

# Sample Paper

## Class 10 CBSE 2020-21

**Time: 3 hrs**

**Max. Marks: 80**

### General Instructions

- (i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
- (ii) (Section-A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
- (iii) Section-B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.
- (iv) Section-C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.
- (v) Section-D - question no. 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
- (vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (vii) Wherever necessary, neat and properly labelled diagrams should be drawn.



## Section-A

1. How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal?

(OR)

Chlorine, bromine and iodine form a Dobereiner triad. The atomic masses of chlorine and iodine are 35.5 and 126.9 respectively. Predict the atomic mass of bromine.

2. Write the chemical equation of the reaction in which the change in colour has taken place.
3. The colour of methyl orange indicator in Dil. HCl and in Dil. NaOH are
  - A. yellow and red respectively.
  - B. colorless and red respectively.
  - C. blue and yellow respectively.
  - D. red and yellow respectively.
4. The change in focal length of an eye lens to focus the image of objects at varying distances is done by the action of the:
  - A. pupil
  - B. retina
  - C. ciliary muscles
  - D. blind spot
5. What kind of mirror is required for obtaining a virtual image of the same size as the object?
6. Refractive indices of carbon disulphide and ethyl alcohol are 1.63 and 1.36 respectively. Which is optically denser?

OR

If the image formed by a convex lens is of the same size as that of the object, what is the position of the image with respect to the lens?

7. State whether the following statement is true or false:  
The magnetic field inside a long circular coil carrying current will be parallel straight lines.



8. A current of 4 A flows around a circuit for 10 s. How much charge flows past a point in the circuit in this time?
9. Name the cells which are responsible for the colour determination in the human eye.

OR

**Answer:** We do not use series combination for connecting electrical appliances in household circuit because if there will be a short circuit in one of the appliance which led to break in the circuit will cause the working of other appliance connected in the series.

Thus, parallel combination is used for connecting electrical appliance in the household circuit.

10. The factors responsible for the rapid spreading of bread mould on slices of bread are:
  - (i) presence of large number of spores in air
  - (ii) presence of large number of thread-like branched hyphae
  - (iii) presence of moisture and nutrients
  - (iv) formation of round shaped sporangia

A. (i) and (iii)                      B. (ii) and (iv)  
C. (i) and (ii)                      D. (iii) and (iv)
11. What is a monohybrid cross?

(OR)

Why do mice whose tails were surgically removed just after birth for generations, continue to produce mice with tails?

12. How does Single-use plastic harm the animals?

(OR)

What is the difference between the amount of energy captured by producers and energy transferred to the consumers?

13. Where does anaerobic respiration occur in the human body?



14. The questions below consist of statements of an assertion and reason. Use the following key to choose appropriate answer:  
Assertion (A): Sodium reacts with water, producing a hissing sound.  
Reason (R): Sodium reacts with water and produces hydrogen gas.
- A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
  - B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
  - C. Assertion is correct and Reason is incorrect.
  - D. Assertion is incorrect and Reason is correct.
15. The questions below consist of statements of an assertion and reason. Use the following key to choose appropriate answer:  
Assertion (A): When TT and tt pea plant were crossed, only tall plants were obtained in F1 progeny.  
Reason (R): This was because Tall allele was recessive over the short allele.
- A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
  - B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
  - C. Assertion is correct and Reason is incorrect.
  - D. Assertion is incorrect and Reason is correct.
16. The questions below consist of statements of an assertion and reason. Use the following key to choose appropriate answer:  
Assertion (A): Arteries are thick-walled and elastic in nature.  
Reason (R): Arteries have to transport blood away from the heart.
- A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
  - B. Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
  - C. Assertion is correct and Reason is incorrect.

D. Assertion is incorrect and Reason is correct.

**Answer Q. No 17 - 20 contain five sub-parts each. You are expected to answer any four subparts in these questions.**

17. **Read the following passage and answer any four questions from 17 (i) to 17 (v)**

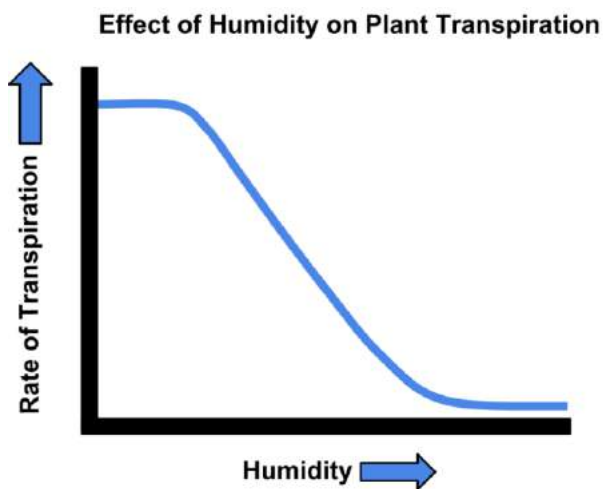
Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots. The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration. It is a fact that a mature corn plant absorbs almost three litres of water in a day, while a mustard plant absorbs water equal to its own weight in about 5 hours.

