

CBSE X

MT EDUCARE LTD.

Set - B

SUBJECT : **SCIENCE**

Marks : 80

QUEST - I (Semi Prelim I)

Date :

MODEL ANSWER PAPER

Time : 3 hrs.

SECTION - A

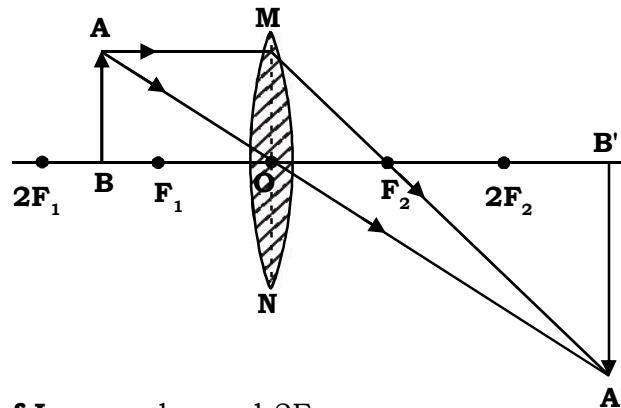
1. So that the time and energy required in segregation may be saved and waste may be disposed off quickly.

1

2. (i) Refraction
(ii) Dispersion
(iii) Internal reflection of light.

1

3. **Object between F_1 and $2F_1$**



Position of Image : beyond $2F_2$

Nature of Image : real, inverted and magnified

2

4. Many fully differentiated organisms have the ability to give rise to new organisms from their body parts by being cut or broken into many pieces. This is known as regeneration. All organisms do not have the capacity to reproduce by regeneration. Hydra and Planaria can reproduce by the process of regeneration.

2

5.	<p style="text-align: center;">Nervous Control</p> <ol style="list-style-type: none"> 1. It is carried out by a specialised tissue called nervous tissue. 2. Information is passed in the form of electric impulses to effector organs/tissues. 3. Nervous control cannot control situations where many different tissues are used and their activities integrated together in the action. 4. Nerve impulses pass through nerves to responding /effector tissue. 	<p style="text-align: center;">Chemical Control</p> <ol style="list-style-type: none"> 1. No specialised tissue is required. 2. Information is passed in the form of chemicals called hormones 3. Chemical signals provide the wide ranging changes needed and can involve different tissues to integrate many activities to do an action/ actions. 4. Hormones diffuse from cell to cell. 	2
6.	<p>The pesticides and chemicals are absorbed by plants from the soil and enter the food chain. Being non-biodegradable they accumulate progressively at each trophic level. As humans occupy the top level of any food chain, the maximum concentration of chemicals is found in our bodies. This is called biological magnification. The level of magnification will be different at different trophic levels, the maximum concentrations will be at the highest trophic levels and the chemical will be less at lower trophic levels.</p>		2
OR			
6.	<ol style="list-style-type: none"> (a) Food chain is defined as the phenomenon of transfer of energy through a series of organisms falling on successive trophic levels. (b) If all the organisms in one trophic level are killed then all the organisms of next trophic level which are dependent on these will die. Next trophic levels will not get food to eat and the entire food chain gets disturbed. At the same time the organisms at the lower trophic level will reproduce and their population will increase in abundance thereby disturbing the ecosystem. 		1
7.	<p>Gastric glands present in the wall of the stomach secrete gastric juice which contains hydrochloric acid, pepsin enzyme and mucus.</p> <ol style="list-style-type: none"> (i) Hydrochloric acid kills bacteria and also makes the medium acidic for the action of pepsin enzyme. (ii) Pepsin enzyme helps in digesting proteins. (iii) Mucus protects the inner lining of the stomach from action of the HCl under normal conditions. 		3
8.	<ol style="list-style-type: none"> (a) Light (b) (i) Phototropism <li style="padding-left: 20px;">(ii) Geotropism 		

