10th STD - SCIENCE SPECIAL GUIDE

KRISHNAGIRI DISTRICT
2024-2025

UNDER THE GUIDANCE OF

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கிருஷ்ணகிரி மாவட்டம்

10-ஆம் வகுப்பு

ஒரு மதிப்பெண் வினாக்கள்

10-ஆம் வகுப்பு பாடப்புத்தகத்தில் உள்ள ஒரு மதிப்பெண் வினாக்கள், GeoGebra மென்பொருளின் உதவியோடு,ஒரு வினாவிற்கு சரியான விடையை தேர்வு செய்ய ,அதிகபட்சம் மூன்று வாய்ப்புகள் வழங்கி, மாணவர்களின் கற்றல் ,கற்பித்தல் திறன் அதிகரிக்கும் வகையில் வடிவமைக்கப்பட்டுள்ளது என்பதை தெரிவித்துக்கொள்கிறோம்.

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பாடம்	தமிழ் வழி (T/M)	ஆங்கில வழி (E/M)
தமிழ் TAMIL	https://www.geogebra.org/m/ezxpdqyz	
ஆங்கிலம் ENGLISH		https://www.geogebra.org/m/b7w4y8an
கணிதம் MATHEMATICS	https://www.geogebra.org/m/q4wb3una	https://www.geogebra.org/m/utz8tarz
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1 . Laws of Motion

1.Define Inertia. Give its Classification.

The inherent property of a body to resist any change in its state of rest or the uniform motion, unless it is influenced upon by an external unbalanced force is known as inertia

1.Inertia of rest. 2. Inertia of motion

3.Inertia of direction.

2.Classify the types of force based on their application?

1 .Like parallel force. 2.Unlike parallel force.

3. State Newton`s Second Law ?

The force acting on a body is directly proportional to the rate of change of linear momentum. F = ma

4. Why a spanner with a long handle is preferred to tighten screws in heavy vehicles ?

- A spanner with a long handle give high torque with less force.
- Easy using long handle spanner.

5. While catching a cricket ball the fielder lowers his hands backwards. Why ?

- Longer interval of time.
- Lesser impulse on his hand.

6. How does an astronaut float in a space shuttle ?

- Since Space Station and astronaut have equal acceleration.
- They are under free fall condition.
- The state of weightlessness and seem floating.

7. Differentiate mass and weight

Mass	Weight
The quantity of matter contained in the body	The gravitational force exerted on the body
Scalar quantity	Vector quantity
Unit - kilogram	Unit – Newton
It is measured by physical balance	It is measured by spring balance

8.What are the types of inertia ? Give an example for each type.

1. Inertia of rest :

The resistance of a body to change its state of rest called inertia of rest.

Eg. Fruits are detached and fall down.

2. Inertia of motion :

The resistance of a body to change its state of motion is called inertia of motion.

Eg .An athlete runs some distance before jumping.

3. Inertia of direction:

The resistance of a body to change its direction of motion is called inertia of direction. Eg. Driving a car tend to lean side ways.

9.State the Newton`s law of motion

FIRST LAW:

Everybody continues to be in its state of rest or in the uniform motion unless it is acted by some external force .

SECOND LAW:

The force acting on a body is directly proportional to the rate of change of linear momentum. **F = ma**

THIRD LAW:

For every action there is an equal and opposite reaction. **F = - F**

10.Describe the rocket propulsion.

- Propulsion of rockets are based on the law of conservation of liner momentum and Newton`s 3rd law.
- Rockets are filled with a fuel.
- The mass of the rocket decreases with increase in velocity of the rocket.
- It reaches a velocity to escape from the gravitational pull of the Earth.
- This velocity is called escape velocity.

2 OPTICS

1.What is refractive Index ?

The ratio of speed of light in Vacuum to the speed of light in a medium is refractive Index of medium $\mu = \frac{c}{v}$

2. State Snell`s law.

The ratio of sine of the angle of incidence to sine of the angle of the refraction is equal to the ratio of refractive indices of the two media.

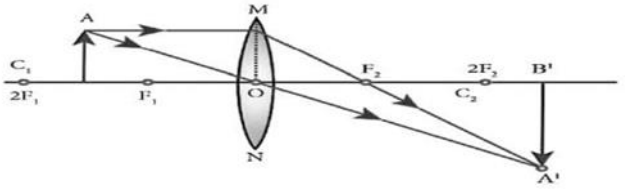
3. Define dispersion of light.