(i) Why is transpiration required in plants?

(ii) Transpiration occurs through special openings on the leaf surface known as:

- |           |                |
|-----------|----------------|
| A. Stroma | B. Hydathodes  |
| C. Stoma  | D. Guard Cells |

(iii) Study the following graph carefully and answer the question:



Why do you think that the rate of transpiration lowers as the levels of humidity increase?

- A.  $H_2O$  concentration is lower outside the leaf
- B.  $H_2O$  concentration is higher inside the leaf



- C.  $H_2O$  concentration is higher outside the leaf
- D. Rate of transpiration does not depend on the levels of humidity.
- (iv) Transpiration is also known as the “necessary evil” in the plants. Why is it so?
- (v) Transpiration increases in:
  - A. Hot, damp and windy condition
  - B. Cool, damp and windy condition
  - C. Cool, dry and still condition
  - D. Hot, dry and windy condition

18. **Read the following passage and answer any four questions from 18 (a) - 18 (e):**

Dobereiner, in 1829, grouped certain elements in the groups of three called triads. The three elements in a triad had similar chemical properties. When the elements in a triad were arranged in the order of increasing atomic masses, the atomic mass of the middle element was found to be approximately equal to the arithmetic mean of the atomic mass of the other two elements. It was found that the middle member of a triad had physical properties that were nearly the average of the other two.

- (a) What is the group of three similar elements by Dobereiner called?
  - (b) What did Dobereiner discover about the middle element in his triads?
  - (c) What is triad law?
  - (d) How many elements are there in Dobereiner triads?
  - (e) Who gave the law of triads?
19. **Answer any four questions from 19(a) – 19(e) on the basis of your understanding of the following paragraph and the relevant studied topic.**



Charges do not flow in a copper wire by themselves, just as water in a perfectly horizontal tube does not flow. If one end of the tube is connected to a tank of water kept at a higher level, such that there is a pressure difference between the two ends of the tube, water flows out of the other end of the tube. For flow of charges in a conducting metallic wire, the gravity, of course, has no role to play; the electrons move only if there is a difference of electric pressure – called the potential difference – along the conductor. This difference of potential may be produced by a battery, consisting of one or more electric cells. The chemical action within a cell generates the potential difference across the terminals of the cell, even when no current is drawn from it. When the cell is connected to a conducting circuit element, the potential difference sets the charges in motion in the conductor and produces an electric current. In order to maintain the current in a given electric circuit, the cell has to expend its chemical energy stored in it.

- (a) Define the term electric potential difference and how it is different from the term electric potential?
  - (b) The SI unit of electric potential is \_\_\_\_\_.
  - (c) Which device is used to measure the electric potential across a current carrying conductor and in which connection it is connected?
  - (d) Comment whether the following statement is true or false.  
“When a positive charge moves from a region of low potential to high potential, the electric field does positive work on the charge.”
  - (e) How much work is done in moving a charge of 2 C across two points having a potential difference 12 V?
20. **Answer any four questions from 20(a) – 20(e) on the basis of your understanding of the following paragraph and the relevant studied topic.**



Inside a substance such as glass or water, light travels more slowly than it does in a vacuum. If  $c$  denotes the speed of light in a vacuum and  $v$  denotes its speed through some other substance, then -

$$v = \frac{c}{n}$$

Where  $n$  is a constant called the index of refraction.

To good approximation, a substance's index of refraction does not depend on the wavelength of light. For instance, when red and blue light waves enter water, they both slow down by about the same amount. More precise measurement, however, reveals that  $n$  varies with the wavelength as shown in the figure given below

Approximately colour	Wavelength in vacuum (nm)	Indices $n$
yellow	580	1.5
yellow orange	600	1.498
orange	620	1.496
orange red	640	1.494

*Refractive indices of Custom glass against varying Wavelength*

- (a) Inside the Custom glass
- Orange light travels faster than yellow light
  - Yellow light travels faster than orange light
  - Orange and Yellow light travels equally fast
  - We cannot determine which color of light travels faster
- (b) For blue-green of wavelength 520 nm, the index of refraction of custom glass is probably closest to
- 1.49
  - 1.50
  - 1.51
  - 1.32
- (c) Which of the following phenomena happens because  $\mu$  varies with wavelength
- A lens focuses light





