CBSE Class 10 Science

Sample Paper 02 (2020-21)

Solution

Section A

1. Magnesium (s) + Hydrochloric acid (aq) → Magnesium chloride (aq) + Hydrogen (g)
   $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$.

   This is a displacement reaction.

   OR

   Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + Barium bromide (aq)

   $$2KBr\,(aq) \; + \; BaI_2\,(aq) \; \rightarrow \; 2KI\,(aq) \; + \; BaBr_2\,(aq)$$

   It is double displacement reaction.
2. The decomposition of ferrous sulphate is an endothermic reaction because heat is required to decompose the compound into its components.
3. (a) All of these

   Explanation: The hardness of water is caused by magnesium and calcium salts. Calcium and magnesium dissolved in water are the two most common minerals that make water hard. Temporary hardness is a type of water hardness caused by the presence of dissolved bicarbonate minerals (calcium bicarbonate and magnesium bicarbonate).
4. Only a concave mirror can give a erect and enlarged image of an object.
5. As red light is scattered the least and it covers longer distances. That's why it is used in danger signal.
6. Washing soda, $Na_2CO_3.10H_2O$

   Blue vitriol crystals $CuSO_4.5H_2O$

   OR

   Hyperacidity is caused by excess of hydrochloric acid in stomach. Antacid is basic in nature. It neutralizes excess of acid and gives relief from pain caused by hyperacidity.
7. Resistance of a conductor is inversely proportional to its area cross-section. As resistivity increases area decreases and as area increases, resistivity decrease.

8. Alternating current can be transmitted without much loss of electric energy to the distant places. So AC is considered to be advantageous over DC.
9. It is potential difference or e.m.f. The other name of this is volt.

OR

If one bulb blows off in a series circuit then all other bulbs stop glowing because current stop flowing .

10. Alveolar ducts are attached to the end of each respiratory bronchiole.
11. Urea is formed by the deamination of uric acid in liver.

OR

Sugar and other metabolites are synthesized in leaves.

12. According to law if 5 J of energy is available to man then 10% energy is available to primary consumer so primary consumer is filled with 50J. Producers consume only 1% of energy which is available from sun therefore 5000J of energy is available to the producers.

OR

Organisms that break down the complex organic compounds present in dead animals and plants are called decomposers.

13. Three methods adopted by plants to minimize the rate of transpiration are:
    i. In some cases leaves are rolled to cover stomata (e.g. some grasses)
    ii. The stomata may be sunken (e.g. Nerium)
    iii. In some cases, leaves may be dropped or absent as in most cacti.
14. (a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
15. (a) Both A and R are true and R is correct explanation of the assertion.

OR

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

16. (c) A is false but R is true.
17. i. (d) Ingestion → Digestion → Absorption → Assimilation
    ii. (c) A, C, and E

iii. (c) C and D

iv. (b) They increase the surface area for absorption of food

v. (c) Fats

18. i. (c) 7 to 7.4

ii. (c) Both (a) and (b)

iii. (d) 10

iv. (b) 5.5

v. (a) Lower

19. i. (a) $V = \frac{W}{Q}$

ii. (d) double

iii. (d) 1 V

iv. (c) voltage

v. (a) Alessandra volta

20. i. (d) - Au and Ag

ii. (b) - roasting

iii. (a) - Cinnabar

iv. (b) - Mg and Al are highly reactive elements

v. (d) - Zinc amalgam

Section B

21. Microscopic finger like projections present in the inner lining of the wall of the small intestine are called villi. They increase the surface area for the absorption of digested food in the small intestine.

OR

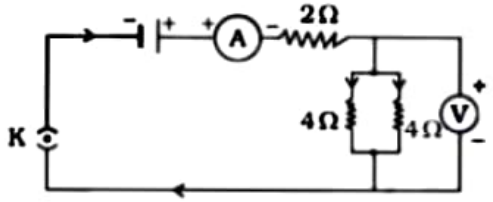
1. During vigorous exercise a lot of oxygen is used by our body to release energy from glucose .
2. This leads to lack of oxygen in our cells.
3. We take in oxygen when we breathe.
4. Hence to increase the amount of oxygen intake there is an increase in breathing rate during exercising.

22. In the heart of these organisms left side have oxygenated blood and right side deoxygenated blood – The separation of blood allows a highly efficient supply of oxygen to the body. It is essential for such animals which have high energy needs. They also

constantly use energy for maintain body heat.

23. The atom of an element reacts with another atom to form a molecule because by doing so it gets its octet (or duplet) completed. Also, it results in the decrease of energy.
24. a. Neutral: Solution D (pH 7)
    b. Strongly alkaline: Solution C (pH 11)
    c. Strongly acidic: Solution B (pH 1)
    d. Weakly acidic: Solution A (pH 7)
    e. Weakly alkaline: Solution E (pH 4)
25. Let us assume that the window pane is between F2 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).

