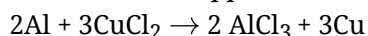# Solution

Class 10 - Science

2020-21 paper 8

Section A

1. It is a redox reaction as oxidation and reduction both take place in the same reaction. Ferrous (Fe^{2+}) is getting oxidised (loss of electron) to ferric ion (Fe^{3+}) whereas oxidation number of Sulphur changes from +6 to +4 (gain of electron)

OR

Aluminium + Copper chloride → Aluminium chloride + Copper.
$2Al + 3CuCl_2 \rightarrow 2\ AlCl_3 + 3Cu$

2. When a solution of slaked lime is applied on the wall, it slowly reacts with the carbon dioxide gas present in the air and forms calcium carbonate. Hence, it does not form the white color immediately.

3. **(b)** (i) and (iv)
   Explanation: Mineral acids are completely ionized but carboxylic acids are partially ionized. Hence, mineral acids are stronger acids than carboxylic acids.

4. Concave mirror and focal length,f= -20cm. As parallel rays always converge to a point and that is called focus.

5. Myopia or short-sightedness. The concave lens should be used to correct his vision.

6. When a bicarbonate is treated with an acid, carbon dioxide gas is evolved. So, when sodium hydrogen carbonate is treated with acetic acid, carbon dioxide gas is liberated.

OR

   i. pH is decreased by adding an acid to the solution of pH 7.
   ii. pH is increased by adding an alkali to the solution of pH 7.

7. We are given, potential difference V = 60 V, current I = 4 A.
   According to Ohm's law, $R = \frac{V}{I} = \frac{60V}{4A} = 15\Omega$
   When the potential difference is increased to 120 V the current is given by
   $Current = \frac{V}{R} = \frac{120V}{15\Omega} = 8A$
   The current through the heater becomes 8 A if the potential difference is increased to 120 V.

8. The nature of the coil is circular in form of loop.

9. His observations are $I_1 < I_2$ because, in a series combination resistance is higher, so the current is less. But $V_1 = V_2$ because in both the cases battery is the same. (For parallel combination current will be more.)

OR

Excess of electrons at the negative terminal and lack of electrons at the positive terminal (due to chemical reactions) causes potential difference between the two terminals of a cell.

10. Factors affecting photosynthesis.
    1) Light
    2) Oxygen
    3) CO_2
    4) Temperature and
    5) Water

11. Valves present in ventricles of the heart prevent backflow of blood during the contraction phase of the heart.

OR

From the right atrium, the deoxygenated blood goes into the right ventricle via the tricuspid valve.

12. Phytoplankton belongs to the aquatic ecosystem.

OR

According to 10% law (given by Lindeman in 1942), only 10% of energy reaches from one trophic level to next as major amount of energy is lost as heat while, some are used in various metabolic processes. Thus, only 10 percent of the consumed food is stored as biomass.

13. Partial digestion of fats take place in stomach and maximum digestion and absorption takes place in duodenum.

14. **(a)** Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

15. **(a)** A is false but R is true.
Explanation: A is false but R is true.

<div align="center">OR</div>

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

16. **(c)** A is false but R is true.
Explanation: A is false but R is true.

17. i. (d) Right auricle $\rightarrow$ Right ventricle $\rightarrow$ Lungs $\rightarrow$ Left auricle $\rightarrow$ 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. (d) 30 Ω

ii. (d) all of these

iii. (a) resistance decreases

iv. (b) 10^{-8} Ωm to 10^{-6} Ωm

v. (b) Alloys does not oxidise readily at high temperature

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

<div align="center">**Section B**</div>

21. In Humans blood flow in two directions simultaneously in one cardiac cycle. Oxygenated blood comes to the heart from the lungs and at the same time, de-oxygenated blood goes from Heart towards the lungs. Because of this double movement is blood circulation in the human heart called double circulation.

<div align="center">OR</div>

There modes for the exchange of gases in plants are as follows:

1. Plants respire through the tiny pores on the surface of their leaves called stomata. Oxygen enters the plant, while carbon dioxide leaves the plant through these pores. This exchange of gases occurs through the process of diffusion.

2. Plants do not get all of the oxygen they need for respiration from their stomata. They also absorb oxygen from their roots. This is why plants need well-aerated soil to grow properly. Waterlogged or compacted soil can kill plants by drowning or suffocating them.

