (c) A is true but R is false.
- (a) 'X' is Sodium sulphate (Na_2SO_4) and 'Y' is Barium sulphate (BaSO_4).
$$\text{Na}_2\text{SO}_4(aq) + \text{BaCl}_2(aq) \longrightarrow \text{BaSO}_4(s) + 2\text{NaCl}(aq)$$

(White ppt.)
- (b) It is called double displacement reaction/precipitation reaction.

22. (a) To carry blood from the heart to kidneys.
 (b) To expel urine out of the body.
 (c) To filter the blood passing through it and initiate urine formation.
 (d) Major function of tubules is reabsorption. Also, tubular secretion helps in urine formation without affecting the electrolyte balance of the body.
23. A. (a) The main raw materials required for photosynthesis are carbon dioxide and water. Sunlight and chlorophyll are also required to make food.
 (b) X' \longrightarrow Glucose
 'Y' \longrightarrow Starch

OR

- B. The pancreas gland present in alimentary canal has a dual function as it secretes enzymes as well as hormones. The pancreas secretes pancreatic juice which contains enzymes. The enzymes secreted by pancreas are trypsin, lipase and amylase. Pancreas also secrete insulin hormone.

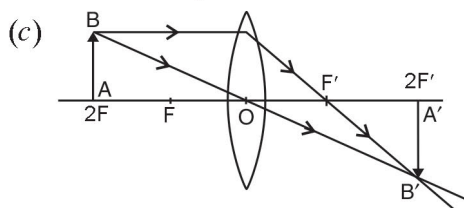
Functions of enzymes

Trypsin breaks down proteins into peptides and peptones i.e. for digesting proteins.

Lipase breaks down emulsified fats into fatty acid and glycerol.

Amylase breaks down starch into simple sugars like maltose.

24. (a) Convex lens.
 (b) Object should be placed at centre of curvature or $2F$ of convex lens, i.e. $u = 2f$ to obtain, real and equal size inverted image at $2F'$, i.e. $v = 2f$ on the other side of the lens.



25. A. (a) R_1 and R_2 are connected in series, so the resistance is

$$R_s = R_1 + R_2 = 6 + 6 = 12 \Omega$$

Now, we can see R_s and R_3 are in parallel, the net resistance is

$$\begin{aligned} \frac{1}{R_p} &= \frac{1}{R_s} + \frac{1}{R_3} \\ &= \frac{1}{12} + \frac{1}{12} = \frac{1+1}{12} \\ R_p &= \frac{12}{2} = 6 \Omega \end{aligned}$$

So the effective resistance of the given electric circuit is 6Ω .

(b) $V = 6 \text{ V}$, $R = 6 \Omega$, $I = ?$

$$V = IR$$

$$I = \frac{V}{R} = \frac{6}{6} = 1 \text{ A}$$

The current recorded by ammeter is 1 A.

OR

B.

$$R = 25 \Omega,$$

$$R = \frac{\rho l}{A} \quad \text{or} \quad 25 \Omega = \frac{\rho l}{A} \quad \dots(i)$$

When the length is increased two times, the cross-sectional area becomes $A/2$

$$R' = \frac{\rho 2l}{A/2} = 4 \left[\frac{\rho l}{A} \right] \quad \dots(ii)$$

From (i) and (ii), $R' = 4 \times 25 = 100 \Omega$

The new resistance becomes 100 Ω .

Resistivity of the wire is independent from its dimensions but depends only on the nature of the material.

\therefore Required ratio = 1 : 1

26. Removal of lion from the above food chain will increase the number of deer to such an extent that they will eat up the whole grass. The density of producer like grass will be very much reduced and this will turn the area into a desert.

27. (a) Metal which

Reacts with cold water – Sodium

Reacts with hot water – Magnesium

Reacts only with steam – Iron

Does not react at all – Gold



(c) $\text{Au} < \text{Fe} < \text{Mg} < \text{Na}$.

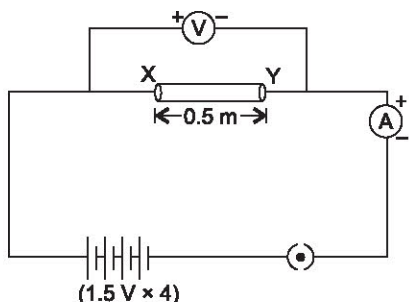
28. A. (a) Add conc. H_2SO_4 into large amount of water very slowly and with constant cooling under running water.



Sodium sulphate will be formed and its pH = 7 because it is neutral as NaOH is strong base and H_2SO_4 is strong acid.