	(iii) Chemotropism	
	(c) Growth dependent movement because stem grows toward light.	3
9.	(a) Hypermetropia or long-sightedness : It is a vision defect in which a person can see the distant object clearly but cannot see the nearby objects clearly.	
	(b) Cause of hypermetropia : This defect arises due to either of the following two reasons :	
	(i) The eyeball becomes too small along its axis so that the distance between the eye lens and the retina is reduced.	
	(ii) The focal length of the eye lens becomes too large resulting in the low converging power of the eye lens.	3
10.	(a) Decomposition reaction	
	$2\text{FeSO}_{4(s)} \longrightarrow \text{Fe}_2\text{O}_{3(s)} + \text{SO}_{2(g)} + \text{SO}_{3(g)}$	1
	(b) Displacement reaction	
	$\text{Fe}_{(s)} + \text{CuSO}_{4(aq)} \longrightarrow \text{FeSO}_{4(aq)} + \text{Cu}_{(s)}$	1
	(c) Precipitation reaction	
	$\text{BaCl}_{2(aq)} + \text{Na}_2\text{SO}_{4(aq)} \longrightarrow \text{BaSO}_{4(s)} + 2\text{NaCl}$	1
	OR	
10.	(a) Solution of sulphuric acid has charged ions H^+ and SO_4^{-2} which help in conducting electricity whereas alcohol does not give any ions in water.	
	(b) Dry ammonia has no H^+ or OH^- ions whereas ammonia in water gives OH^- ions which turns red litmus blue.	3
11.	(a) Copper is found as Cu_2S in nature. It can be obtained from its ore by just heating in air.	
	$2\text{Cu}_2\text{S}_{(s)} + 3\text{O}_{2(g)} \xrightarrow{\text{heat}} 2\text{Cu}_2\text{O}_{(s)} + 2\text{SO}_{2(g)}$	
	$2\text{Cu}_2\text{O}_{(s)} + \text{Cu}_2\text{S}_{(s)} \xrightarrow{\text{heat}} 6\text{Cu}_{(s)} + \text{SO}_{2(g)}$	2
	(b) Metallurgy involves various processes starting with the treatment of ore to getting metal in the pure form.	1
12.	(a) During digestion, food is broken down into simpler substances. Food like rice, potato and bread are made up of carbohydrates. These carbohydrates are further broken down to glucose. Glucose during respiration (inhalation of oxygen) is oxidised with the liberation of energy as shown below :	
	$\text{C}_6\text{H}_{12}\text{O}_{6(aq)} + 6\text{O}_{2(aq)} \longrightarrow 6\text{CO}_{2(aq)} + 6\text{H}_2\text{O}_{(l)} + \text{energy}$	
	Glucose	
	Thus, respiration is an exothermic process.	

13.	<p>(b) When two reactants in solution react and one or more of the products is insoluble or forms a precipitate, the reaction is called a precipitation reaction. For example, when a solution of iron chloride and ammonium hydroxide are mixed, a brown precipitate of iron hydroxide is formed.</p> $\text{FeCl}_{3(aq)} + 3\text{NH}_4\text{OH}_{(aq)} \longrightarrow \text{Fe}(\text{OH})_{3(s)} + 3\text{NH}_4\text{Cl}_{(aq)}$ <p style="text-align: center;"> Ferric chloride Ferric hydroxide </p> <p>Object Size, $h = +5$ cm Focal length, $f = +20$ cm [f is +ve for a convex lens] Object distance, $u = -30$ cm Image distance, $v = ?$; Image size = ?</p> <p>For a lens, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$</p> $\therefore \frac{1}{v} = \frac{1}{u} + \frac{1}{f} = \frac{1}{-30} + \frac{1}{20} = \frac{-2 + 3}{-60} = \frac{1}{60}$ <p style="text-align: center;">$v = +60$ cm</p> <p>or</p> <p>The positive sign of v shows that the image is formed at a distance of 60 cm to the right of optical centre of the lens. Therefore, the image is real and inverted.</p> <p>Magnification, $m = \frac{h'}{h} = \frac{v}{u}$</p> $m = \frac{v}{u} = \frac{+60 \text{ cm}}{-30 \text{ cm}} = -2$ <p>Also Image size, $h' = \frac{vh}{u} = \frac{(+60) \times (+5)}{(-30)} = -10$ cm</p> <p>A real, inverted image, 10 cm tall image is formed at a distance of 60 cm on the right side of the lens. The image is two times enlarged in size.</p>	3
14.	<p>Here, $P = -2.5$ D</p> <p>Negative power shows that the lens is concave, so the person is near-sighted.</p> $f = \frac{1}{P} = \frac{1}{-2.5} \text{ m} = -40 \text{ cm}$ $u = -\infty, v = ?$ <p>From lens formula,</p>	3