3. In woody stems, exchange of gases occurs through lenticels in the bark.

22. The chief excretory organs and the waste products removed by them are:

    1) Kidneys - Urea in the form of urine

    2) Lungs - Carbon dioxide

    3) Skin - Water and salts as sweat

23. Soap solution will turn red litmus paper blue because soap is alkaline in nature.

24. i. Sulphuric acid burnt the hand of Madhu because sulphuric acid is a strong dehydrating agent and it dries up the water causing the release of heat which burns the skin.

    ii. She should always wear a lab coat in the laboratory. She must keep herself at a distance from the table where the bath is placed. She should be always alert in the laboratory and should not lose concentration.

    iii. A student must show attentiveness while doing practicals in the lab.

25. Given, magnification produced by a spherical mirror -3, i.e. m=-3.

    $\therefore$The four information obtained from this statement are as follows:

    i. Real image

    ii. Image is inverted

    iii. Magnified image and

    iv. Mirror is concave

26.
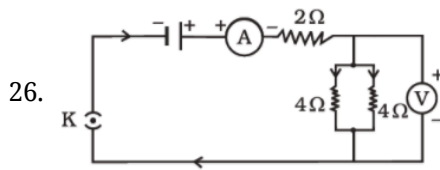
    Total resistance for parallel combination of 4Ω resistor can be calculated as follow:

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

    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. Gregor Johann Mendel in 1866 demonstrated the way in which characters are transmitted from one generation to another and suggested that each cell of an organism contains two factors for each character, both of which separate and are passed on to different progeny through different gametes. Thus Mendel laid the foundation of genetics, the science of heredity and variation, hence it is proper to call him father of Genetics.

    OR

    The oldest surviving terrestrial rocks, about 4.3 billion years old, contain no definite trace of life, at least not recognisable as yet. Some rocks, about 3.9 billion years old, contain carbonates. Geologists interpret that these carbonates have resulted from life processes. Therefore, life was present on Earth about 3.9 billion years ago. However, the oldest microfossils discovered so far that of photosynthetic cyanobacteria.

28. Pesticides are poisonous chemical substances, which are sprayed over crop plants to protect them from pests and diseases by either killing them or stopping their growth. These chemical pesticides mix up with soil and water from where they are absorbed by the growing plants along with water and other minerals and get deposited in plant tissues. When herbivorous animals eat plants then these poisonous chemical pesticides go into their bodies through the food chain and further when they are consumed by carnivores, then the pesticides get transferred to their bodies. In this process of transfer of food through food chains these harmful chemicals get concentrated at each subsequent trophic level and their concentration keep on increasing (Biomagnification) with increasing trophic level.

29. 120-refers to the systolic pressure value (contraction)

    80 - refers to the diastolic pressure value (relaxation)

30. The two reactions, given below clarify that chemical reactions are also determined by the change in color and change in temperature.

    i. When hydrated copper sulphate is heated then the blue color of the salt changes to white.

    $$CuSO_4.5H_2O \underset{(Blue)}{\overset{\text{Heat}}{\longrightarrow}} CuSO_4 + 5H_2O$$
    $$ (White)$$
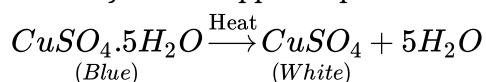
ii. A large amount of heat is released when calcium oxide is dissolved in water.

$$\underset{(Quick\,lime)}{CaO} + H_2O \xrightarrow{Dissolution} \underset{(Slaked\,lime)}{Ca(OH)_2} + Heat$$
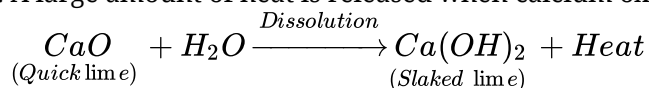
31. 1) The atomic number of Li, Na and K are 3, 11 and 19 respectively. Lithium (2,1), Sodium (2,8,1) and Potassium (2,8,8,1) are three metals of group 1 called alkali metals having a valency of 1.
The atomic number of Cl, Br and I are 17, 35 and 53 respectively. Lithium (2,8,7), Sodium (2,8,18,7) and Potassium (2,8,18,18,7) are three non-metals of group 17 called halogens having a valency of 7.

Group 1	Group 17
Li	Cl
Na	Br
K	I

2) Li (2,1), Na (2,8,1) and K (2,8,8,1) are grouped together in the periodic table and belong to group I. They are grouped together because all of them have one electron in their valence shell. Rest of the elements Cl (2,8,7), Br (2,8,18,7) and I (2,8,18,18,7) are grouped together in the periodic table and belong to group 17 as they all have 7 electrons in their valence shell.

