CBSE Class 10 Science

Sample Paper 01 (2020-21)

Solution

Section A

1. Unbalanced equation: $K + H_2O \rightarrow KOH + H_2$

   Balanced equation: $2K + 2\ H_2O \rightarrow 2\ KOH + H_2$

   OR

   Methane burns in oxygen to form carbon dioxide and water.

   Methane + oxygen $\rightarrow$ carbon dioxide + water.

   $CH_4\ (g) + 2O_2\ (g) \rightarrow CO_2(g) + 2H_2O\ (l)$

2. NH_3 is the reducing agent as it gets oxidized to NO by the removal of hydrogen and the addition of oxygen. O_2 has been reduced to H_2O by the addition of H.

3. (a) H - C $\equiv$ C - H

   Explanation: The formula of ethyne is C_2H_2

4. The ratio of the speed of light in the free space (c) to the speed of light in given medium (v^-) is called its refraction index.

   $n = c/v^-$

   It has no unit. Glass has more refractive index than water.

5. The phenomenon responsible for increasing the apparent length of the day by 4 min is **atmospheric refraction.**

6. It is used for bleaching cotton and linen in textile industry.

   OR

   Acids are compound which on dissolving in water gives hydronium ion $[H_3O^+]$ as the only positively charged ions.

7. 1kWh = 1,000 Ω × 1h = 1,000 J/S × 3600S

   1kWh = 3,600,000 J = 3.6×10^6 J

8. The poles of a magnet are marked in the figure as we know that out side magnet field

lines moves N→S and inside the Magnet field lines moves S→N .

9. Given, I = 1A and t = 16s

   We know that,

   $I = \frac{q}{t} = \frac{ne}{t}$ [∵ q = ne]

   $\Rightarrow \quad n = \frac{I \times t}{e} = \frac{1 \times 16}{1.6 \times 10^{-19}}$ [∵ e = 1.6×10^{-19}C]

   = 10^{20} electrons will flow through the conducting wire,when 1A current is passed through it for 16 seconds .

OR

Electrons are flowing from higher potential end to lower potential end through the conductor.

10. The process by which green plants prepare food is called photosynthesis. During this process; the solar energy is converted into chemical energy and carbohydrates are formed. Green leaves are the main sites of photosynthesis. The green portion of the plant contains a pigment chloroplast; which contains chlorophyll.
11. We can observe following components in a slide of stomata under high power microscope :
    1. guard cells
    2. stomatal pores
    3. chloroplasts
    4. epidermal cells

OR

The valves in the walls of veins prevent the backflow of blood.

12. An ecosystem has two types of components, biotic component and abiotic component.

OR

Trophic levels

13. In the chemosynthetic mode an organism utilises chemical energy whereas in

photosynthetic mode autotrophs requires solar energy to prepare food.

14. (b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion. Explanation: Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
15. (a) Both A and R are true and R is correct explanation of the assertion.

OR

(c) A is true but R is false.

16. (a) Both A and R are true and R is correct explanation of the assertion.
17. i. (d) Right auricle → Right ventricle → Lungs → Left auricle → Left ventricle

ii.

	carries blood to body	carries blood to lungs	carries blood from lungs	carries blood from body
(d)	3	1	4	2

iii. (a) Aorta

iv. (b) Haemoglobin

v. (a) Left auricle and left ventricle

18. i. (b) Carbonic acid

ii. (c) Baking soda

iii. (c) $NaHCO_3$

iv. (b) $Ca(OH)_2$

v. (a) Washing soda

19. i. (a) $V_1 + V_2 + V_3$

ii. (a) Same in every point of circuit

iii. (a) W = VIT

iv. (a) 1 ohm

v. (d) $\frac{15}{2}\Omega$

20. i. (b) Impure copper

ii. (a) Insoluble impurities

iii. (b) B and C

iv. (a) Cathode

v. (d) Ag

Section B

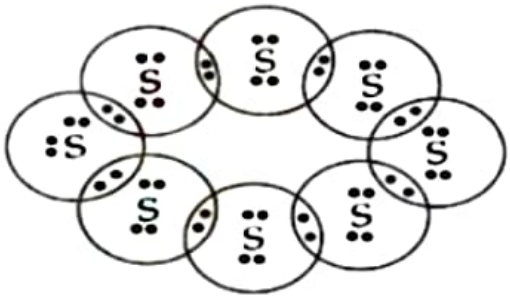
21. When body has sudden shortage of water, then nephron starts re absorbing more water from the filtrate .This is done to retain more water in the body.