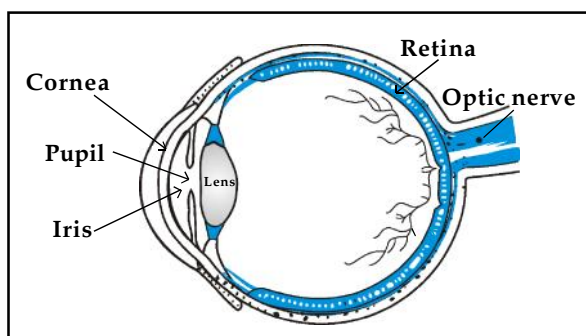
	$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{-40} + \frac{1}{-\infty}$ $= \frac{1}{-40} - 0$ $= \frac{1}{-40}$ <p>or $v = -40 \text{ cm}$</p> <p>Thus, the far point of the eye is at 40 cm from the eye.</p>	3
15.	<p>(a) Laws of refraction of light : The refraction of light obeys the following two laws :</p> <p>First law : The incident ray, the refracted ray and normal to the surface of separation at the point of incidence, all lie in the same plane.</p> <p>Second law : The ratio of the sine of the angle of incidence and the sine of the angle of refraction is constant for a given pair of media. Mathematically,</p> $\frac{\sin i}{\sin r} = \eta_{21} \text{ (}\eta \text{ is a constant).}$ <p>The ratio η_{21} is called refractive index of the second medium with respect to the first medium. The second law of refraction is also called Snell's law of refraction.</p>	2
	<p>(b) Refractive index of air with respect to water = $\frac{3}{4}$</p>	1
16.	<p>(a) (i) $\sin 30^\circ < \sin 40^\circ < \sin 45^\circ \Rightarrow \eta_A > \eta_C > \eta_B$ \therefore Medium A has maximum optical density.</p> <p>(ii) Speed of light will be maximum in the medium B of lowest refractive index η_B.</p> <p>(iii) As $\eta_A > \eta_B$, light travelling from A to B will bend away from the normal</p> <p>(b) (i) Light travels fastest through ice which has the lowest refractive index.</p> <p>(ii) Velocity of light in water</p> $= \frac{\text{Velocity of light in air}}{\text{Refractive index of water}}$ $= \frac{3 \times 10^8 \text{ ms}^{-1}}{1.33}$ $= 2.25 \times 10^8 \text{ ms}^{-1}$	3

OR

16. Human eye : It is the most valuable and sensitive sense organ. It is a remarkable real instrument.

Structure of the eye : As shown in figure, the main parts of the human eye are as follows:

- (i) **Sclerotic** : The eyeball is nearly spherical with a diameter of about 2.3 cm. has a tough and opaque white covering, called sclerotic which protects and holds the eye.
- (ii) **Cornea** : Light enters the eye through a thin membrane called cornea which covers transparent bulge on the front portion of the eyeball.
- (iii) **Choroid** : It is a black membrane below the sclerotic. It absorbs straight light and any blurring of image due to the multiple reflections in the eyeball.
- (iv) **Iris** : Behind the cornea, there is an opaque circular diaphragm called iris. The colour of the iris determines the colour of the eyes of a person. The iris has a control over the pupil. Due to its muscular action, the iris controls the size of the pupil and hence the amount of light entering the eye.



