

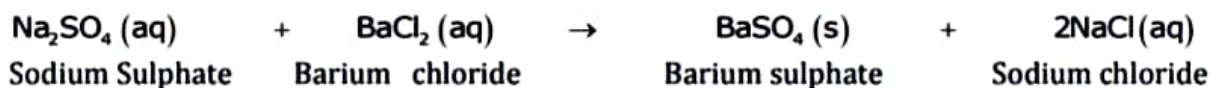
Solution

SECTION-A

Ans 1.

Correct option – C: White, BaSO_4

When an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride, insoluble white coloured barium sulphate along with solution of sodium chloride is formed.



Ans 2.

Correct option – A: (i) and (iii)

Na_2O and K_2O are soluble in water to form alkalis



Ans 3.

Correct option – D: Hydrogen which while burning produces a popping sound.

When a metal reacts with acid then hydrogen gas is evolved. When a burning stick is brought near the mouth of the test tube then the evolving hydrogen gas is burnt with a pop sound.

Ans 4.

Correct option – B: $2\text{Na}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{NaOH}(\text{aq}) + \text{H}_2(\text{g})$

Ans 5.

Correct option – C: (ii) and (iii)

Sour milk consist of lactic acid and ant sting has methanoic acid.

Ans 6.

Correct option – C: Exothermic reaction

During respiration, carbohydrates (glucose) combine with oxygen in the cell and energy is released hence it is considered an exothermic reaction.



Ans 7.

Correct option – C: (i) and (ii) only

HCl is oxidized to Cl_2 and MnO_2 is reduced to MnCl_2 .

Ans 8.

Correct option – D:

Bases turn pink when a drop of phenolphthalein is added to them.

Ans 9.

Correct option – D: Sodium Acetate – CH_3COOH – NaOH – Basic.

Sodium acetate is a basic salt derived from a strong base NaOH and a weak acid CH_3COOH .

Ans 10.

Correct option – D: Mass cannot be created nor destroyed.

The law of conservation of mass states that mass can neither be created nor destroyed in a chemical reaction.

Ans 11.

Correct option – A: (i) and (ii) only

Blood vessel A is pulmonary artery while blood vessel B is pulmonary vein. The pulmonary arteries carry low-oxygen blood from the right ventricle of the heart to the lungs. The pulmonary veins carry oxygenated blood from the lungs to the left atrium of the heart.

Ans 12.

Correct option – C: Lactic acid + Alcohol

Alcohol is produced during fermentation in yeast while lactic acid is produced during anaerobic respiration in human muscle cells.

Ans 13.

Correct option – C: (ii) and (iv)

In unicellular organisms, simple diffusion is sufficient to carry out the process of gaseous exchange. They do not need specific organs for taking in food, exchange of gases or removal of wastes because the entire surface of the organism is in contact with the environment.

Ans 14.

Correct option – B: Urea

Plants produce release oxygen and carbon dioxide, excess water, gums, oils, latex and resins as waste products. Urea is not produced in plants.

Ans 15.

Correct option – D: (i), (ii) and (iv)

A is diaphragm which flattens as we inhale air, helps to decrease the residual volume of air in lungs and helps the chest cavity to become larger.

Ans 16.

Correct option – C: Large amount of water flows out from the guard cells.

A large amount of water flows out from the guard cells thereby closing the stomata.

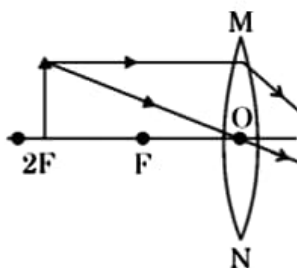
Ans 17.

Correct option – A: A solar cooker

A concave mirror is used in a solar cooker.

Ans 18.

Correct option – C:



In order to obtain the magnified image on the screen the object must be placed between F and $2F$ of convex lens. In fourth option, the image obtained will be magnified but it cannot be obtained on the screen as it will be formed at infinity. So correct option is option c).

Ans 19.

Correct option – B: concave lens

In given diagram, we can see that the light rays after refraction are getting diverged. Thus, the optical device used in the arrangement is concave lens.

Ans 20.

Correct option – B: A-B

In case of medium A and medium B, the difference between their refractive indices is less than any other paper. Thus, the bending of the light will be least for these two media. So correct option is b).

Ans 21.

Correct option – C: Scattering of light takes place as various colours of white light travel with different speed in air.

All other statements except option c) are correct. So correct option will be untrue statement which is option c).