- B. A prism breaks sunlight into different colors
  - C. Total internal reflections ensures that light travels down the fiber optic cable
  - D. Light rays entering a pond change direction at the pond's surface
- (d) Which of the following remain/s the same as the light enters a denser medium from a rarer medium?
- A. Frequency
  - B. Speed of Light
  - C. Wavelength
  - D. All of the above
- (e) What is the speed of the orange component of the light as it passes through the custom glass (in m/s)?
- A.  $3 \times 10^8$
  - B.  $4.97 \times 10^7$
  - C.  $2.6 \times 10^8$
  - D.  $3.5 \times 10^7$

### Section-B

21. What is the information source for making proteins in the cell?

(OR)

If a normal human cell has 46 chromosomes, how many chromosomes will be there in a human (i) sperm cell, and (ii) zygote?

22. Name one organism each having autotrophic, saprophytic, parasitic and holozoic modes of nutrition.
23. Classify the following salts into acidic, basic and neutral: Potassium sulphate, ammonium chloride, sodium carbonate, sodium chloride.

OR

Write the names of the metals for the following:

- (i) Two metals which are alloyed with iron to make stainless steel.
  - (ii) Two metals which are used to make jewelry.
24. What happens when chlorine is passed over slaked lime at 313K? Write a chemical equation of the reaction involved and state one use of the product obtained.



25. An electric heater of resistance  $500\Omega$  is connected to a mains supply for 30 min. If 15A current flows through the filament of the heater, then calculate the heat energy produced in the heater.
26. Why does a ray of light passing through the center of curvature of a concave mirror gets reflected along same path after reflection?

### Section-C

27. What is meant by breathing? What happens to the rate of breathing during vigorous exercise and why?

(OR)

Name four chambers of the human heart. State one function of each chamber in a tabular form.

28. Define trophic level. Draw the food chain with four trophic levels.
29. Why does a child bear all the basic features of a human being but it does not look exactly like its parents?
30. (a) Explain alkali with an example.  
(b) Why do HCl,  $\text{HNO}_3$  show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character?
31. (a) Explain the formation of ionic compound CaO with electron dot structure.  
(b) Name the constituent metals of bronze.
32. What do you understand by exothermic and endothermic reactions? Give one example of each.
33. (a) For the same angle of incidence, the angle of refraction in three different media A, B and C  $10^\circ$ ,  $25^\circ$  and  $40^\circ$ , respectively. In which medium the velocity of light will be maximum?  
(b) When a light ray passes obliquely through the atmosphere in an upward direction how does its path generally change?

### Section-D

34. (a) Crystals of a substance changed their colour on heating in a closed test tube but regained it after sometime when they were



allowed to cool down. Name the substance and write its formula and explain the phenomenon involved.

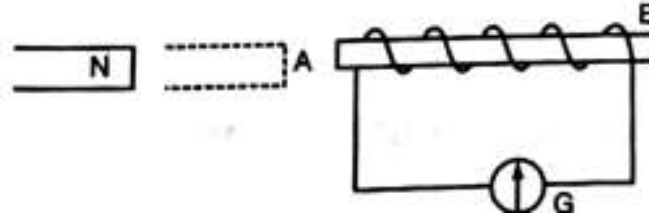
- (b) Name the compound whose one formula unit is associated with 10 water molecules. How is it prepared? Give equations of related reactions. Give two uses of the compound.

(OR)

Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electronic shells but different number of electrons in their outermost shell. It was found that elements A and G combine to form an ionic compound. This compound is added in a small amount to almost all vegetable dishes during cooking. Oxides of elements A and B are basic in nature while those of E and F are acidic. The oxide of D is almost neutral. Based on the above information answer the following questions:

1. To which group or period of the Periodic Table do the listed elements belong?
  2. What would be the nature of compounds formed by a combination of elements B and F?
  3. Which two of these elements could definitely be metals?
  4. Which one of the eight elements is most likely to be found in gaseous state at room temperature?
  5. If the number of electrons in the outermost shell of elements C and G be 3 and 7 respectively, write the formula of the compound formed by the combination of C and G.
35. Mention the components of the transport system in highly organized plants. State the functions of these components.
36. A. The diagram below shows a coil connected to a center zero galvanometer G. The galvanometer shows a deflection to the right when the N-pole of a powerful magnet is moved to the right as shown.

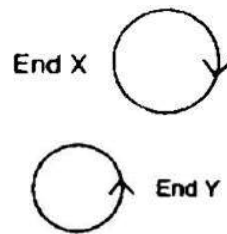




- (i) Explain why the deflection occurs in the galvanometer.
- (ii) Does the direction of current in the coil appear clockwise or anticlockwise when viewed from end A?
- (iii) State the observation in G when the coil is moved away from N.