- (v) **Eye lens** : It is a double convex lens situated behind the iris. It is fibrous, jelly like material. The lens is held in position by suspensory ligaments and to the sclerotic by the ciliary muscles. By contracting or relaxing, the ciliary muscles it changes the shape or curvature of the eye lens. This ability to change its focal length is called accommodation. This enables the eye to focus the images of objects at different distances on the retina of the eye.
- (vi) **Retina** : It is a delicate inner membrane on the back wall of the eyeball. It contains light sensitive cells called rods and cones. These cells change light energy into electrical signals which send messages to the brain via the optic nerves.
- (vii) **Blind spot and yellow spot** : In the region where the optic nerve enters the eyeball, there are no rods and cones. This

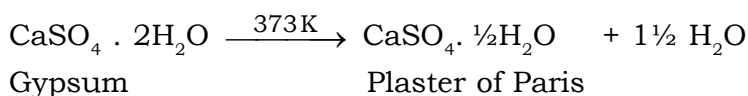
region is totally insensitive to light and is called blind spot. Yellow spot has maximum concentration of light sensitive cells. It is situated in the centre of the retina.

(viii) **Aqueous humour and vitreous humour** : Aqueous humour is a salty fluid that fills the space between the cornea and the eye lens. Vitreous humour is a jelly like fluid that fills the space between the retina and the eye lens.

17. (a) $\text{Na}_2\text{O} + \text{H}_2\text{O} \longrightarrow 2\text{NaOH}(aq)$
Sodium oxide in water gives sodium hydroxide solution. It is alkaline and turns phenolphthalein solution pink and red litmus paper to blue.

(b) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ is known as Plaster of Paris.

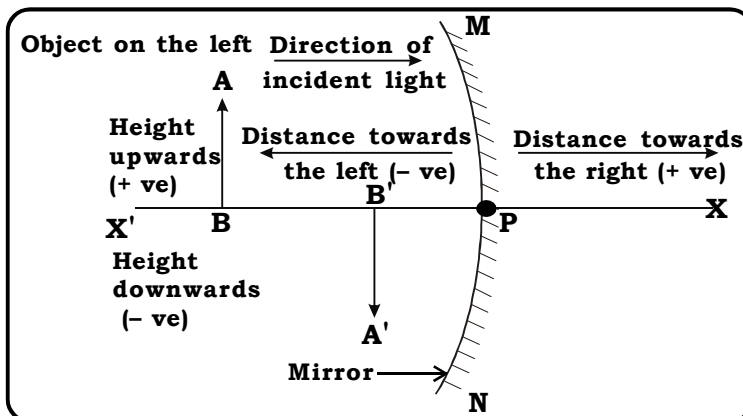
This is prepared by heating gypsum at 373K .



Uses of Plaster of Paris:

- (i) It is used in making chalks and fire proof materials.
- (ii) Used for making patient plasters used in surgery and for plastering fractured parts of the body.
- (iii) In making toys & materials for decoration.

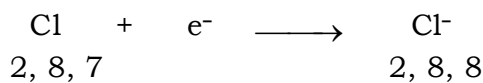
18.



New cartesian sign convention for reflection by spherical mirrors : According convention :

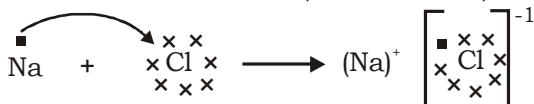
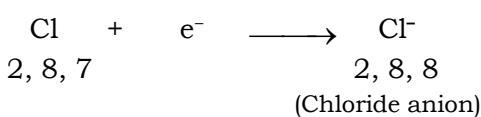
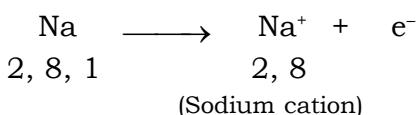
1. The object is on the left of the mirror. So all the ray diagrams are drawn with to incident light travelling from left to right.
2. All the distances parallel to the principal axis are measured from the pole of the mirror.

