SAMPLE PAPER

CLASS – X | CBSE | SCIENCE

Time: 3 hours **Maximum Marks : 80**

SOLUTION

SECTION - A

PHYSICS

1. An object is placed at a distance of 10 cm in front of plane mirror distance of image from mirror will be :

(A) 20 cm (B) 5 cm

(C) 10 cm (D) 40 cm

Ans. C

Sol. Distance of image from mirror = distance of object from mirror

2. The colour of sky appears blue because :

(A) Blue light gets absorbed in the atmosphere

(B) Ultraviolet radiations are absorbed in the atmosphere

(C) Violet and blue lights get scattered more than light of all other colours

(D) Light of all other colours is scattered more than the violet and blue colour light by the atmosphere.

Ans. C

Sol. As wavelength of violet, indigo and blue is least so these colours get scattered by atmosphere most.

3. A concave mirror forms a real image that is twice the size of object. If the object is 30 cm from the mirror, the radius of curvature of the mirror must be about :

(A) 20 cm (B) 13 cm

(C) 40 cm (D) 27 cm

Ans. C

Sol. $m = -2$

$$m = -\frac{v}{u}$$

$$-2 = \frac{-v}{-30}$$

$$\boxed{v = -60 \text{ cm}}$$

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

$$= -\frac{1}{30} - \frac{1}{60}$$

$$= \frac{-2-1}{60}$$

$$\frac{1}{f} = \frac{-3}{60}$$

$$\boxed{f = -20 \text{ cm}}$$

so, R = 40 cm

4. Image of an object formed on the retina of our eyes is :

(A) Real and inverted (B) Virtual and erect

(C) Real and erect (D) Virtual and inverted

Ans. A

Sol. Conceptual

5. Angle of deviation caused by dispersion of light by a prism is least for :

(A) Red light (B) Yellow light

(C) Blue light (D) Violet light

Ans. A

Sol. Conceptual

CHEMISTRY

6. The below reaction is used in the manufacture of washing soda commercially. This process is known as Solvay's process. Identify X and Y in the reaction

$$NaCl + H_2O + CO_2 + X \longrightarrow NaHCO_3 + Y$$

	X	Y
(A)	NH_4Cl	NH_3
(B)	NH_3	NH_4Cl
(C)	N_2	NH_4Cl
(D)	NCl_3	NH_4Cl

Ans. B

Sol. Fact

7. Bindhu mixed equal volume of silver nitrate solution with a solution of sodium chloride. What would she observe?

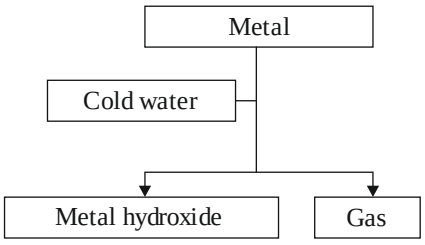
(A) Formation of yellow precipitate (B) Formation of white precipitate

(C) Release of carbon dioxide gas (D) Formation of green precipitate

Ans. B

Sol. $AgNO_3(aq) + NaCl(aq) \rightarrow \underset{\text{white ppt}}{AgCl(s)} + NaNO_3(aq)$

8.



Which of the following combination(s) are correct?

	Metal	Gas evolved
i	Sodium	Yes
ii	Potassium	No
iii	Iron	Yes
iv	Calcium	Yes

(A) (i) and (ii) (B) (ii) and (iii)

(C) (i) and (iii) (D) (i) and (iv)

Ans. D

Sol. $2Na + \underset{\text{cold water}}{2H_2O} \longrightarrow 2NaOH + H_2 \uparrow$

$2K + \underset{\text{cold water}}{2H_2O} \longrightarrow 2KOH + H_2 \uparrow$

$Ca + \underset{\text{cold water}}{2H_2O} \longrightarrow Ca(OH)_2 + H_2 \uparrow$

$\underset{\text{Red hot}}{3Fe} + \underset{\text{steam}}{2H_2O} \longrightarrow Fe_3O_4 + 4H_2 \uparrow$

9. Which of the following correctly represents a balanced chemical equation ?

(A) $3Hg(OH)_2 + 2H_3PO_4 \rightarrow Hg_3(PO_4)_2 + 6H_2O$ (B) $N_2 + H_2 \rightarrow 2NH_3$