When a beam of white light is refracted through any transparent media , it splits into its seven colour. This is called dispersion of light.

4. State Rayleigh`s law of scattering.

The amount of scattering of light is inversely proportional to the fourth power of its wave length. $S \propto 1/\lambda^4$

5.Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F



6.Differentiate convex lens and concave lens

Convex lens	Concave lens
Thicker in middle	Thinner in middle
Converging lens	Diverging lens
Real image	Virtual image
Used to treat hypermetropia	Used to treat myopia

7.What are the causes of ``Myopia`` ?

Lengthening of eye ball and shortening of focal length increases the distance between eye lens and retina.

8.Why does the sky appears in blue colour ?

According to Rayleigh`s law,The blue colour with shorter wave length scatters to a greater extent, causes the sky to appear in blue colour .

9.Why are traffic signals red in colour ?

As the red light has highest wavelength , it scatters least and travels longer distance.

10.List any five properties of light ?

- Light is a form of energy.
- Travels along a straight line.
- Dose not need any medium.

- Different coloured light has different wave length.
- Speed of light in air or vaccum3×10^8 m/s.

11.Differentiate Myopia and Hypermetropia.

Myopia	Hypermetropia
Lengthening of eye ball	Shortening of eye lens
Distance objects cannot be seen	Nearby objects cannot be seen
The focal length of the eye lens is reduced	The focal length of the eye lens is increased
Can be corrected using concave lens	Can be corrected using convex lens
It is short sightedness	It is long sightedness

3. THERMAL PHYSICS

1.Define one calorie

Amount of heat energy required to rise the temperature of 1 gram of water through 1°C.

2.State Boyle's law

When the temperature is kept constant, the **volume of gas is inversely proportional to its pressure**. $P\propto 1/V$

3.State-the law of volume (Charles law)

When the pressure is kept constant, the **volume of a gas is directly proportional to the temperature**. $V\propto T$

4.State Avogadro's Law?

At constant pressure and temperature, the **volume of a gas is directly proportional to the number of atoms** or molecules present in it. $V\propto n$

5.Distinguish between ideal gas and real gas

Ideal gas	Real gas
If the atoms or molecules of a gas do not interact with each other	If the atoms or molecules of a gas interact with each other
Force of attraction is very weak	Force of attraction is more
It obeys Boyle's law, Charles law and Avogadro law	It does not obey laws of gases

4. ELECTRICITY

1.What is electric current?

The **rate of flow of charges** in a conductor. **I = Q/t**

2.Define the unit of current .

1 **ampere = 1coulomb/1second**

3.Which instrument is used to measure the electric current?

Ammeter

4.What happens to the resistance, as the conductor is made thicker?

The resistance **decreases**

5.Name any two devices, which are working on the heating effect of the electric current.

1. Electric iron 2. Electric heater

6.State Ohm's law.

At a constant temperature, the steady **current** 'I' flowing through a conductor is **directly proportional** to the **potential difference** 'V' . **V = IR**

7.What connection is used in domestic appliances?

Connected in **parallel**

8.State Joule's law of heating?

$H = I^2RT$

5 ACOUSTICS

1.Match it.

Infrasonic	- 10 Hz
Echo	- Ultrasonography
Ultrasonic	- 22 kHz
High pressure region	- Compressions

2.What is a longitudinal wave ?

The particles of the medium vibrate along the direction of propagation is called longitudinal wave.

3.What is the audible range of frequency?

Between 20 Hz and 20,000 Hz

4.What is the minimum distance needed for and echo?

17.2m

5.Name three animals, which can hear ultrasonic vibrations.

Mosquito, Dogs, bats.

6.Why does sound travel faster on a rainy day than on a dry day?

- Moisture content is more in the atmosphere
- Velocity of sound increases as humidity increases.

7.Explain why, the ceilings of concert halls are curved.

- ceilings of concert halls are cruved so that the sound after reflection reaches every corner of the concert hall and the audience can listen the sound clearly.
- When the sound waves are reflected from the curved surfaces, the intensity of the reflected waves is changed.
- It is due to the multiple reflections of sound waves from the curved walk.

8.Mention two cases in which there is no Doppler effect in sound?

- When source (S) and listener (L) both are at rest.
- When source (S) and Listener (L) moving in mutually perpendicular directions.