(c) Dry HCl does not ionise into H^+ and Cl^- , therefore, does not change colour of dry blue litmus paper.

32. (a)



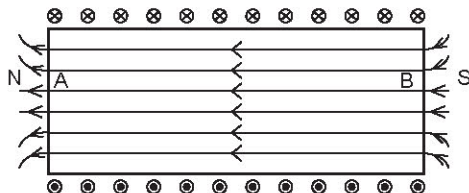
(b) From the graph, when p.d is 1.6 volt and 0.6 A current the ratio of

$$\frac{V}{I} = \frac{1.6}{0.6} = 2.67 \Omega.$$

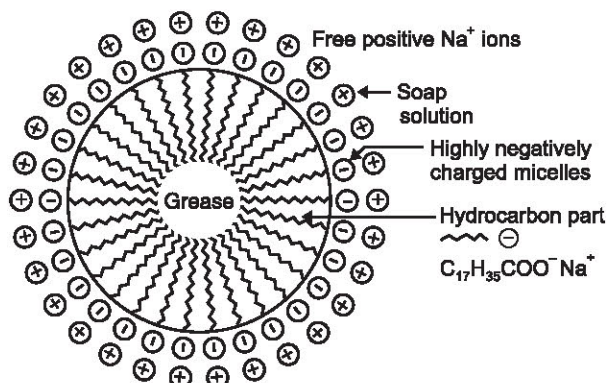
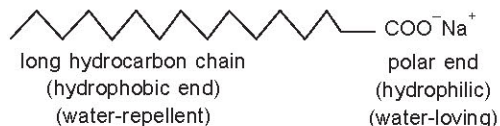
Therefore, straight line nature of graph shows that the value of $\frac{V}{I}$ ratio for all potential difference of 0.8 V, 1.2 V and 1.6 volt will be same and is equal to 2.67 Ω .

We conclude that at the given temperature, the resistance of wire is constant and is equal to 2.67 Ω .

33. 'A' end of the given solenoid will behave as north pole because at this end direction of current appears anticlockwise (By using clock face rule)



34. A. (a)



- (b)
- (i) 'Y' will have more foam because detergents work well even with hard water.
 - (ii) 'X' will have curdy solid because Ca²⁺ and Mg²⁺ present in hard water form insoluble calcium and magnesium salts of higher fatty acids by reacting with soap solution.

OR

- B. (a) During the time of gamete formation, the chromosome numbers are halved. When the gametes fuse during the process of fertilisation, the original number of chromosomes is restored in offspring. That is why Divya and her parents have the same number of chromosomes.
- (b) The basic event in reproduction is the creation of a DNA copy. Cells use chemical reactions to build copies of their DNA. In this way, two copies of the DNA are formed in a reproducing cell. DNA copying is also accompanied by the creation of cellular apparatus for both the copies. Then the DNA copies separate, each with its own cellular apparatus.
- (c) (i) Seminal vesicle – Provides fluid medium to sperms which makes it easier for the transport of sperms. This fluid also provides nutrition to sperms.
(ii) Vas deferens – Passage for sperms
(iii) Urethra – Common passage for sperms and urine.
36. A. (a) Electric line wires offer extremely low resistance to the flow of current, so they do not glow because negligible heat is produced in it.
The filament of bulb glows because it becomes red hot due to large amount of heat produced, as it offers high resistance to the flow of current through it.
- (b) The filament of bulb when it glows at 2700 °C does not get burnt because the tungsten metal of filament has
(i) a very high melting point (of 3380 °C) and
(ii) a high resistivity.
- (c) Given : $I = 0.25 \text{ A}$, $t = 4 \text{ h} = 4 \times 60 \times 60 \text{ sec}$.
So, amount of charge flowing the filament of electric lamp
 $q = It = 0.25 \times 4 \times 60 \times 60 = 3600 \text{ C}$
- (d) Given $P = 2 \text{ kW}$
 $= 2000 \text{ W}$
 $V = 220 \text{ V}$
Using, $P = VI$
 $2000 = 220 \times I$
 $\Rightarrow I = \frac{2000}{220} = 9.09 \text{ A}$
So, the capacity of the fuse that should be used for the electric iron is 10 A.

OR

- B. (a) Sabina would see that the current flow more easily through thick wire as thick wire has a greater area of cross section and hence less resistance. We know resistance is inversely proportional to the area of cross section $R \propto \frac{1}{A}$.
Hence resistance of thick wire will be less than that of thin wire. So current would flow more easily through thick wire.