OR

The directions of current flowing in the coil of an electromagnet at its two ends X and Y are as shown below:



- (a) What is the polarity of end X?
- (b) What is the polarity of end Y?
- (c) Name and state the rule which you have used to determine the polarities.

## HINTS & SOLUTIONS

### Section-A

1. **Answer:** Bring a burning matchstick near the gas. It burns with a 'pop' sound showing that it is hydrogen.

(OR)

$$\begin{aligned}\text{Atomic mass of Br} &= \frac{35.5 + 126.9}{2} \\ &= \frac{162.4}{2} = 81.2\end{aligned}$$

2. **Answer:**  $\text{Cu (s)} + 2\text{AgNO}_3 \text{ (aq)} \rightarrow \text{Cu(NO}_3)_2 \text{ (aq)} + 2\text{Ag}$

The solution will become blue in colour and shiny silver metal will be deposited.

3. **Answer:** D

**Solution:** The colour of methyl orange indicator in acidic solution (Dil. HCl) is red and in basic solution (Dil. NaOH), it is yellow.

4. **Answer:** C

**Solution:** Ciliary muscles help in changing the focal length or the curvature of the eye lens so that we can see the object clearly. This is referred to as the power of accommodation.

5. **Answer:** Plane mirror is required for obtaining a virtual image of the same size as the object

6. **Answer:** Refractive indices of carbon disulphide = 1.63

Refractive indices of ethyl alcohol = 1.36

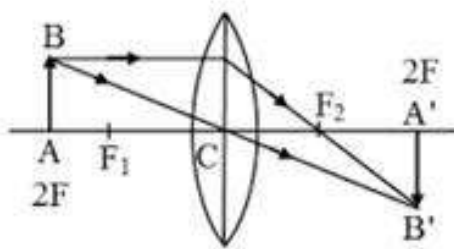
A material with greater refractive index is considered to be optically denser. Thus, Carbon disulphide is denser than the ethyl alcohol.

OR

The image formed by a convex lens is of the same size as that of the object. When an object is placed at 2F, the image is formed at



2F and is of the same size as that of the object i.e. magnification is equal to 1.



7. **Answer:** True, inside a long circular coil carrying current the magnetic field lines are always parallel with each other.

8. **Answer:** Here it is given that current,  $I = 4 \text{ A}$  and Time,  $t = 10 \text{ sec}$   
The total amount of charge flown is given as

$$\text{Charge (Q)} = \text{Current (I)} \times \text{time(t)}$$

$$4 \times 10 = 40 \text{ C}$$

9. **Answer:** Cone cells are responsible for the colour determination. As the name suggests they are cone shaped photoreceptor cells on retina. They help us see and distinguish between different colours hence making colour perception possible.

OR

We do not use series combination for connecting electrical appliances in household circuit because if there will be a short circuit in one of the appliance which led to break in the circuit will cause the working of other appliance connected in the series.

Thus, parallel combination is used for connecting electrical appliance in the household circuit.

10. **Answer:** A

**Solution:** The factors responsible for the rapid growth of bread mould on slices of bread are presence of a large number of spores in air as well as presence of moisture and nutrients on the slice of bread.

11. **Answer:** When a cross is conducted between dominant and recessive traits of only one character, then it is known as a monohybrid cross.

(OR)



**Answer:** It is because cutting of tail does not change the DNA in the gametes, and hence the progeny will have a tail.

12. **Answer:** Animals like stray cattle eat the plastic bags, which are non-biodegradable and tend to choke the alimentary tract, thereby killing the animal.

(OR)

**Answer:** The energy captured by the plants is 1-2% of the total solar energy received on Earth while approximately 10% of energy fixed by producers is passed on to the consumers.

13. **Answer:** Anaerobic respiration in humans takes place in the muscle cells when there is a deficient supply of oxygen. It produces lactic acid that causes muscle cramps.

14. **Answer:** A

**Solution:** Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

15. **Answer:** C

**Solution:** Tallness in pea plants is dominant over dwarf pea plants. Therefore, in a heterozygous pea plant having the genotype Tt, all the progeny plants will be taller ones.

16. **Answer:** B

**Solution:** Reason does not explain the assertion statement. Arteries carry the blood under high pressure due to the pumping action of the heart. That is why these are thick-walled, to resist the rupturing of walls.

17. **Solution:**

(i) Transpiration is required in plants because it creates the "suction pull" that is necessary to pull water from the roots to the top of the plants. It also helps in lowering the leaf surface's temperature due to the cooling effect of evaporation.