9. a) What do you understand by the term 'ultrasonic vibration'?

b) State three uses of ultrasonic vibrations.

c) Name three animals which can hear ultrasonic vibrations.

a) Ultrasonic vibrations :

- High frequency sound waves beyond the range of human hearing is called Ultrasonic vibration.
- Range of frequency – greater than 20000 Hz (20 KHz).

b) Three uses of ultrasonic vibrations :

- Animals such as bats and frogs use ultrasonic waves to communicate with each other.
- It is used to remove impurities such as grease, oil from glass, metals and ceramics.
- To create the images of the internal organs of the body.

c) Dogs, Bats, and Dolphins

10.What is an echo?

a) State two conditions necessary for hearing an echo.
b) What are the medical applications of echo?
c) How can you calculate the speed of sound using echo?

Echo : An echo is the sound reproduced due to reflection of the original sound from various rigid surfaces.

a) Conditions necessary for hearing an echo :

- The minimum time gap between the original sound and an echo must be 0.1 s
- The minimum distance required to hear an echo is 1/20th

b) Medical applications of echo :

- It is used in obstetric ultrasonography to create real – time visual images of developing embryo or foetus in the mother's uterus.

c) Calculation of speed of sound using echo:

- Speed of sound v = 2d/t.

6 NUCLEAR PHYSICS

1.Match it

Fuel - Uranium

Moderator - Heavy water

Control rods - Water

Shield - lead

Fe – 59 - Leukemia

I – 131 - Thyroid disease

Na – 24 - Function of heart

C – 14 - Age of fossil

2.Who discovered natural radioactivity?

Henri Becquerel

3.Write any three features of natural and artificial radioactivity.

Natural Radioactivity	Artificial Radioactivity
It takes place on its own in nature	It is induced by man
Spontaneous process	Induced process
Cannot be controlled	Can be controlled
Alpha, Beta, and gama radiations are emitted	Neutron, positron and gama rays are emitted

4.Define one roentgen

The quantity of radioactive substance which produces a charge of 2.58 X 10^{-4} coulomb in 1 kg of air under STP.

5.State Soddy and Fajan's displacement law.

Alpha decay – In daughter nuclei 4 units of mass number and 2 units of atomic number will be decreased.

Beta decay – In daughter nuclei same mass number and atomic number will be increased by 1 unit.

6.Give the function of control rods in a nuclear reactor.

- To control the number of neutrons.
- To control chain reaction.
- Boron and cadmium rods absorb the neutrons.

7.In japan some of the new born children and having congenital diseases. Why?

- Due to high exposure of radiation.
- Caused by atom bomb during second world war.
- It affected the mother who were pregnant at that instant.

8.What is stellar energy?

Fusion reaction that take place in the core of the stars like sun, emit a large amount of energy in the form of light and heat.

9.Give any two uses of radio isotopes in the field of agriculture?

- To increase the productivity of crops
- To kill the insects and parasites.

11.Explain the process of controlled and uncontrolled chain reactions.

Controlled chain reaction :

- The number of neutrons released is maintained to be one.
- This is achieved by absorbing the extra neutrons with a neutron absorber leaving only one neutron to produce further fission.

- The energy produced was used for construction purpose.
- Used in nuclear reactor to produce energy in sustained manner.

Uncontrolled chain reaction :

- The number of neutrons multiplies in a very large amount .
- Release of a huge amount of energy within a fraction of a second.
- Used in atom bomb to produce explosion.

12.Compare the properties of alpha, beta and gamma radiations.

Properties	Alpha rays	Beta rays	Gama rays
Particle	Helium nucleus	Electrons	Photons
Charge	Positively charge	Negatively charge	Neutral
Ionising power	High	Low	Very low
Penetrating power	Very low	High	Very high
Speed	1/10 to 1/20 times the speed of light	Upto 9/10 times the speed of light	Travel with the speed of light.

13.What is a nuclear reactor? Explain its essential parts with their functions.

Device in which the nuclear fission reaction takes place in a self-sustained and controlled manual to produce electricity is called Nuclear reactor

Fuel	A fissile material is used as fuel. Eg. Uranium
Moderator	Used to slow down the high energy neutrons to provide slow neutrons Eg. Graphite and heavy water.
Control rod	Used to control the number of neutrons Eg. Boron or cadmium Rods.
Coolant	To remove the heat. Eg.Water , air and helium.
Protection wall	It is made up of thick concrete lead wall to prevent the harmful radiations.