The elements of group 1 are called alkali metals because they react with water to liberate H_2 gas and form alkalies. The elements of group 17 are monovalent non-metals. They form acidic oxides. They are called halogens.

32. The electronic configuration of the two atoms are:
Mg (Z = 12) = 2, 8, 2
Al (Z = 13) = 2,8, 3
Both these elements are present in the third period. Al comes after Mg. The atomic radius decreases when moving from left to right along a period. This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom. Therefore, the atomic radius of Mg is more.
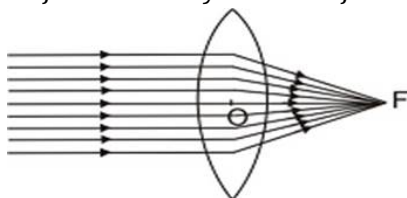
33. Given, $u = -20cm, v = -30cm, P = ?$
Using lens formula,
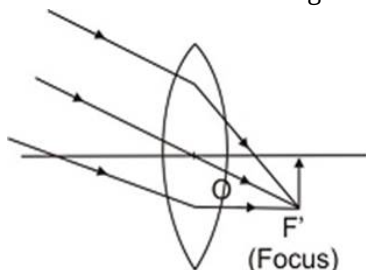$$f = \frac{uv}{v-u} = \frac{(-20)\times(-30)}{-30+20} = -60cm$$
$$\therefore P = \frac{100}{f} = \frac{100}{-60} = -1.67D$$

34. Object at Infinity. When object is at infinity, a real image is formed at F on the other side of the lens
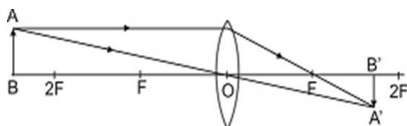

Object at infinity. Image at F on the other side of lens.
However if the rays are parallel to themselves but not parallel to principal axis, then these rays after refraction will form image at focus F' and not at principal focus F.


Object at infinity, rays parallel to themselves but not parallel to principal axis. Image is formed at F', the focus on the other side of lens. Object beyond 2F. When the object is beyond 2F, a real, inverted, diminished image is formed between F and 2F.
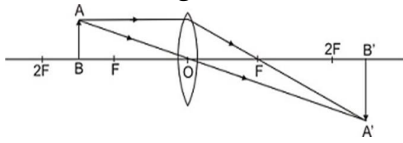

Object beyond 2F, real, inverted, diminished image between F and 2F. Object at 2F. When the object is at 2F, a

real, inverted image of the same size is formed on the other side of the lens at 2F as given in Fig.
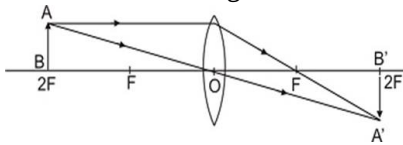

Object at 2F, image at 2F on the other side of the lens. Image is of size same as that of the object. When the object is between F and 2F, its real, inverted, magnified image is formed on the other side of the convex lens as shown in fig.
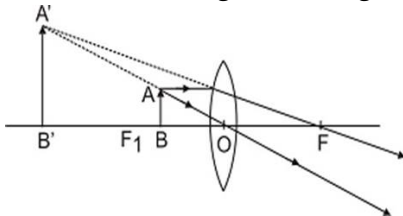

Object between F and 2F real, inverted, magnified image is formed beyond 2F on the other side of lens.
Object at F. When object is placed principal focus, a real, inverted, very highly magnified image is formed at infinity.
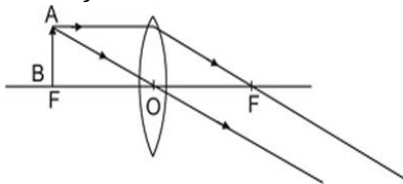
Object at F, a very highly magnified, real, inverted image is formed at infinity.
Object between F and C. When an object is placed between principal focus and optical centre of the lens, virtual, erect, magnified image is formed on the same side of the lens.

Object between F and C; a virtual, erect, magnified image is formed on the same side.