- (ii) **Answer:** C

**Solution:** Stoma (singular Stomata) are the special pores through which water is lost during Transpiration.

- (iii) **Answer:** C

**Solution:** Due to increase in humidity, the  $\text{H}_2\text{O}$  concentration is higher in the surroundings outside the leaf. This will prevent the water from evaporating from the leaves due to unfavorable partial pressure. You can imagine this phenomenon similar to osmosis where the water will not move from lower to higher regions of concentration.

(iv) Transpiration is considered to be a necessary evil because when there is a huge amount of transpiration that takes place, it leads to huge amounts of water loss, thus causing wilting of the plant. But transpiration is also needed for pulling of water and minerals from the root to the top most parts of the plant.

(v) **Answer:** D

**Solution:** Transpiration increases in Hot, dry and windy conditions. Transpiration is the evaporation of water from plants. It occurs chiefly at the leaves while their stomata are open for the passage of  $\text{CO}_2$  and  $\text{O}_2$  during photosynthesis. When stomata are open, transpiration rates increase; when they are closed, transpiration rates decrease.

18. **Answer:**

- (a) Group of three similar elements by Dobereiner called triads.
- (b) Dobereiner discovered the atomic mass of the middle element was found to be approximately equal to the arithmetic mean of the atomic mass of the other two elements.
- (c) Triad law states that When the elements in a triad were arranged in the order of increasing atomic masses, the atomic mass of the middle element was found to be approximately equal to the arithmetic mean of the atomic mass of the other two elements.
- (d) Groups of three elements are there in Dobereiner triads.
- (e) In 1829, Dobereiner grouped certain elements in the groups of three called triads.

19. **Answer:**

- (a) The amount of work done in moving a unit charge from a point A to another point B. It can be mathematically expressed as,





$$\Delta V = \frac{W}{q}$$

On the other hand, the electric potential is defined as the amount of work done in moving a charge  $q$  from infinity to a point.

- (b) The SI unit of electric potential is Volt or  $\text{JC}^{-1}$
- (c) A voltmeter is used to measure the potential difference across a current carrying conductor. The voltmeter is always connected in parallel across the points between which the potential difference is to be measured.
- (d) A positive test charge will naturally move from high potential to low potential. If it is moved in the opposite direction, then the electric field will do work against its motion (negative work). This be seen from the equation for electric field work:

$$W = -q\Delta V$$

$W$  is the work done by the electric field,  $q$  is the charge, and  $\Delta V$  is the potential difference. If  $\Delta V$  is positive (the final potential is higher than the initial potential) and  $q$  is also positive, then work done by the field is negative.

- (e) The electric potential difference is the amount of work done in moving a charge between two points. Mathematically described as,

$$V = \frac{W}{q}$$

Therefore, the work done in moving the charge across the two point having a potential difference 12 V is

$$W = qV = 2 \text{ C} \times 12 \text{ V} = 24 \text{ J}$$

20. (a) **Answer:** A

**Solution:** The refractive index of a material is inversely proportional to the speed of the light in the medium

$$\mu = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in a medium}}$$

Thus,  $\mu \propto \frac{1}{v}$



Yellow light has the greatest refractive index and therefore the light will travel the slowest among all the other components mentioned in the table.

Hence, option A is the correct Answer:

(b) **Answer:** C

**Solution:** From the table, it can be concluded that the increase in the wavelength of the light results in the increase in index of refraction.

$$\lambda \propto \mu$$

For 520 nm, the wavelength must be greater than 1.50.

Thus, option C is the correct Answer:

(c) **Answer:** B

**Solution:** When a white light enters a prism it splits into a spectrum of light of different colors. The refractive index of a material varies with the wavelength of the individual component of light as a result the white light splits into seven distinct component of light.

Hence, option B is the correct Answer:

(d) **Answer:** A

**Solution:** The wavelength and speed of the light varies as the light travels from the one medium to another.

(e) **Answer:** B

**Solution:** The refractive index of the light is given by the following expression

$$\mu = \frac{c}{v}$$

It is given that the refractive index of orange light is 1.496; and the speed of light is  $3 \times 10^8$  m/s

Hence,

$$v = \frac{1.496}{3 \times 10^8} \Rightarrow 4.97 \times 10^7 \text{ m/s}$$

Thus, option B is the correct Answer:



## Section-B

21. **Answer:** The source of information for making proteins is the DNA in the cells. The part of DNA which codes for a particular protein is the gene for that protein.

(OR)

**Answer:** (i) Sperm cells will have 23 chromosomes as gametes consist of half the number of chromosomes of somatic cells.

(ii) Zygote will have 46 chromosomes as 23 chromosomes from the gamete of mother (egg) and 23 chromosomes from the gamete of the father (sperm) will fuse to a total of 46 chromosomes.

22. **Answer:** Rose plants have an autotrophic mode of nutrition.  
Fungi have saprophytic mode of nutrition.  
Leech has a parasitic mode of nutrition.  
*Amoeba* has a holozoic mode of nutrition.