(C) $H_2O_2 \rightarrow 2H_2O + O_2$ (D) $As + 6NaOH \rightarrow 2Na_2AsO_3 + 3H_2$

Ans. A

10. Which of the given options correctly represents the parent acid and base of potassium phosphate

Option	Parent acid	Parent base
(A)	CH_3COOH	$CaSO_4$
(B)	HCl	NaOH
(C)	H_3PO_4	KOH
(D)	H_2SO_4	K_2SO_4

Ans. C

Sol. H_3PO_4 + 3KOH ¾® K_3PO_4 + $3H_2O$

parent acid parent base potasium phosphate

11. Out of the following pairs of compounds, the unsaturated compounds are

(A) C_2H_6 and C_4H_6 (B) C_6H_{12} and C_5H_{12}

(C) C_4H_6 and C_6H_{12} (D) C_2H_6 and C_4H_{10}

Ans. C

Sol. C_4H_6 follows C_nH_{2n-2} its an alkyne and C_6H_{12} follows C_nH_{2n} it's an alkene

12. Find the incorrect match:

(A) Bauxite $\rightarrow$ Oxide ore (B) Zinc blende $\rightarrow$ Sulphide ore

(C) Calamine $\rightarrow$ Carbonate ore (D) Horn Silver $\rightarrow$ Phosphate ore

Ans. D

Sol. Horn silver (AgCl) is a halide ore

13. Assertion : Commercial Name of calcium hydride is known as Hydrolith

Reason : Metal Hydride are covalent in nature

(A) Assertion and Reason are both correct and Reason is the correct explanation of Assertion

(B) Assertion and Reason are both correct and reason is not the correct explanation of Assertion

(C) Assertion is true, reason is false

(D) Both Assertion and Reason are false

Ans. C

Sol. Metal Hydrides are ionic in nature

BIOLOGY

14. Glycolysis occurs in the ———and produces———, which in the presence of O_2 enters the———

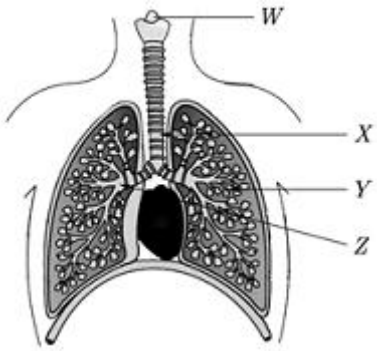
(A) Cytosol, pyruvate, mitochondria (B) Cytosol, glucose, mitochondria

(C) Mitochondria, pyruvate, chloroplast (D) Chloroplast, glucose, cytosol

Ans. A

Sol. Glycolysis occurs in cytoplasm. It it glucose is broken down to pyruvic acid. In presence of O_2 pyruvic acid enters mitochondrial matrix to form CO_2, H_2O.

15. The diagram shows part of the human gas exchange system. Here, W X, ,Y and Z are?

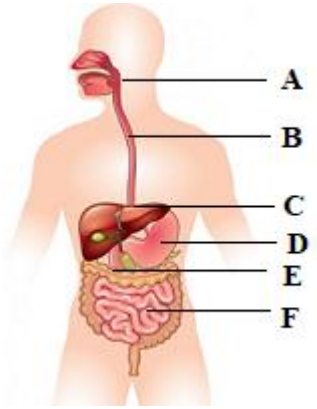


	Bronchus	Bronchiole	Larynx	Trachea
(A)	W	X	Z	Y
(B)	X	Z	Y	W
(C)	Y	W	X	Z
(D)	Z	Y	W	X

Ans. D

Sol. Larynx is at the beginning of trachea. After trachea, bronchi are found which further branch into bronchioles

16. Which of these correctly represent the labels B C D and E



(A) Pancreas , Oesophagus , Stomach , Liver
(B) Oesophagus , Liver , Stomach , Pancreas
(C) Stomach , Liver , Oesophagus , Pancreas
(D) Oesophagus , Pancreas , Liver , Stomach

Ans. B

Sol. Oesophagus , Liver , Stomach , Pancreas

17. Hormone released by placenta :

(A) Estrogen
(B) Progesterone
(C) hCG hormone
(D) Both (B) and (C)