Ans 22.

Correct option – B: sign – positive, value more than 1

In the diagram given, the optical device used is concave mirror and object is placed between focus and pole. When object is placed between focus and pole of concave mirror the image formed is virtual, erect and magnified. As the image will be virtual and erect

according to the sign convention the image formed will have magnification with positive sign and as it is magnified the value of magnification will be more than 1.

Ans 23.

Correct option – C: $\angle 3 = \angle 2$

By observing the image it is clear that, only relation possible from the given option is option c).

Ans 24.

Correct option – C: Colour used to paint the danger signals.

It is given that X and Y are the end colours of spectrum. The end colours of the spectrum are violet and red. The prism is placed inverted but X ray has bent more towards the base and Y is least bent. Thus, Y represent red and X represents violet colour. Red colour is used to paint danger signals. Thus, correct option is c).

SECTION - B

Ans 25.

Correct option – D: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

Reactions in which a substance is dissociated into two or more than two substances by applying heat is thermal decomposition reaction. CaCO_3 requires heat to convert into CaO and CO_2 .

Ans 26.

Correct option – C: $2 > 1 > 4 > 3$

$\text{pH} = -\log[\text{H}^+]$

When pH decreases then H^+ ion concentration increases.

Ans 27.

Correct option – D: $\text{P} = \text{K}_2\text{CO}_3$, $\text{Q} = \text{CO}_2$ gas, Turns milky

When acid reacts with metal carbonate it releases CO_2 which turns solution milky.

Ans 28.

Correct option – D:

After donating 2 electrons, Ca is having 8 electrons in outermost shell and after donating 1 electron to 1 Cl atoms, Cl atom also have 8 electrons in outermost shell and becomes stable.

Ans 29.

Correct option – C: (iii) and (iv)

Metals who are above have higher reactivity than metals who are below in reactivity series. Metals with higher reactivity displaces the metals with low reactivity.

Ans 30.

Correct option – D: (i) and (iv)

Bleaching powder- $\text{Ca}(\text{OCl})_2$

Baking Soda- NaHCO_3

Washing Soda- $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Plaster of Paris- $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$

Ans 31.

Correct option – A: Both (A) and (R) are true and (R) is the correct explanation of (A)

Sodium bicarbonate is non corrosive basic salt so it is used as antacid to treat acidity.

Ans 32.

Correct option – D: (A) is false, but (R) is true.

When methane (natural gas) reacts with oxygen, the result is carbon di-oxide and water, along with heat, hence making it an exothermic reaction.

Ans 33.

Correct option – B: Both (A) and (R) are true but (R) is not the correct explanation of (A).

Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites. The soil is the nearest and richest source of nitrogen, phosphorus and other minerals for the plants.

Ans 34.

Correct option – C: (A) is true, but (R) is false

Sun appears reddish at sunrise and sunset is correct. But during sunrise and sunset the sun is at horizon and it has to travel more distance during this time. Thus, (R) statement is false statement.

Ans 35.

Correct option – A: Both (A) and (R) are true and (R) is the correct explanation of (A).

Hydrochloric acid creates an acidic medium to activate protein digesting enzymes. Thus, it helps in the digestion of food in the stomach.

Ans 36.

Correct option – C: Both potted plants are kept in sunlight after the starch test.

Plants get destarched when kept in dark because in dark they are not able to produce food by the process of photosynthesis as there is no sunlight available to run this process.

Ans 37.

Correct option – B: Both have thin and moist surface for gaseous exchange.

Both the respiratory structures, gills and alveoli have thin and moist surface for gaseous exchange. They are richly with blood vessels to conserve energy.

Ans 38.

Correct option – C: Percentage of carbon dioxide is more in the exhaled air.

When we exhale air into a test-tube containing lime water, the water turns milky. This shows that exhaled air contains more carbon dioxide than inhaled air.

Ans 39.

Correct option – C: +5D

It is said that the sun rays are converged at 20 cm from optical centre. This means lens is convex lens and have focal length 20 cm.

$$f = 20 \text{ cm} = 0.2 \text{ m}$$

Power of lens, $P = 1/f$ (in metre) $= 1/0.2 = +5D$

Ans 40.

Correct option – D: Between 0 cm and 15 cm

The mirror is concave mirror (converging mirror). The radius of curvature is 30 cm which means the focal length will be 15 cm. For concave mirror, to obtain the virtual image the object must be placed between pole and focus. Thus, the object must be placed between 0 cm and 15 cm.