Chemistry

1.Write the different types of isotopes of oxygen and its percentage abundance

Isotopes of oxygen:.

Isotopes	% abundance
$_8O^{16}$	99.757
$_8O^{17.}$	0.038
$_8O^{18}$	0.205

2.Define: Atomicity

The number of atoms present in the molecule is called its atomicity

E.g: Atomicity of Phosphorus (P_4) = 4, Atomicity of HCl = 2.

3. What is molar volume of a gas?

One mole of any gas occupies 22.4 litre at S.T.P.

4.Give any two examples for heterodiatomic molecules.

1. Hydrogen Chloride (HCl) 2. Carbon monoxide (CO)

5.Give the salient features of "Modern atomic theory

- An atom is divisible.
- ($E = mc^2$)
- Atom is the smallest particle
- Isotopes ($_{17}Cl^{35}$, $_{17}Cl^{37}$)
- Isobars ($_{18}Ar^{40}$, $_{20}Ca^{40}$).
- Atoms are destructible
- Atoms may not always combine in a simple whole number ratio. E.g: Glucose $C_6H_{12}O_6$

6.What is rust? Give the equation for formation of rust.

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface.This compound is known as rust .

$4Fe + 3O_2 + xH_2O \longrightarrow 2Fe_2O_3.xH_2O$

7.State two conditions necessary for rusting of iron.

- Moist air
- Presence of oxygen
- Presence of water

8.The aquatic animals live more in cold region. Why?

- More amount of dissolved oxygen
- The solubility of oxygen in water is more at low temperatures.

9. Classify the following substances into deliquescent, hygroscopic. Conc. Sulphuric acid, Coppersul phatepenta hydrate, Silica gel, Calcium chloride and Gypsum salt.

Hygroscopic	Deliquescent
Conc. sulphuric acid, Silica gel, Copper sulphate penta hydrate, Gypsum salt	Calcium chloride,

10.What is meant by binary solution?

Solutions with two components are called binary solutions. E.g: salt in water.

11.Give an example each

Solute Solvent	Example
Gas in liquid.	Soda water
Solid in liquid.	Salt in water
Solid in solid.	Alloys
Gas in gas.	Mixture of Helium - Oxygen gases

12.A hot saturated solution of copper sulphate forms crystals as it cools. Why?

- It is due to the water of crystallization.
- when heated loses its five water molecules
- On cooling, the salt turns back into hydrated salt crystals.

13. Write notes on.

- **Saturated solution:**
  A solution in which no more solute can be dissolved
  E.g: 36 g of NaCl in 100 g of water

- **Unsaturated solution:**
  An unsaturated solution contains less solute
  E.g: 10 g NaCl in 100 g of water

14.Explain the factors influencing the rate of a reaction.

- Nature of the reactants
- Concentration of the reactants
- Temperature
- Catalyst
- Pressure
- Surface area of the reactants

15.What happens when MgSO4.7H2O is heated? Write the appropriate equation.

- It loses seven water molecules

$$MgSO_4.\ 7H_2O \xrightarrow{\Delta} MgSO_4 + 7H_2O$$

16.In what way hygroscopic substances differ from deliquescent substances.

Hygroscopic substances	Deliquescence substances
They absorb moisture and do not dissolve.	They absorb moisture and dissolve.
Do not change its physical state	Change their physical state
Amorphous solids	Crystalline solids
Used as drying agents. Eg.Quick lime,	Forming saturated solutions. E.g: Caustic soda

17.Differentiate reversible and irreversible reactions.

Reversible Reaction	Irreversible Reaction
Can be reversed	Cannot be reversed
Attains equilibrium	Equilibrium is not attained
Slow.	Fast

18.Derive the relationship between Relative molecular mass and Vapour density.

Vapour Density (V.D) = Mass of a given volume of gas / Mass of the same volume of hydrogen

According to Avogadro's law

V.D =Mass of 'n' molecules of a gas/Mass of 'n' molecules of hydroge

since hydrogen is diatomic

V.D = Mass of 1 molecules of a gas / Mass of 2 atoms of hydrogen

V.D = Relative molecular mass/ 2

Relative molecular mass = 2 x vapour density.