Ans. D

18. Menopause in woman

(A) Phase when ovulation and menstruation starts
(B) Begin when no follicles are left in ovaries
(C) Occurs at the age of 30 years
(D) When egg is not fertilized

Ans. B

19. Filteration of the blood takes place at

(A) PCT
(B) DCT
(C) Collecting duct
(D) Malphigian capsule

Ans. D

20. Expiration involves

(A) Relaxation of diaphragm and intercostals muscles
(B) Contraction of diaphragm and intercostals muscles
(C) Contraction of diaphragm muscles
(D) Contraction of inter costal muscles

Ans. A

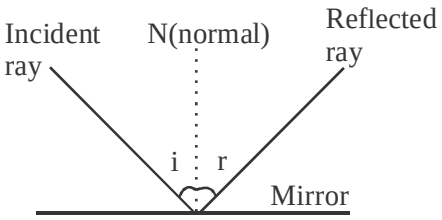
Sol. Expiration involves Relaxation of diaphragm and intercostals muscles where as for inspiration cantraction occurs of the diaphragm and intercoastal muscles.

SECTION - B

PHYSICS

21. Explain laws of reflection with the help of a ray diagram

Sol. The 1st law of reflection states that the angle of incidence is equal to the angle of reflection. Angle of incidence is the angle made by the incident ray with the normal. The reflected ray is the angle made by the reflected ray with the normal.



Thus, Angle of incidence, i =Angle of reflection, r

The 2nd law of reflection states that: The Incident ray, the reflected ray and the normal to the reflecting surface are coplanar.

By coplanar it is mean that they lie on re same piane.

CHEMISTRY

22. Answer the following questions?

a) Why graphite is used as lubricant?

b) How many hexagonal and pentagonal rings are present in C_{60} molecules

Sol. a) As structure of graphite contains flat hexagonal parallel layers joined togethers by weak vander waals forces. Thus these layers can slide over one another easily making graphite a good lubricant.

b) It contains 20 hexagonal and 12 pentagonal rings fused together.

BIOLOGY

23. If a plant is kept covered with a polythene sheet, we notice some water drops on the inner side of the sheet after sometime. What are they due to ? What is the significance of this process ?

Sol. The condensed water is from the water vapour that is lost from aerial part of plant - The process called transpiration.

Transpiration helps in temperature regulation and it also helps in ascent of sap from roots to leave.

24. Explain briefly double circulation

Sol. In double circulation, blood passes twice through the heart.

Systemic circulation :-

$$\text{Left ventricle} \xrightarrow{\text{Aorta}} \text{Body parts} \xrightarrow{\text{Venacava}} \text{Right atrium}$$

Pulmonary Criculation :-

$$\text{Left ventricle} \xrightarrow[\text{artery}]{\text{Pulmonary}} \text{Lungs} \xrightarrow[\text{Vein}]{\text{Pulmonary}} \text{Left atrium}$$

25. Name one sexually transmitted disease. Each caused due to bacterial infection and viral infection. How can they be prevented?

Sol. Bacterial infection is gonorrhea.

Viral infection is AIDS.

These disease can be prevented by responsible. Sexual behaviour such as use of condom during intercourse etc.

26. (i) In human body what is the role of

(a) Seminal vesicles (b) Prostate gland

Sol. (i) (a) Seminal vesicles produce seminal plasma which is in the form of fluid makes the transport of sperms.

(b) Prostate gland secretes prostatic fluid that keeps the sperms alive and help them to swim vigorously.

SECTION - C

PHYSICS

27. A proton is moving in a uniform magnetic field what will be the path of the proton.

If its initial direction is-

(a) (i) Parallel to the field.

(ii) Perpendicular to the field.

(b) What will happen to the momentum of proton in both the above mentioned cases? will it change?

Sol. (a) (i) Straight line

(ii) Circle

(b) When proton goes parallel, $\Delta p = 0$

When proton goes perpendicular, 'p' changes

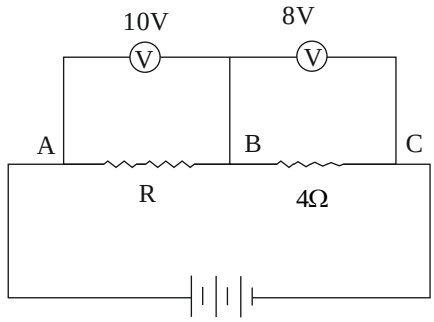
28. A spherical mirror produces a magnification of + 1.5. Explain all the nature and size of the image formed by it . Which type of spherical mirror is this?