- (b) We can get the maximum resistance when we connect resistors in series as the resultant resistance is equal to the sum of the individual resistances and is greater than any individual resistance.

$$R = \frac{1}{3} \Omega$$

$$\begin{aligned} R_e &= R_1 + R_2 + R_3 \\ &= \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} = 1 \Omega \end{aligned}$$

- (c) Total energy consumed by fan in 30 days (June month has 30 days)
 $= 100 \times 8 \times 30 = 24000 \text{ Wh} = 24 \text{ kWh}$

$$\begin{aligned} \text{Total energy consumed by refrigerator} &= 400 \times 8 \times 30 \\ &= 96000 \text{ Wh} = 96 \text{ kWh} \end{aligned}$$

$$\begin{aligned} \text{Total energy consumed by two bulbs} &= 2 \times 40 \times 8 \times 30 \\ &= 19200 \text{ Wh} = 19.2 \text{ kWh} \end{aligned}$$

$$\text{Total energy consumed in the circuit} = 24 + 96 + 19.2 = 139.2 \text{ kWh}$$

$$1 \text{ kWh} = 1 \text{ unit}$$

$$\text{Cost of energy to operate these appliances} = 139.2 \times 5 = ₹ 696$$

37. (a) The brown coloured gas is nitrogen dioxide (NO_2) and the nitrate salt is lead nitrate [$\text{Pb}(\text{NO}_3)_2$].



OR

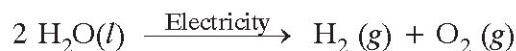
- (b) The heating of nitrate salt is thermal decomposition reaction.

The given figure shows the correct way of heating the boiling tube containing crystals of a salt. The precautions which should be taken while heating are:

- (i) Do not point the mouth of the boiling tube towards your neighbours.
 - (ii) Do not point the mouth of the boiling tube towards yourself.
- (c) (i) Photochemical decomposition reaction where sunlight is required to decompose a reactant.



- (ii) Electrolytic decomposition reaction where electricity is required to decompose a reactant.



38. (a) Rohit's sister is suffering from goitre. The doctor has advised her to eat iodised salt as iodine present in iodised salt is needed to produce thyroxine hormone by thyroid gland. Thyroxine regulates carbohydrate, protein and fat metabolism in our body and provide the best balance for growth. In case of iodine deficiency in our diet, there is a possibility that we may suffer from goitre.

OR

- (b) Adrenaline hormone is known as emergency hormone or stress hormone. Whenever a person is under stress, adrenaline is secreted from adrenal glands directly into the blood and carried to different parts of the body. The target organ on which it acts is heart. As a result, the heart beats faster, resulting in supply of more oxygen to our muscles. The blood to the digestive system and skin is reduced due to contraction of muscles around small arteries in these organs. This diverts the blood to our skeletal muscles. The breathing rate also increases because of the contractions of the diaphragm and rib muscles. All these responses together enable the animal body to be ready to deal with the emergency.
- (c) Insulin hormone helps in regulating the metabolism of sugar. When pancreas does not produce and secrete sufficient amount of insulin into blood, then the sugar level in the blood rises. This disease is called diabetes. Therefore, the patient excretes sugar in urine. The people having severe diabetes are treated by giving injections of insulin.
- (d) Testes in males produces testosterone hormone.
Ovaries in females produces estrogen hormone.

39. (a) The material 'X' placed inside the box – a parallel sided glass block

(b) Given: $n = 1.5$, $\angle i = 48.6^\circ$

$$\sin 48.6^\circ = 0.75$$

From Snell's law of refraction

$$n = \frac{\sin i}{\sin r}$$

$$\Rightarrow \sin r = \frac{\sin i}{n} = \frac{\sin 48.6}{1.5} = \frac{0.75}{1.5} = 0.5 = \frac{1}{2}$$

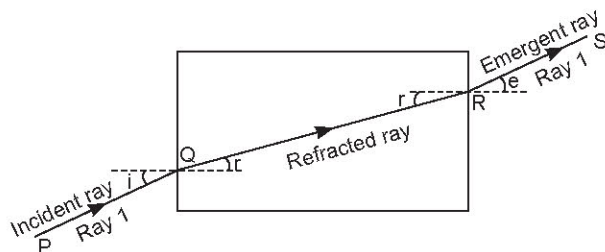
$$\Rightarrow \sin r = \sin 30^\circ \quad (\sin 30^\circ = \frac{1}{2})$$

$$\Rightarrow r = 30^\circ$$

Hence, angle of refraction = 30° .

OR

(c)



(d) Alankrita observed that the lateral shift of the rays would have been less.