OR

Arteries	Veins
It carries blood away from the heart.	It carries blood towards the heart.
They are thick walled.	They are thin walled
They have narrow lumen	They have wide lumen
Pressure of the blood is high	Pressure of the blood is low
It carries oxygenated blood.	It carries deoxygenated blood
It does not have valves	It has valves to prevent backflow of blood.

22. The vital functions of the kidney are as follows:
    1. Removal of toxic waste such as urea.
    2. Control of water balance and level of mineral ions in the body which is known as osmoregulation.
23. Electron dot structure of a molecule of sulphur (S_8)

    Atomic number of Sulphur is 16 and the electronic configuration is 2, 8, 6. The number of valence electrons is 6 and a sulphur atom requires 2 more electrons to complete an octet. A sulphur atom achieves the octet by sharing one electron each with two other sulphur atoms. Thus, 8 sulphur atoms form a cyclic octa-atomic molecule with formula S_8.

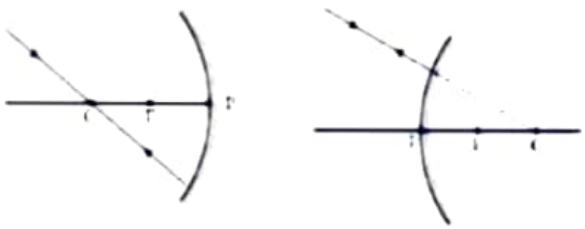


24. Soda-acid fire extinguisher contains sodium bicarbonate and sulphuric acid, which are present in separate containers inside the extinguisher. When the knob of the fire extinguisher is pressed, the sulphuric acid mixes with sodium bicarbonate solution and a lot of CO_2 gas is produced.

Carbon dioxide gas forms a blanket over the fire and cuts off the supply of air to the burning substance and the fire stops.

$$\underset{\text{Sodium hydrogen carbonate}}{2NaHCO_3} + \underset{\text{Sulphuric acid}}{H_2SO_4} \rightarrow \underset{\text{Sodium sulphate}}{Na_2SO_4} + \underset{\text{Water}}{2H_2O} + \underset{\text{Carbon dioxide}}{CO_{2(g)}}$$

25. When the ray of light passes through the centre of curvature of the spherical mirror it strikes along the normal that means it is incident on the mirror at 900. Hence the incident ray coincides with the normal and retraces its path. Therefore the angle of incidence = 0
According to the law of reflection
The angle of reflection = 0
Hence the angle of reflection to become zero degrees
Thus ray of light retraces its path.
The figure below illustrates the above situation as follows:



26. An electrical fuse is a simple device used to interrupt an electrical circuit during overcurrent condition due to short circuit and/or overload. An electrical fuse operates on the principle of heating effect of electric current.
The fuse should be placed on the live wire because the live wire has a higher voltage. If the live wire is damaged inside the appliance and a large current is created, then the fuse needs to be in this part of the circuit so that it can not blow. If the fuse was on the neutral wire and a fault occurred on the line, then the fuse would not be in the circuit to blow off.

27.

Parents	RRYY	x	rryy
	Round, yellow		wrinkled, green
F_1 —	Rr Yy	x	Rr Yy
	Round, yellow		**Round, yellow**

The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant

progeny in the F_1 generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F1 progeny will give F_2 generation.

OR

Lamarck believed that the character we accquire during our life time passes on to the next generation. But, his theory was not acceptable . Only and only the characters which cause genetic changes are passed to next generation. Differences between acquired and inherited characters are as follows:

Acquired Characters	Inherited Characters
These characters develop in the organism during their lifetime.	These characters are received by organisms from their parents through DNA.
These do not bring about any change in the genes of organisms. That is the change is physical. It does not cause genetic variation.	These bring about change in genes of organisms. Such as mutation.
These are lost with the death of the individual, e.g. good physique of an athlete, intelligence.	These are transferred to the next generation, e.g. fused and free earlobes.