Sol. Image in enlarged

Magnification is positive means the image is virtual and erect

Cocave mirror is used

29. Consider the circuit shown in figure. The voltmeter on the left reads 10V and that on the right reads 8V. Find (a) The current through the resistance R, (b) the value of R, and (c) the potential difference across the battery.



Sol. (a) As both resistors R and 4Ω are in series the current through both resistors is same.

$\therefore$ Current through 4Ω resistors is

$$I = \frac{V}{R} \Rightarrow V = 8V, R = 4\Omega$$

$$\therefore I = \frac{8}{4} \Rightarrow I = 2A$$

as current through R = current through 4Ω resistors

$\therefore$ Current through resistor R is 2A

(b) Now we know the current through the circuit value

i.e ; I = 2A and the voltage across the resistance R is 10V.

$$\therefore R = \frac{V}{I} \Rightarrow V = 10V, I = 2A$$

$$R = \frac{10}{2} \Rightarrow R = 5\Omega$$

(c) The voltmeter readings are 10V and 8V.

$\therefore$ The potential difference across the battery is 10 + 8 = 18V

CHEMISTRY

30. Name the oxidising agent used for the conversion of ethanol to ethanoic acid (give equation), distinguish between ethanol and ethanoic acid on the basis of

i. Litmus test ii. Reaction with sodium hydrogen carbonate

Sol. Oxidising agent - alkaline $KMnO_4$

i. Litmus test

Ethanol : No change in colour

Ethanoic acid : Blue to Red

ii. $C_2H_5OH + NaHCO_3 \longrightarrow$ No reaction

$CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2$

31. Define Homologous series. Explain atleast four characteristics of homologous series.

Sol. Within in a particular family, the compounds are further grouped in a number of series on the basis of structure. These series are known as homologous series. Homologus series may be defined as a series of similarly constituted compounds in which the members possess the same functional group and have similar chemical characteristics and the two consecutive members differ in their molecular formula by $-CH_2$.

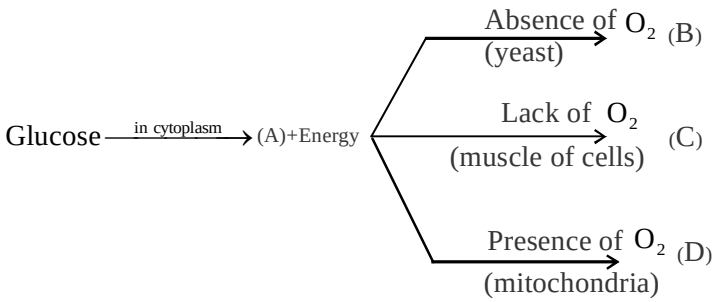
The various members of a particular homologous series are called homologues.

The common characteristics of homologous series are as follows:

1. All the members of a series can be represented by the same general formula. For example, general formula of alkanes is C_nH_{2n+2}.
2. Any two consecutive members differ in their formula by a common difference of $-CH_2$.
3. Different members in a series have a common functional group. For example, the members of the alcohol family have –OH group as their functional group.
4. The members in any particular family have almost identical chemical properties. Their physical properties such as melting point, boiling point, density, solubility, etc., show a regular gradation with the increase in the molecular mass.
5. The members of a particular series can be prepared almost by the identical methods, known as the general methods of preparation.

BIOLOGY

32. **(a)** Fill in this flow chart and state what is A,B, C and D



(b) What is the name given to the process to form A and D.

Sol. (a) (A) Pyruvate

(B) Ethanol + CO_2+ Energy

(C) Lactic acid + Energy

(D) CO_2 + H_2O + Energy.

(b) Process to form A is : Glycolysis.

Process to form D is: Cellular respiration

33. What are the parts of central nervous system ? Give two functions of each part.

Sol. Brain and spinal cord are parts of central nervous system.

Brain - Cerebrum helps in perceiving senses like smell, taste, vision, touch etc.