19. How does pH play an important role in everyday life?

- Our body works, within the pH range of 7.0 to 7.8.,
- pH of blood ranges from 7.35 to 7.45.
- pH of the stomach fluid is 2.0
- pH of the saliva 6.5 to 7.5.
- pH of soil:
- Citrus fruits - alkaline soi
- rice -acidic soil.
- Sugarcane -neutral soil.
- pH of rain water-7
- less than 7 acid rain

20.Differentiate soaps and detergents.

Soap	Detergent
It is a sodium salt of long chain fatty acids	It is sodium salts of sulphonic acids
It is prepared from vegetable oils	It is prepared from crude oil.
Biodegradable	non- biodegradable.
poor foaming capacity	rich foaming capacity.
It forms a scum in hard water	Does not form a scum in hard water

21.What is called TFM?

TFM-Total Fatty Matter.

22.What is called homologous series? Give any three of its characteristics?

Homologous series:

A class of organic compounds having same general formula

Characteristics:

- Have the same elements and functional group.
- General molecular formula.
- Similar chemical properties
- prepared by a common method.

23.A is a reddish brown metal, which combines with O2at < 1370K gives B, a black coloured compound. At a temprature> 1370K A gives C which is red in colour. Find A, B and C with reaction.

A- reddish brown metal - copper

$2Cu + O_2 \xrightarrow{<1370K} 2CuO$

(copper II oxide – black)

$4Cu + O_2 \xrightarrow{>1370K} 2Cu$

(copper I oxide - red)

- A-Copper (Cu)
- B-Copper II oxide (CuO)
- C-Copper I oxide (Cu_2O)

24.A is a silvery white metal. A combines with O_2 to form B at 800°C, the alloy of A is used in making the aircraft. Find A and B.

A-silvery white metal - Aluminium

$4Al + 3O_2 \xrightarrow{800°C} 2A_2IO_3$

A - Aluminium

B - Aluminium oxide

25.Write notes on various factors affecting solubility.

There are three main factors.

1.Nature of the solute and solvent:

- Polar compound dissolves readily in polar solvent eg.NaCl in water
- Non-polar compounds are soluble in non-polar solvents. E.g: Fat dissolved in ether.

2.Effect of Temperature:

- . In endothermic process, solubility increases with increase in temperature
- In exothermic process, solubility decreases with increase in temperature
- Solubility of gases in liquid decrease with increase in temperature.

3.Effect of Pressure:

- When the pressure is increased, the solubility of a gas in liquid increases. E.g: carbonated beverages

26.What is amalgam? Give example.

An amalgam is an alloy of mercury with another metal.Eg.Silver tin amalgam.

27.Define alloys.

An alloy is a homogeneous mixture of two or more metals with certain non metalic elements.

28. What are the methods of preventing corrosion?

- Alloying -stainless steel
- Galvanizing- coating zinc on iron sheets
- Electroplating- coating one metal over another metal by passing current
- Anodizing-Converse the metal surface into a decorative
- Cathodic protection - coated with sacrificial metal

29.State the applications of Avogadro's law.

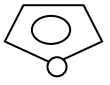
- It explains Gay-Lussac's law.
- Molecular formula of gases can be derived
- It determines the relation between molecular mass and vapour density
- It helps to determine gram molar volume of all gases.

30.Define chemical equilibrium.

Rate of forward reaction = Rate of backward reaction.

31.Classify the following compounds based on the pattern of carbon chain and give their structural formula

- **Propane**
- **Benzene**
- **Cyclobutane**
- **Furan**

Name	Class		Structural Formula
1.Propane	Acyclic Compound		CH_3-CH_2-CH_3 (C_3H_8)
2.Benzene	Cyclic Compound	Aromatic compound	C_6H_6 
3.Cyclobutane		Alicyclic Compound	C_4H_8 
4.Furan		Hetrocyclic compound	C_4H_40 

32.How is ethanoic acid prepared from ethanol? Give the chemical equation.

Ethanoic acid is prepared by the oxidation of ethanol in the presence of alkaline potassium permanganate or acidified potassium dichromate.

$$CH_3CH_2OH \xrightarrow[2[0]]{KMnO_4/OH^-} CH_3COOH + H_2O$$

Ethanol — Ethanoic acid

33.How is ethanol manufactured from sugarcane?