23. **Answer:** Neutral: Potassium sulphate, Sodium chloride  
Acidic: Ammonium chloride  
Basic: Sodium carbonate

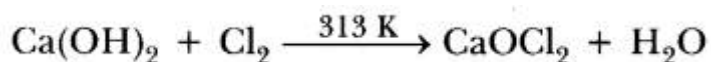
OR

**Answer:**

(i) Nickel and chromium

(ii) Gold and platinum

24. **Answer:** When chlorine is passed over slaked lime at 313K, bleaching powder is formed.



Use:

(i) It is used as a bleaching agent in paper and textile industries.

(ii) It is used as disinfectant in purification of drinking water.

25. **Answer:** We know that the formula of heat (H) is given by:

$$H = I^2 R t$$



Where;

$$t = 30 \text{ min} = 30 \times 60 \text{ s} = 1800 \text{ s}$$

$$I = 15 \text{ A}$$

$$R = 500 \Omega$$

$$\therefore H = (15)^2 \times 500 \times 1800 \text{ J}$$

$$H = 225 \times 500 \times 1800 \text{ J}$$

$$\therefore H = 20.25 \times 10^7 \text{ J}$$

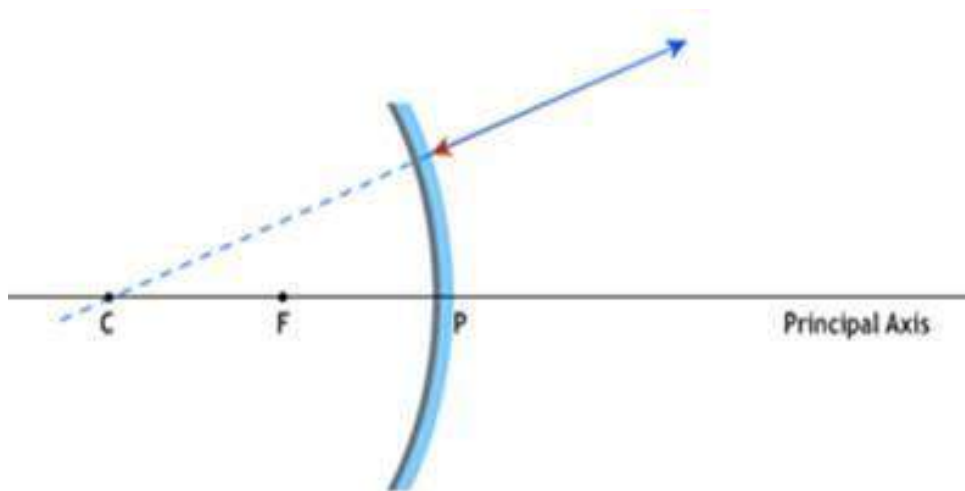
Thus, Total heat produced by the heater is  $20.25 \times 10^7 \text{ J}$  in 30 min due to flow of 15 A current.

26. **Answer:** When ray of light passes through the center of curvature of the concave mirror it strikes along the normal that means it is incident on mirror at  $90^\circ$ .

Thus by the law of reflection which states that the angle of incidence is always equal to the angle of reflection i.e.  $90^\circ$ .

Hence the incident ray coincides with the normal and retraces its path after reflection from the spherical mirror.

The figure below illustrates the above situation.



### Section-C

27. **Answer:** Breathing is the act of moving air in and out of your lungs, as the diaphragm muscles move up and down in the chest. Breathing in is called inhalation. Breathing out is called exhalation.



During vigorous exercise, the rate of breathing increases than the normal rate because more oxygen is needed for more energy and carbon dioxide produced in the respiratory cells of the muscles. The increased production of carbon dioxide increases the rate of breathing and thus oxygen is quickly supplied to the body cells and carbon dioxide is rapidly removed from lungs.

(OR)

**Answer:** The four chambers of heart are Right atrium, Left atrium, Right Ventricle and Left ventricle.

CHAMBER	FUNCTION
1. Right Atrium	It receives deoxygenated blood from superior and inferior vena cava and pumps it to right ventricle through the tricuspid valve.
2. Left Atrium	It receives oxygenated blood from lung through left and right pulmonary veins and pumps this blood to left ventricle through the bicuspid valve.
3. Right Ventricle	It receives deoxygenated blood from right atrium and pumps it to the lung through pulmonary artery.
4. Left Ventricle	It receives oxygenated blood from left atrium and pumps to aorta. From aorta, the blood is sent to the body.

28. **Answer:** Trophic level is a step in a food chain where transfer of food in the form of energy takes place between organisms. At each step in a food chain, there is an organism that consumes the organism at the lower trophic level.