Hypothalamus helps in regulation of body temperature and also controls master endocrine gland.

Spinal cord - Spinal cord helps in coordinating simple spinal reflexes, coordinating autonomic reflexes like the contraction of the bladder.

SECTION - D

PHYSICS

34. (i) What is Overloading? How it occurs?

(ii) Some devices used at a home are given along with their numbers, power ratings & usage time.

Device	Number	Power	Usage time
Refrigerator	1	400 W	8hour/day
Electric Bulb	2	40 W	4 hour/day
Tube light	4	60 W	4 hour/day
Fan	4	100 W	6 hour/day

Find the total units (in KWH) of energy consumed for 30 days. What is the cost of the total energy consumed for 30 days if one unit consists Rs.3.00

Sol. (i) Overloading is a condition in which exclusively high current flows through a circuit.

It can occur in many way:-

(a) Due to accidental hike in the supply voltage.

(b) By connecting too many devices to a single socket.

(c) When the live wire & the neutral wire come into direct contact, the resistance in the circuit increases abruptly. This is called short-circuiting. This usually occurs when the insulation of wires is damaged or there is a fault in the appliance.

(ii) Thus converting power in KW for each device

P of Refrigerator = $\frac{400}{1000}$kW

P of Electric bulb = $\frac{40}{1000}$kW

P of Tube light = $\frac{60}{1000}$kW

P of Fan = $\frac{100}{1000}$kW

Total energy consumed by each appliance in a single day.

For refrigerator,

Energy consumed per day (in kWh) =

$1 \times \frac{400}{1000}\text{kW} \times 8\text{hr}$

$= 3.2\text{kWh}$

For electric bulb,

Energy consumed per day (in kWh) = $2 \times \frac{40}{100}\text{kW} \times 4\text{hr}$

$= 0.32\text{kWh}$

For tubelight,

Energy consumed per day (in kWh) = $4 \times \frac{60}{1000}\text{kW} \times 4\text{hr}$

$= 0.96\text{kWH}$

For Fan

Energy consumed per day (in kWh) = $4 \times \frac{100}{1000}\text{kW} \times 6\text{hr}$

$= 2.4\text{kWh}$

Total energy consumed per day by all devices

$= 2.4 + 0.96 + 0.32 + 3.2$

$= 6.88\text{kWh}$

CHEMISTRY

35. A. Give one example each of the sodium salts as

i. Acidic salt ii. Normal salt iii. Mixed salt iv. Complex salt

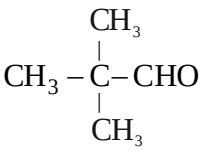
B. a. Define a balanced chemical equation

b. Write balanced chemical equation for the following reaction

i. Phosphorus burns in presence of chlorine to form phosphorus pentachloride

ii. Burning of natural gas (Methane).

c. Write the IUPAC name for the following.

(i) 

(ii) $CH_3 - CH_2 - CH_2 - OH$

Sol. A. i. $NaHCO_3$

ii. Na_2SO_4 or Na_2CO_3

iii. $NaKSO_4$

iv. $Na\left[Ag(CN)_2\right]$

B. a. A chemical equation is defined as a shorthand notation of an actual chemical reaction in terms of the symbols & formulae along with no of atoms & molecules of its reactants & products.

b. i. $P_{4(s)} + 10Cl_{2(g)} \longrightarrow 4PCl_{5(s)}$

ii. $CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(i)} + \text{heat energy}$

c. i. 2,2-Dimethyl propanal

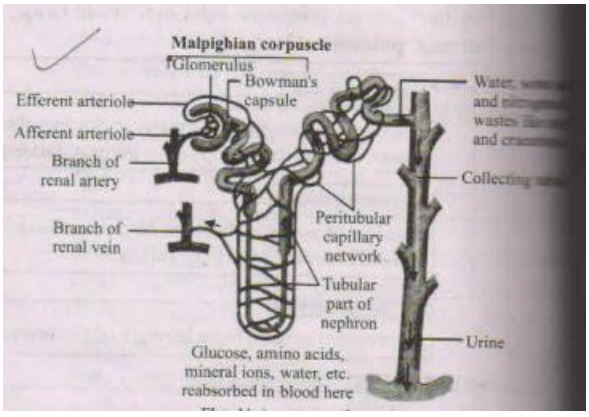
ii. Propanol

BIOLOGY

36. (a) Draw a neat and well labeled diagram of nephron.