- Ethanol is prepared from **Molasses** by fermentation process.
- **Dilution of molasses:**
  Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent.
- **Addition of nitrogen source**
  If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate or ammonium phosphate
- **Addition of yeast:**
  The enzymes invertase and zymase present in yeast, convert sucrose into ethanol.
- The fermented liquid is technically called **wash.**
- **Distillation of 'Wash':**
  Ethanol which contains 95.5% of ethanol and 4.5% of water it is called **rectified spirit.**
- On distillation of this mixture, pure alcohol100% is obtained.
  This is called **absolute alcohol**.

34.The electronic configuration of metal A is 2, 8, 18, 1.
The metal A when exposed to air and moisture forms B a green layered compound. A with con. H_2SO_4, forms C and D along with water. D is a gaseous compound. Find A, B, C and D.

$$\underset{(A)}{2Cu} + O_2 + CO_2 + H_2O \longrightarrow \underset{(B)}{CuCO_3.Cu(OH)_2}$$

$$\underset{(A)}{Cu} + 2H_2SO_4 \longrightarrow \underset{(C)}{CuSO_4} + \underset{(D)}{SO_2} + 2H_2O$$

- A-Copper
- B-Copper carbonate
- C - Copper sulphate
- D- Sulphur dioxide gas

35. Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A,B and C with reactions

$$\underset{(A)}{2Al} + 3H_2O \longrightarrow \underset{(B)}{Al_2O_3} + 3H_2$$

$$\underset{(A)}{2Al} + 2NaOH \longrightarrow \underset{(C)}{2NaAlO_2} + 3H_2$$

- A - Aluminium
- B - Aluminium oxide
- C - sodium meta aluminate

36.'A' is a blue coloured crystalline salt. On heating it loses blue colour and to give 'B'. When water is added, 'B' gives back to 'A'. Identify A and B, write the equation.

- A - blue colour crystalline salt - Copper sulphate pentahydrate
- B - Anhydrous copper sulphate

37.Lemon juice has a pH 2, what is the concentration of H^+ ion

Since, pH = -log[H^+]

$$-pH = \log[H^+]$$

$$[H^+] = 10^{-pH}$$
$$= 10^{-2}$$
$$= 0.01 \text{moles / litre.}$$

38.Find the percentage of nitrogen in ammonia.

Molar mass NH_3 = (1atomic mass of nitrogen) +(3 x atomic mass of hydrogen)

$$= (1 \times 14) + (3 \times 1)$$

$$= 14 + 3$$

$$= 17g$$

$$\text{Percentage of N in NH3} = \frac{\text{mass of nitrogen}}{\text{molarmass of } NH_3} \times 100$$
$$= (14/17)x100$$
$$= 0.8235x100$$

The percentage of nitrogen in ammonia = 82.35%

39.Calculate the number of water molecule present in one drop of water which weigh 0.18 g.

Avogadro number = 6.023×10^{23}

Given Mass = 0.18g

Molecular weight of water (H_2O) = (2 atomicnumber of H) +(1x atomic number of O)

= (2 x1) + (1 x16) = 2 + 16 = 18g

Number of molecules of one drop of water = $(6.023 \times 10^{23} \times 0.18)/18$

$= 6.023 \times 10^{23} \times 0.01$

$= 0.06023 \times 10^{23}$

40.Calculate the molecular masses ofCO_2

Molecular mass of CO_2 = 1 x atomic mass of C + 2 x atomic mass of O

= (1x12) + (2 x16) = 12 + 32 = 44g

41.Calculate the PH of 1.0×10^{-4} molar solution of HNO_3.

$HNO_3 \rightarrow H^+ + NO_3^{2-}$

$PH = -\log_{10}[H^+]$

$H^+ = 1.0 \times 10^{-4}$

$PH = -\log_{10}(1.0 \times 10^{-4})$

$= -(-4 \times 1 \log_{10} 10)$

PH = 4

42.What is the PH of 1.0×10^{-5} molar solution of KOH?

$KOH_{(aq)} \rightarrow K^+_{(aq)} + OH^-_{(aq)}$

$[OH^-] = 1 \times 10^{-5}$ mol.litre^{-1}

$pOH = -\log_{10}[OH^-]$

$= -\log_{10} x10^{-5}$

$= -(-5 x \log_{10} 10) = -(-5) = 5$

$pH + pOH = 14$

$pH = 14 - pOH$

$pH = 14 - 5 = 9.$

43.Find ph of 0.01M HNO3

$[H+] = 0.01$

$pH = -\log_{10}[H^+]$

$pH = -\log_{10}[0.01]$

$pH = -\log_{10}[1 \times 10^{-2}]$

$pH = -(-2 \times \log_{10} 10)$

pH = 2

44.The hydroxide ion concentration of a solution is 1×10^{-11} M What is the pH of the solution?