28. **Factors affecting decomposition:**
    1. Upper layer of soil is the main site of decomposition processes in the ecosystem.
    2. The rate of decomposition of detritus is affected by climatic factors and chemical quality of detritus.
    3. Temperature and soil moisture affect the activities of root microbes.
    4. The chemical quality of detritus is determined by relative proportion of water soluble substances, polyphenols, lignin and nitrogen.
29. Difference between aerobic and anaerobic respiration:

Aerobic respiration	Anaerobic respiration
(i) Takes place in presence of oxygen.	(i) Takes place in absence of oxygen.
(ii) Complete oxidation of glucose occurs.	(ii) Incomplete oxidation of glucose occurs.
(iii) More energy is produced.	(iii) Less energy is produced.

Anaerobic respiration takes place in yeast, some bacteria and some internal parasites like tapeworm. Anaerobic respiration also takes place in our muscles during vigrous exercise to meet the energy demands of the body.

30. When silver is kept in open for a few days, it reacts with atmosphere oxygen to form oxide. In due course of time, this react with oxygen and hydrogen sulphide (in the atmosphere) to form silver sulphide; which appears as black layer. This phenomenon is called tarnishing of silver.

$4Ag + O_2 + 2H_2S \rightarrow 2Ag_2S + 2H_2O$

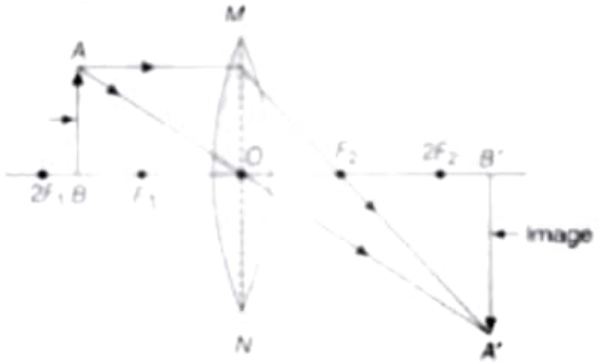
31. **The uses of Modern Periodic Table:**
    1. Periodic table systematizes the study of elements. In the periodic table, the elements with similar properties are placed together in the same group. If we know the properties of one element of the group, the properties of other elements belonging to the same group can be predicted. Thus, there is no need to study the properties of all the elements.
    2. Properties of an element can be predicted from the position of the element in the periodic table. For example, if the element belongs to group IA or IIA it is likely to be a reactive metal, and if it belongs to group VII A it is likely to be a reactive non-metal.
    3. Periodic table has led to the discovery of many elements.

32. i. D as it has 4 valence electrons. Thus, to gain stablility it will form covalent bonds.
    ii. C as it lies in group 2. All elements in group 2 has 2 valence electrons.
    iii. C has bigger atomic radius than D because atomic radius decreases on moving from left to right across a period.

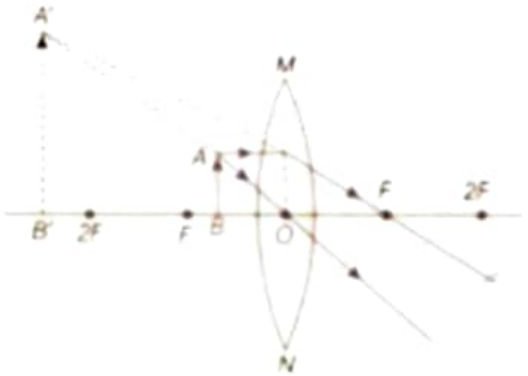
33. The phenomenon of splitting up of white light into its constituent colurs as it passes through prism is known as dispersion. Light rays bend towards the normal when it enters the prism. Since white light consists of 7 colours it splits into 7 bands of colour.

34. i. a. Object is placed between F and 2F of thin converging lens.
        b. Object is placed between optical centre and F.
    ii. The ray diagrams for real magnified and virtual magnified images are as follows:

Part (a)



Part (b)



iii. a. There will be no change in focal length of converging lens.

b. Intensity will become one-fourth and brightness of lens will be less .

OR

Height of the object h = + 2.0 cm; Focal length f = + 10 cm; object-distance u = -15 cm; Image-distance v = ? Height of the image h' = ?

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

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

$\frac{1}{v} = \frac{1}{(-15)} + \frac{1}{10} = -\frac{1}{15} + \frac{1}{10}$

$\frac{1}{v} = \frac{-2+3}{30} = \frac{1}{30}$

or, v = + 30 cm

The positive sign of v shows that the image is formed at a distance of 30cm on the other side of the optical centre. The image is real and inverted.