	<p>3. All distances measured in the direction of direction of incident light are taken as positive.</p> <p>4. All distances measured in the opposite direction of incident light are taken as negative.</p> <p>5. Heights measured upwards and perpendicular to the principal axis are positive.</p> <p>6. Heights measured downwards and perpendicular to the principal axis are negative.</p>	5
19.	<p>(a) About a litre or two a day.</p> <p>(b) (i) The amount of water present in the body. (ii) The amount of nitrogenous waste that is to be removed from the body.</p> <p>(c) Urea and uric acid.</p> <p>(d) Diabetes mellitus</p> <p>(e) Causes of kidney failure are infections, injury or restricted blood flow to kidneys.</p>	1 1 1 1 1
20.	<p>(a) (i) Anodising is a process of forming a thick oxide layer of aluminium. During anodising, a clean aluminium article is made the anode and is electrolysed with dilute sulphuric acid. The oxygen liberated at the anode reacts with aluminium to produce a thick protective oxide layer on its surface. Also the oxide layer can be dyed easily to give an attractive finish to the aluminium articles.</p> <p>(ii) Aqua regia is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio 3 : 1. It is also called royal water. It is highly corrosive and fuming liquid. It can dissolve noble metals like gold and platinum.</p> <p>(b) Formation of sodium ion (Na⁺) : Atomic number of sodium = 11 Electronic configuration = K L M 2 8 1</p> <p>Sodium Metal has one electron in its outermost (Valence) shell. If it loses one electron from its M shell then its L shell now becomes the valence shell and that has a stable octet. The nucleus of this atom has 11 protons but the number of electrons has become 10, so there is a net positive charge giving a sodium cation (Na⁺).</p> <p>Na \longrightarrow Na⁺ + e⁻ 2, 8, 1 2, 8</p> <p>□ Formation of chloride ion (Cl⁻) : The atomic number of chlorine = 17 Electronic configuration = K, L, M 2, 8, 7</p>	2



After gaining an electron, the chlorine atom gets a unit negative charge because the nucleus has 17 protons and there are 18 electrons. This gives us a chloride ion (Cl⁻)

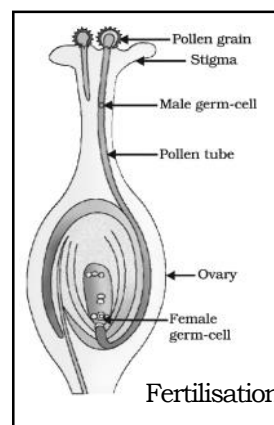
- If sodium and chlorine were to react, the electron lost by sodium could be taken up by chlorine.



- An electrovalent bond is formed between sodium and chloride ion.
- So, both these elements have give and take relation between them. Sodium and chloride ions being oppositely charged attract each other and are held by strong electrostatic forces of attraction to exist as sodium chloride (NaCl).
- It should be noted that sodium chloride does not exist as molecules but aggregates of oppositely charged ions.

3

21. (a) Fertilisation occurs when the male gamete present in pollen grain fuses with the female gamete present in ovule.
- (b) When a pollen grain falls on the stigma of the carpel, it bursts open and grows into a pollen tube that moves downwards through the style towards the female gamete in the ovary.
- (c) A male gamete moves downwards the pollen tube. The pollen tube enters the ovule in the ovary. The tip of pollen tube bursts open and male gamete comes out of pollen tube.
- (d) In ovary, the male gamete of pollen tube combines with the the nucleus of female gamete to form a fertilised egg (zygote).



5

SECTION - B		
22.	(i) Neutralization reaction (ii) Combination reaction	2
23.	(a) Bleaching powder smells strongly of chlorine because it slowly reacts with carbon dioxide of air to evolve chlorine gas. $\text{CaOCl}_2 (s) + \text{CO}_2 (g) \longrightarrow \text{CaCO}_3(s) + \text{Cl}_2(g)$ (b) Carbon in the form of diamond.	1 1
24.	(a) Violet colour is seen at X and red colour is seen at Y. (b) This is because refractive index of glass is different for different colours.	1 1
25.	(i) Meena is suffering from 'anaemia'. (ii) She should take fruits and green leafy vegetables (Spinach) which are rich in iron. Iron is an essential component of haemoglobin and is required for its proper functioning.	
26.	(A) Sensory neuron (B) Spinal chord (CNS) (C) Motor neuron (D) Effector-muscle in arm	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
27.	This phase of growth is called as 'puberty'. Some other physical changes seen in girls during puberty are : (i) Breast size begins to enlarge with darkening of the skin of the nipples at the tips of the breasts. (ii) Menstruation starts and ovaries start to release a mature egg every month.	1 1
◆◆◆◆◆		