<div align="center">OR</div>

Object height, h= +2 cm
Image height, h' = - 3 cm (real image hence inverted)
Object distance, u = -16 cm
Image distance, v -?
Focal length, f=?
(i) Position of image
From the expression for magnification
m = $\frac{h'}{h}$
= $\frac{v}{u}$
We have, v = $-u\frac{h'}{h}$
Putting values, we get v = $-(-16) \times \frac{-3}{2}$
v = -24 cm
The image is formed at distance of 24 cm in front of the mirror (negative sign means object and image are on the same side).
(ii) Focal length of mirror
Using mirror formula, Putting values, we get
Using mirror formula,
$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
Putting values, we get $\frac{1}{f} = \frac{1}{-16} + \frac{1}{-24}$
= $-\frac{3+2}{48}$
or f = $-\frac{48}{5}$
= -9.6 cm

35. i. Differences between pollen tube and style are:

Pollen Tube	Style
It is part of male gamete. When pollen grain sticks to flower stigma a tube growing out of pollen grain better known as pollen tube.	The middle elongated part of the carpel, i.e. female part of a flower. Which allows path for pollen tube to grow.
It transports male gametes from pollen grains to ovules.	The attachment of stigma to the ovary.

ii. Difference between fission in amoeba and plasmodium is

Fission in Amoeba	Fission in Plasmodium
The fission in amoeba is binary fission. The division of parental body into two identical daughter cells at a time. Thus, the size is comparitive to parent cell.	The fission in plasmodium is multiple fission. The parental body divides into numerous daughter cells simultaneously. Here the daughter cells are numerous and very small.

iii. Difference between fragmentation and regeneration is:

Fragmentation	Regeneration
The method in which multicellular organism breaks up into two or more smaller fragments.	The growth of a whole new organism from any of its body, with the help of special cells.i.e. single segment forming new individual.

iv. Difference between bud of Hydra and Bryophyllum is:

Bud of Hydra	Bud of Bryophyllum
It is seen during budding as an outgrowth on the body of Hydra which gets fully grown and then detaches from the body and becomes a new individual.	This is present on the leaves of Bryophyllum develop into a new plant when it comes in contact with soil and other favourable conditions. The bud here are numerous in single leaf at a time

v. Difference between vegetative propagation and spore formation is:

Vegetative propagation	Spore Formation
New plants are obtained from different parts of parent body like leaves, stems, etc. It is a form of asexual reproduction that can be natural or induced artificially.	Spore formation is also an asexual reproduction procedure which occur in non-flowering plants. Parent plant produce numerours spores. Spores when fall on land, have the ability to germinate and produce new fungal colonies under favourable conditions.

36.
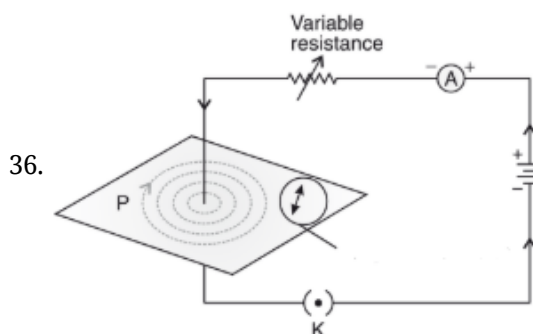
Maxwell Right-hand Thumb Rule: Hold a current carrying conductor in right hand such that thumb points the direction of current then fingers wrapped around the conductor. The fingers point in the direction of magnetic field lines of the magnetic field.
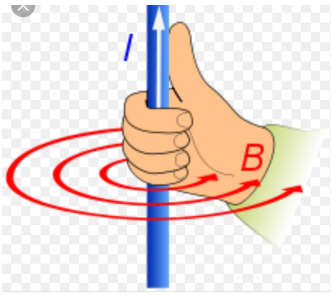
Reason:- The magnetic field strength decreases with increase of distance from the current carrying conductor.

There is a inverse relationship between field strength and distance from current carrying conductor.

$$Field\ strength \propto \frac{1}{distance\ of\ point\ from\ the\ current\ carrying\ conductor}$$

OR

The activity to demonstrate that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field can be explained as follows:

Activity: To show the effect of magnetic field on a current-carrying conductor

Materials Required: For this, we need to take a small aluminum rod, a horseshoe magnet, battery, plug key, wires, and a stand.

i. Suspend an aluminum rod horizontally from the stand and two wires at the ends of it are tied. The wires are connected to a Rheostat, battery and a key so that a circuit is completed,

ii. Place a horseshoe magnet in such a manner that the aluminum rod is between the poles of a magnet.

Assume that the above the aluminum rod is South pole of the magnet and below, the north pole of the magnet. Insert the plug key and current is supplied to the rod.

Observation: the aluminum rod is deflected towards the left direction

On changing the direction of the current, the rod is deflection in the right direction.

Hence, it demonstrates that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field

The direction of the magnetic field can find out with the help of Fleming's left-hand rule. Let current is moving in an anticlockwise direction, then the direction of the magnetic field will be in clockwise direction i.e. at the top of the loop whereas vice-versa in case of the clockwise direction of the current.