Magnification m = $\frac{h'}{h} = \frac{v}{u}$ or, h' = $h\frac{v}{u}$

Height of the image, h' = $(2.0)(\frac{+30}{-15})$ = -4.0 cm

or m = $\frac{+30cm}{-15cm}$ = -2

The negative signs of m and h' show that the image is inverted and real. It is formed

below the principal axis. Thus, a real, inverted image, 4 cm tall, is formed at a distance of 30 cm on the other side of the lens. The image is two times enlarged.

35. Each species face many forces that reduce the number of individuals constantly. Some of them are namely struggling for survival, competition.
For natural rescores, prediction, the natural cycle of aging and death, any natural calamity, etc. All these natural forces reduce the number of individuals per species.
Reproduction is the process of production of own kind. It includes the production of offspring having both similarities and variations among themselves and from presents. Further, the process of DNA replication and its inheritance to offspring ensure production of own kind only.
Therefore, reproduction not only restores the number of individuals removed from the species by (competition) natural forces but also maintain heredity of genetic character and introduction of variations, as needed for continuity and stability of species. Without it all of the exciting species will diminish soon life will come to an end.

36. Take a straight conducting wire AB which passes through a horizontal cardboard. The ends of the wire are connected to a battery as shown in fig. When the key is closed, the current flows through the wire from B to A as shown in fig. (a), it produces magnetic field around it.

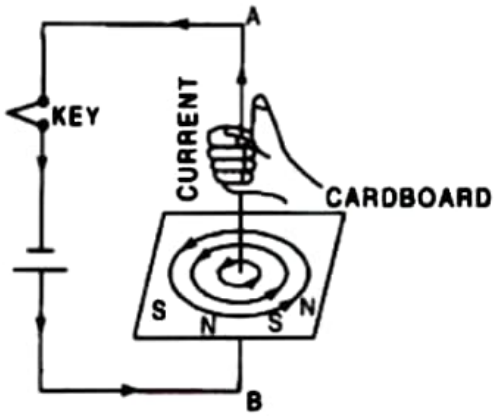
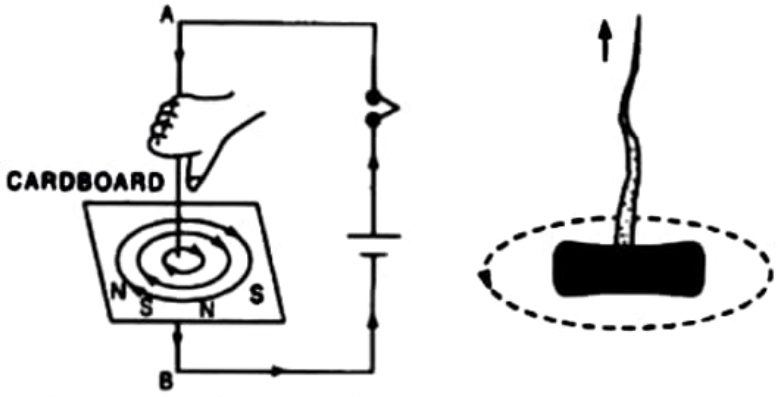


fig. (a)

The magnetic lines of force can be drawn with the help of a compass needle. The magnetic lines of force can also be visualized by sprinkling iron filings on the cardboard. On tapping the cardboard sheet, the iron filings arrange themselves in circles around the wire. The direction of the field is indicated by compass needle (a) The direction of magnetic field is given by right hand grip rule and by right hand cork screw rule.
Right hand grip rule is stated below : Grasp the wire in the right hand so that the thumb

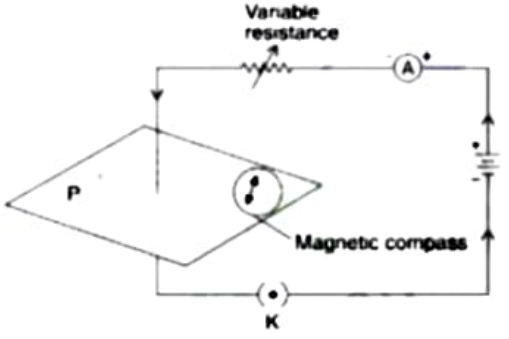
points along the wire in the direction of current, the fingers will then point in the direction of magnetic field.



Right hand cork-screw rule : Imagine a right handed cork-screw to be lying with its direction coinciding with the conductor carrying current and to be revolved so that it travels in the direction in which thumb rotates gives the direction of lines of force.

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.