A food chain consisting of four trophic levels is as follows:

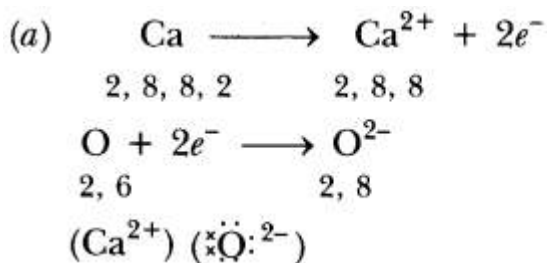
Grass → Grasshopper → Frog → Snake

29. **Answer:** The DNA copying mechanisms of sexual reproduction are precise, but they are not completely accurate. This allows for a good extent of variations to take place. But, the variations are not so large to change the basic structure of the human being. Thus, the child bears all basic features but doesn't look exactly like its parents.
30. **Answer:**
- (a) Soluble bases are called alkalis, e.g. sodium hydroxide is an alkali.



(b) HCl, HNO<sub>3</sub> ionise in aqueous solution, whereas alcohol and glucose do not show acidic characters because they do not ionise in aqueous solution.

31. Answer:



(b) Bronze is made up of copper and tin

32. Answer: Exothermic reactions are those in which heat is evolved, e.g.



Endothermic reactions are those reactions in which heat is absorbed, e.g.



33. Answer:

(a) Refractive index ( $\mu$ )

$$\frac{c(\text{speed of light})}{v(\text{speed of light in the medium})} \dots (1)$$

Hence refractive index of a medium is inversely proportional to the speed of light in that medium.

Also.

$$\mu = \frac{\sin i}{\sin r} \dots (2)$$



Thus, refractive index is inversely proportional to the angle of refraction.

From (1) and (2)

Velocity of light is directly proportional to the angle of refraction.

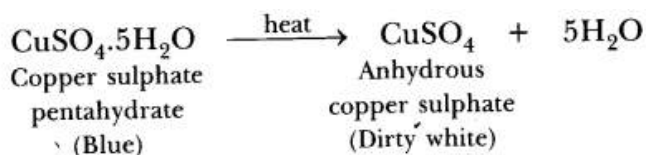
Thus, velocity of light is maximum in medium C because angle of refraction is  $40^\circ$  is maximum.

- (b) When a light ray passes obliquely through the atmosphere in an upward direction its path generally changes due to refraction. When the light ray enters the earth's atmosphere, it undergoes refraction due to the varying optical densities of air at various altitudes. The atmosphere is continuously changing (due to which the optical densities of air at different levels in the atmosphere keep on changing). The air higher up in the sky is rarer but that nearer to the earth's surface is denser. The continuously changing atmosphere refracts the light. Hence the path generally changes.

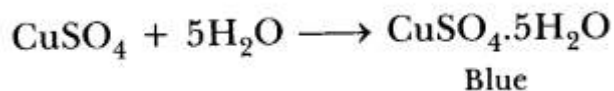
### Section-D

34. Answer:

- (a)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is a blue crystalline solid. It becomes dirty white on heating due to loss of water molecules and it becomes amorphous.

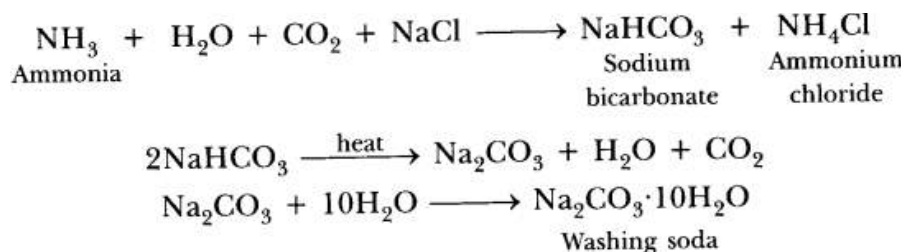


It regains its colour by absorbing water from the atmosphere and becomes blue in colour.



- (b)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . It is called sodium carbonate decahydrate or washing soda. It is prepared by passing  $\text{CO}_2$  gas through a saturated solution of ammonical brine.





Uses:

- (i) It is used in the production of washing powder.
- (ii) It is used for the manufacture of glass.