Ans 41.

Correct option – B: Type of food consumed.

Herbivores mainly eat plants. Plants contain cellulose, which is difficult to digest. Hence, they have the longest small intestine.

Ans 42.

Correct option – B: Sieve tubes and companion cells

The food (sugar) made in leaves is loaded into the sieve tubes of phloem tissue by using the energy derived from ATP. The companion cells make use of the transmembrane proteins for the uptake of sugar and amino acids by active transport.

Ans 43.

Correct option – D: -40 cm

Given that,

Size of image, $h' = 3 \times$ size of object, h

$$\text{i.e., } \frac{h'}{h} = \frac{3}{1}$$

Focal length, $f = 30 \text{ cm}$

For the given setup converging lens or convex lens is used and magnification of the convex lens is expressed as

$$M = \frac{-v}{u} = \frac{h'}{h} = \frac{3}{1}$$

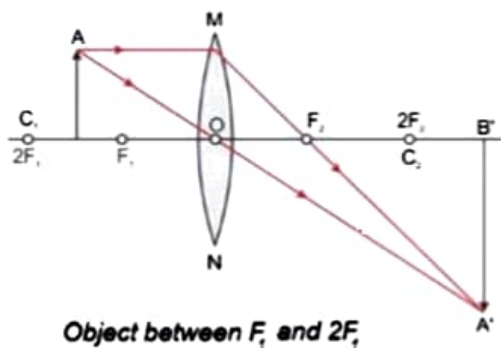
$$\therefore v = -3u$$

Here, the object distance is considered as negative since it will be placed towards the negative x-axis, whereas both focus and image will be measured toward the right side of the lens (i.e., +x-axis) as we can see below.

Now the relation between image distance (v), object distance (u) and focal length (f) can be expressed as

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{30} = \frac{u-v}{v \times u} = \frac{u-(-3u)}{-3u^2}$$

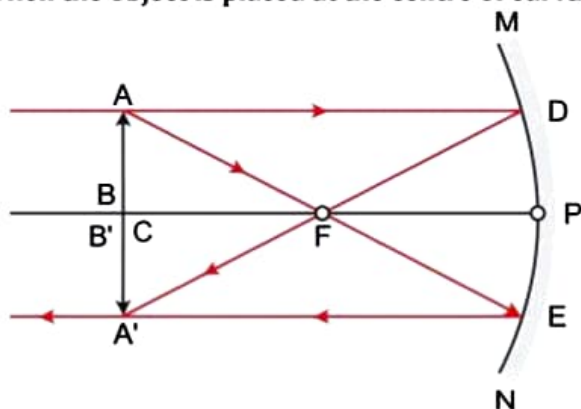
$$\therefore f = -\frac{3u}{4} \Rightarrow u = -\frac{30 \times 4}{3} = -40 \text{ cm}$$



Ans 44.

Correct option – C: Image is formed at a distance equal to double the focal length.

The ray diagram for the given case can be illustrated as shown below and from this, we conclude that if the size of the image and object are equal and the object and image distance will also be the same when the object is placed at the centre of curvature (i.e., $C = 2f$).



Ans 45.

Correct option – D: $n_3 > n_1$

From the given diagram we can see that when the light ray enters from 1st to 2nd medium it bends towards normal which means the refractive index of the second medium is greater than the first medium (i.e., $n_1 < n_2$), similarly we can conclude that $n_2 < n_3$.

Hence for the given case, the correct option is d, since $n_3 > n_1$.

Ans 46.

Correct option - D: 2×10^8 m/s and 2.25×10^8 m/s

Given that,

Refractive index of medium A, $n_A = 1.5$

Refractive index of medium B, $n_B = 1.33$

Speed of light in air, $c = 3 \times 10^8$ m/s

Now the refractive index of medium A with respect to air can be given as

$$\frac{n_A}{n_{\text{air}}} = \frac{1.5}{1} = \frac{c}{v_A} \Rightarrow v_A = \frac{3}{1.5} \times 10^8 = 2 \times 10^8 \text{ m/s}$$

Similarly,

$$v_B = \frac{3}{1.33} \times 10^8 = 2.25 \times 10^8 \text{ m/s}$$

Ans 47.

Correct option - C: +1 cm

Object height, $h = 4$ cm

Object distance, $u = -30$ cm

Focal length, $f = 10$ cm

Now as we know the relation between focal length, image distance and object distance can be predicted using the mirror formula as shown below.