26. 

    Total resistance for parallel combination of 4Ω resistor can be calculated as follow:

    $\frac{1}{R} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$

    or, $R = 2\Omega$

    Thus, resistance of parallel combination is equal to resistance of resistors in series. So, potential difference across 2Ω resistance will be same as potential difference across the other two resistors which are connected in parallel.
27. On this basis we cannot say that light eye colour is dominant or recessive until a cross is made between parent having light eye colour and another with dark eye colour is made. Only then it will be possible to predict the dominant or recessive nature of gene.

OR

Forelimbs of horse, forelimbs of bat and forelimbs of turtle are homologous organs.

28. Pollution caused by garbage can be controlled by-
    a. Recycling of certain wastes products like plastic and paper.

b. Maximizing the use of biodegradable products like that of paper, cloth bags etc.
c. Producing biogas from the organic wastes.
d. Separation of biodegradable and non-bio-degradable waste during disposal.
e. Making the compost of biodegradable wastes by decomposing them under the layers of soil.

29.

Right ventricle	Left ventricle
1) Right ventricle is the lower chamber of the right side of the heart.	1) Left ventricle is the lower chamber of the left side of the heart.
2) Right ventricle gives rise to the pulmonary artery which carries deoxygenerated blood to the lungs.	2) Left ventricle gives rise to the aorta which supplies oxygenated blood to different organs of the body.
3) Right ventricle is a part of pulmonary circulation.	3) Left ventricle is a part of systemic circulation.
4) The right ventricle is connected with tricuspid valve.	4) Left ventricle connected with the bicuspid valve.

30. Hydrogen gas and Iron chloride are produced.

$2HCl\ (aq) + Fe(s) \rightarrow FeCl_2\ (aq) + H_2(g)$

This is a redox reaction

$Fe(0) - 2e^- \rightarrow Fe(II)$ oxidation loss of electrons

$2H^+ + 2e^- \rightarrow H_2$ reduction: gain of electrons

So it is certainly a chemical reaction: bonds are broken and made.

HCl is not a sufficiently strong oxidizing agent to produce $FeCl_3$ (need Cl2).

31. The given elements belongs to 2^{nd} period. Atomic radii decreases along a period from left to right due to increase in nuclear charge. Thus, the atomic radii of Li, Be, F and N increases in the order: F < N < Be < Li

32. Since, atomic number of the given element is 16. Hence, the element is sulphur(S). It is kept in group VI A or group 16 in modern periodic table.

Electronic configuration = $\overset{K}{2},\ \overset{L}{8},\ \overset{M}{6}$

Number of valence electrons in sulphur are 6, present in M-shell. Its valency is 2 as it requires 2 electrons to complete its octet or achieve the nearest noble gas configuration.

33. By geometry, angle of incidence (i) of all three rays is 45° . Light suffers total internal

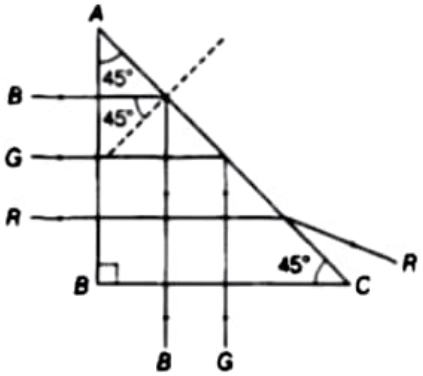
reflection for which this angle of incidence is greater than the critical angle.

$i > i_c \Rightarrow \sin_i > \sin i_c$

or $\sin 45^0 > \sin i_c$ or $\frac{1}{\sin 45^\circ} < \frac{1}{\sin i_C}$

$\sqrt{2} < \mu$

Total internal reflection takes place on AC for rays with $\mu > \sqrt{2} = 1.414$., i.e green and blue colour suffers total internal reflection whereas red undergoes refraction.

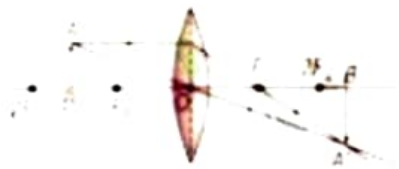


34. i. He should use a convex lens as real images are formed by a convex lens, when objects are placed between the focus and infinity .

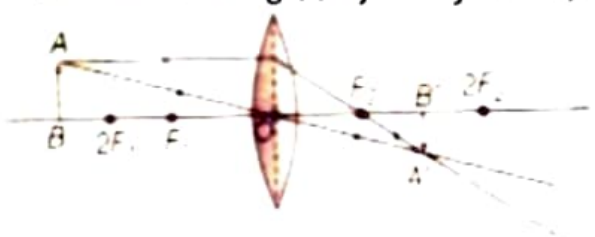
ii. a. For magnified image candle should be placed between focus (F) and centre of curvature (2F) of lens.

b. To get diminished image candle should be placed beyond centre of curvature (2F) of lens.

iii. a. For magnified image, (object between F and 2F).