(OR)

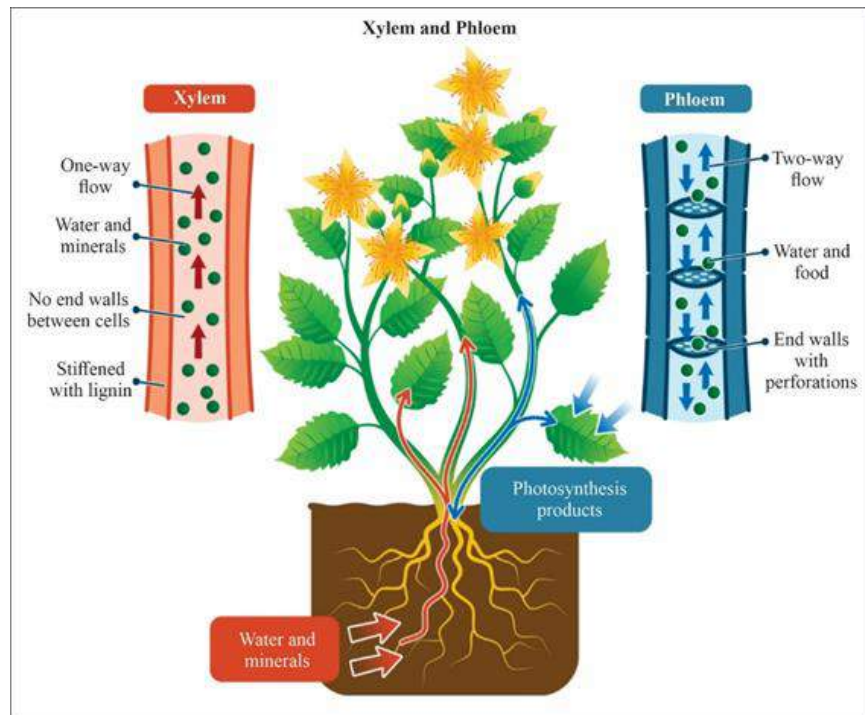
Answer:

1. A and B belong to group 1 and 2 because they form basic oxides. C belongs to group 13 as it has 3 valence electrons. D belongs to group 14 as it forms almost neutral oxide. E and F belong to group 15 and 16 as they form acidic oxides, G belongs to group 17 as it has 7 valence electrons and H belongs to group 18. They belong to the 3rd period of the Periodic Table because AG is NaCl, added in a small amount to almost all vegetable dishes during cooking and Na and Cl belong to 3rd period.
  2. Ionic compounds will be formed because 'B' is metal and 'F' is non-metal. 'B' can lose two electrons and 'F' can gain two electrons.
  3. A and B are definitely metal as they form basic oxides.
  4. G and H are gaseous at room temperature.
  5. CG3 is the formula of the compound formed by the combination of C and G.
35. **Answer:** In higher plants, "Xylem" and "Phloem" comprises the transport system. The basic function of these components is:
- Xylem: - In xylem tissue, vessels and tracheid of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. At the roots, cells in contact with the soil actively take up ions. This creates a difference in the concentration of these ions between the root and the soil. Water, therefore, moves into the root from the soil to eliminate this difference. This means that there is a steady



movement of water into root xylem, creating a column of water that is steadily pushed upwards

**Phloem:** - transports amino acids and other substances. These substances are specially delivered to the storage organs of roots, fruits and seeds and to growing organs. The translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions. In phloem translocation is done with the utilisation of energy. Material like sucrose is transferred into phloem tissue using energy from ATP. This increases the osmotic pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure.



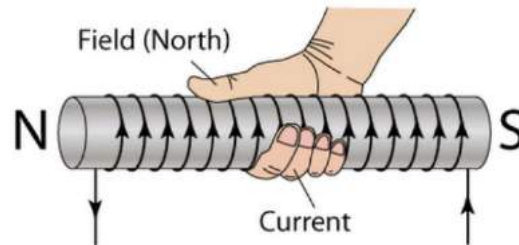
36. **Answer:**

- A. (i) The deflection in the galvanometer occurs because of change in magnetic flux linked with the coil which results in formation of induced emf and further induced current due to the phenomena called electromagnetic induction.

- (ii) The direction of current appears to be anti-clockwise from point A because at point A there is formation of North pole and at point B there is formation of South pole.
- (iii) When the coil is moved away from north pole the direction of induced current gets reversed because point A now becomes South pole and point B now becomes North pole due to change in magnetic flux linked with the coil. So the galvanometer will show deflection to the left side.

OR

The easy way to find the polarity is right-hand rule: " If the current flows in the direction of your fingers, the thumb points towards the north pole". Electromagnet-polarity If we assume an electromagnet which has two ends i.e. X and Y, then,



- (a) South is the polarity of end X as direction of current flow from that end is clockwise.
- (b) The end Y will be the north pole as the current flow from this end shows the anticlockwise direction.
- (c) The rule used here to find the polarity of the ends is clock face rule. According to this rule if the face from where it is being observed is showing the flow of current in anticlockwise direction then that end is N-pole but if the same face shows the flow of current in a clockwise direction then that end becomes S-pole.