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \Rightarrow \frac{1}{10} = \frac{1}{v} + \frac{1}{-30}$$

$$\therefore \frac{1}{v} = \frac{1}{30} + \frac{1}{10} = \frac{4}{30} \Rightarrow v = -7.5 \text{ cm}$$

$$M = \frac{h'}{h} = \frac{-v}{u} \Rightarrow h' = -\frac{-4 \times 7.5}{-30} = +1 \text{ cm}$$

Ans 48.

Correct option - C: (iii) and (iv)

The pH of the solution decreases rapidly on addition of acid. And the pH of tap water was around 7.0.

SECTION – C

Ans 49.

Correct option – B: R

R reacts violently with water so it is stored in kerosene.

Ans 50.

Correct option – D: Magnesium

Magnesium starts floating due to the bubbles of hydrogen gas sticking to its surface. As the Bubbles move up it pulls Mg with it.

Ans 51.

Correct option – A: P

Al, Zn and Fe does not react with cold or hot water but reacts with steam. Al forms Al_2O_3 . Al is amphoteric in nature ($P=Al$).

Ans 52.

Correct option – C: $S < P < Q$

$P=Al$, $Q=Mg$, $R=Na$ or K , $S=Cu/Ag/Au/Pt$

According to metal reactivity series $R > Q > P > S$

Ans 53.

Correct option – C: In passing the waste products in the dialyzing solution.

The haemodialyzer has semi-permeable lining of tubes which help in passing the waste products in the dialyzing solution.

Ans 54.

Correct option – A: To reabsorb essential nutrients from the blood.

Unlike natural kidneys, artificial kidneys are unable to absorb essential nutrients which might have passed into the blood during the filtration process.

Ans 55.

Correct option – A: Urea and excess salts

The 'used dialysing' solution is rich in urea and excess salts such as sodium, potassium, calcium, chloride, magnesium and bicarbonates.

Ans 56.

Correct option – C: Tubules

The proximal and distal tubules, the loop of Henle, and the collecting ducts are sites for the reabsorption of water and ions.

Ans 57.

Correct option – A: Both convex

As we know for concave lens image formed is always virtual, erect and diminish hence in our case according to the given condition both lens L_1 and L_2 are convex lenses since both produce enlarged and inverted images.

Ans 58.

Correct option – D: Value = More than 1 and Sign = Negative.

For the given case the image is inverted and magnified for L_1 .

Hence the value of the magnification is more than 1 since the height of the image is greater than the object and it will be negative to show the image is inverted.

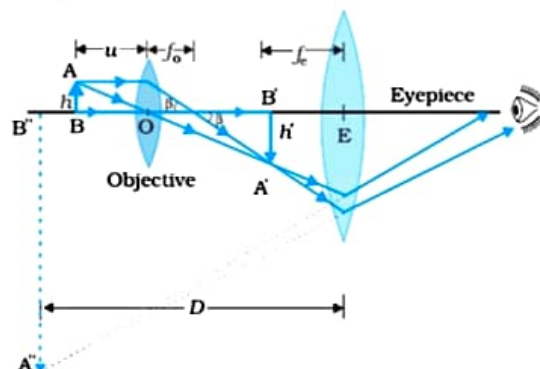
i.e., $M = -\frac{h'}{h}$... (here, $h < h' \Rightarrow M > 1$)

Ans 59.

Correct option – D: Value = More than 1 and Sign = Negative.

For the given case the image is inverted and magnified for L_2 .

Hence the value of the magnification is more than 1 since the height of the image is greater than the object and it will be positive to show the image is erect and virtual.



Note: In the given case image formed by lens L_1 is considered as an object hence image formed by L_2 will be erect and virtual as we can see above.

i.e., $M = -\frac{h'}{h}$... (here, $h \ll h' \Rightarrow M \gg 1$)

Ans 60.

Correct option – B: 16 cm

Given,

Power of eyepiece of lens 2, $P_2 = 5 \text{ D}$

i.e., $f = \frac{1}{5} = 0.2 \text{ m} = 20 \text{ cm}$

Image distance, $v = -80 \text{ cm}$

Note: Here image distance is considered as negative since the image formed by L_2 is virtual and it will be formed along the negative x-axis or behind the lens.

Now by using the lens formula we know that

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

$$\therefore \frac{1}{u} = -\frac{1}{80} - \frac{1}{20}$$

$$u = -16 \text{ cm}$$