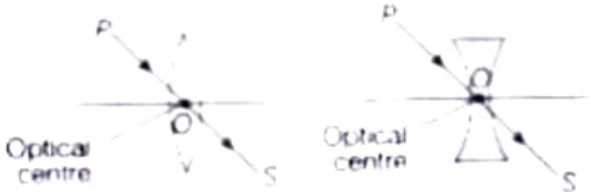


b. For diminished image, (object beyond 2F).



OR

i. The centre point of a lens is known as its optical centre. The optical centre is a point within the lens, directed to which incident rays refract without any deviation in the path whether it is convex lens or concave lens as represented below:



ii. Given, there is a divergent lens(concave lens.)

Given, f =-20cm, h_0 =4 cm , v = -10 cm

$\because$ By lens formula,

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

$$\Rightarrow \frac{-1}{10} - \frac{1}{u} = \frac{-1}{20}$$

$$\Rightarrow \frac{1}{u} = \frac{-1}{10} + \frac{1}{20} \Rightarrow \frac{1}{u} = \frac{-2+1}{20}$$

$\Rightarrow$ u = - 20 cm

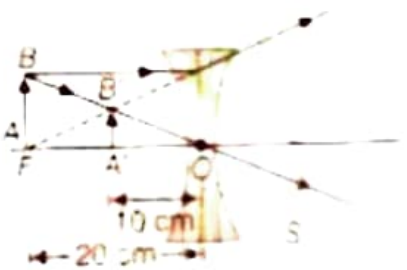
$\therefore$ Magnification, $m = \frac{v}{u} = \frac{h_i}{h_0}$

$$\Rightarrow \frac{h_i}{4} = \frac{-10}{-20}$$

$\Rightarrow$ h_i = 2 cm

Size of the image, h_i = 2 cm

iii.



Thus, the object is placed at 20 cm from the concave lens.

35. a. **Reproduction**- It is a biological process by which new individual organisms (offspring)are produced from their parents.

Types of reproduction:-

i. Asexual reproduction

ii. Sexual reproduction

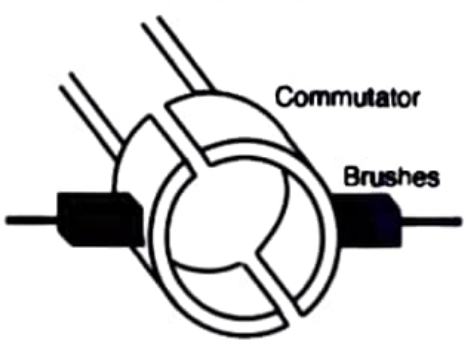
b.

Unicellular Organisms	Multicellular Organisms
Only one parent is required for reproduction.	Two parents are required for reproduction.
It is a fast process of reproduction.	Slower than unicellular organisms.
No specialized cells are required for reproduction.	Specialized cells are required for reproduction.

36. a. **Fleming's left-hand rule:** Adjust your forefinger, middle finger and thumb of left hand in such a way that they are mutually perpendicular to one another. If the forefinger point in the direction of magnetic field, middle finger point in the direction of current then the thumb show the direction of force or motion on the current carrying conductor.

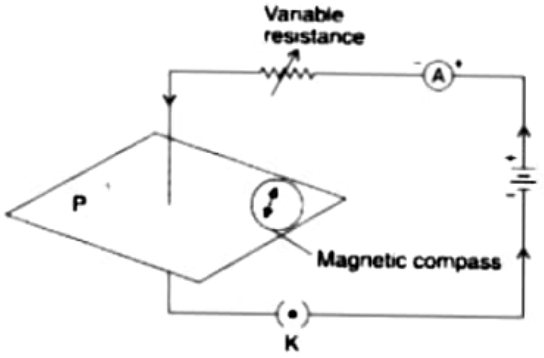
i. **Function of brushes:** Maintain contact between the coil and the external circuit.

ii. **Function of split rings:** Reverse the direction of current after each half rotation of the coil so that the coil can keep rotating continuously.



OR

a. The magnetic field lines produced around a current-carrying straight conductor passing through cardboard is shown below.



A right-hand thumb rule is applied to find the direction of these field lines. Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of the current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field.

b. When we move away from the straight wire, the deflection of the needle decreases which implies the strength of the magnetic field decreases. The reason is that the concentric circles representing the magnetic field around a current-carrying straight wire become larger and longer as the distance increases.