(b) State and explain the steps of urine formation.

Sol. (a)



(b) Urine formation involves three basic steps namely

1. Ultra filteration: where filteration and separation of substances occur through ultra microscopic pores of glomerulus and collects in Bowman's capsule
2. Selective Reabsorption: Reabsorption of essential nutrients in the tubules of nephron
3. Tubular secretion: Secretion of some waste or toxic materials directly at DCT by the blood vessels that pass around it. The fluid that now flows through collecting tubule is called urine.

SECTION - E

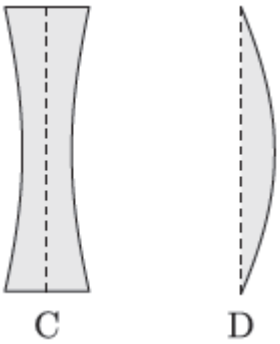
PHYSICS

37. Lenses are objects made of transparent materials such as glass or clear plastic that has curved surfaces. Diverging lenses are thicker at their edges than at their centres and makes light rays passing through them spread out.Converging lenses are thicker in their middle than at this edges and make light rays passing through them focus at a point. These are used in spectacles to help people with poor vision see better. The converging lenses magnify by bending the rays of light that pass through them to meet at a point called focus. Thicker the converging lens is at its centre, the more its magnifies and closer the focus is to the lens.

(i) Ravi uses two lenses A and B of same size and same material as shown. P_1 and P_2 are the powers of A and B. An object is kept at the same distance from the lens between F and 2F of each lens on the princi pal axis in turn. Let I_1 and I_2 be the image formed by two lenses respectively. What is the relation of image distances of both lens ?

(ii) Write down the relation between the power of lens of both lenses ?

(iii) Meenakshi uses above two lenses A and B along with another two lenses C and D, as shown :



She is able to see the subject matter on the black board while sitting in the front row in the classroom but is unable to see the same matter while sitting in the last row.

Which of the above four lenses will she require to correct the defect in her vision? Why ?

OR

(iv) Natasha places an object on the principal axis of above given lens A. One end of this object coincides with the focus F and the other end with 2F. What will be the nature of the image formed by the lens on the other side ?

Sol. (i) Distance of image I_2 will be less than distance of I_1 from the lens.

(ii) $P_1 < P_2$

(iii) She will require lens C. Because, she is suffering from myopia and in myopia concave lens is required to correct it.

OR

(iv) The nature of the image formed will be infinite in size

CHEMISTRY

38. The reactivity series is a list of metals arranged in the order of their decreasing activities. The metal at the top of the reactivity series is the most reactive and metal at the bottom is the least reactive. The more reactive metal displaces less reactive metal from its salt solution.

K	Potassium	More reactive
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	Reactivity decreases.
Fe	Iron	
Pb	Lead	
[H]	[Hydrogen]	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	Least reactive

(i) Name the metals which react with steam but not with hot water.

(ii) What happen when calcium react with concentrated nitric acid and which method is used to extract metal present at the top of the reactivity series?

OR

(iii) Which of the following metals exist in their native states in nature?

I. Cu

II. Au

III. Zn

IV. Ag

Sol. (i) Fe, Al, Zn

(ii) $Ca + 4HNO_3 \rightarrow Ca(NO_3)_2 + 2H_2O + 2NO_2$

Electrolytic reduction

(iii) Au, Ag

BIOLOGY

39. Question numbers i - iv are based on the table given below. Study the table and answer the following questions

	Characters	Males	Females
1	Total no. of chromosomes	23 pairs	23 pairs
2	No. of autosome	22 pairs	22 pairs
3	No. of sex chromosome	1 pairs	1 pairs

(i) What is sex determination?

(ii) What are the sex chromosomes in the males?

(iii) What are the sex chromosomes in the females?

OR

(iv) Is the father responsible for the sex of the child ?

Sol. (i) A sex determination system is a biological system that determines the development of sexual characteristics in an organism.

(ii) XY

(iii) XX

OR

(iv) Yes, father is responsible for sex determination