$pOH = -\log_{10}[OH^-]$

$pOH = -\log_{10}[1 \times 10^{-11}]$

$pOH = -[-11 \log_{10} 10]$

$pOH = -[-11]$

pOH = 11

$pH + pOH = 14$

$pH = 14 - pOH$

$= 14 - 11$

$pH = 3$

45.$[OH^-] = 1.0 \times 10^{-11}$ Find the pH ?

$[OH-] = 1 \times 10^{-11}$

$pOH = - \log_{10}[OH^-]$

$= - \log 10\ 1 \times 10^{-11}$

$= -(-11) \log 10^{10}$

$pOH = 11 \times 1 = 11$

$pH = 14 - pOH$

$pH = 14 - 11$

$pH = 3$

46.Define Hydrated salt.

The number of water molecules found in the crystalline substance is called water of crystallization.Such salts are called hydrated salts. Eg: Blue vitriol

47.Calculate the number of moles in 27 g of Al 1.51×10^{23}molecules of NH_4Cl.

Number of moles = Number of molecules / Avogadro Number

$= 1.51 \times 10^{23} / 6.023 \times 10^{23} = 15/60$

$= ¼$

$= 0.25$ mole

48.Define-solubility.

Solubility is defined as the number of grams of a solute that can be dissolved in 100 g of a solvent to form its saturated solution at a given temperature and pressure.

Solubility = Mass of the solute/ Mass of the solvent X 100

49.Define Solution.

A solution is a homogeneous mixture of two or more substance.

12.PLANT ANATOMY AND PLANT PHYSIOLOGY

1.What is collateral vascular bundle?

Xylem lies towards the centre and phloem lies towards the periphery.

2. **Where does the carbon that is used in photosynthesis come from?**

Carbon dioxide taken from atmosphere

3. **What is the common step in aerobic and anaerobic path way?**

Glycolysis

4. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.

Anaerobic respiration.

5. Give an account on vascular bundle of dicot stem.

Vascular bundles of dicot stem are conjoint collateral, endarch and open.

They are arranged in the form of a ring around the pith.

6.Write a short note on mesophyll.

In a leaf, the tissue present between the upper and lower epidermis is called mesophyll.

It is differentiated into palisade parenchyma and Spongy parenchyma.

7. Name the three basic tissue system in flowering plants.

- Dermal (or) Epidermal tissue system
- Ground tissue system
- Vascular tissue system

8. **What is photosynthesis and where in a cell does it occur?**

Photosynthesis is a process by which autotrophic organisms like green plants, algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesize their own food. Photosynthesis occur in the chloroplast.

9. **Why should the light dependent reaction occur before the light independent reaction?**

During light independent reactions, CO_2 is reduced into carbohydrates with the help of ATP and $NADPH_2$.So light dependent reaction occur before the light independent reaction.

10. Write the reaction for photosynthesis.

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll / sunlight}]{} C_6H_{12}O_6 + 6H_2O + 6O_2$$

11. What is R.Q?

It is the ratio of volume of carbon dioxide liberates and the volume of oxygen consumed during respiration

RQ = volume of CO_2 liberated / volumeof O_2 consumed

12. Write down the functions of chloroplast

- Photosynthesis
- Storage of starch
- Synthesis of fatty acids.
- Storage of lipids.

13. What are the factors affecting photosynthesis

External factors → Light, CO_2, temperature, water and mineral elements.

Internal factors → Pigments, leaf age, accumulation of carbohydrates and hormones.

13. STRUCTURAL ORGANISATION OF ANIMALS

1.Give the common name of the Hirudinariagranulosa.

The Indian Leech

2. How does leech respire?

Respiration takes place through the skin in leech.

3. Write the dental formula of rabbit.

Dental formula is I 2/1 ,C 0/0 ,PM 3/2, M 3/3

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4. How many pairs of teeth are present in leech?

11 pairs of teeth.

5. How is diastema formed in rabbit?

The gap between the incisors and premolar is called diastema

6. What organs are attached to the two bronchi?

Lungs

7. Which organ acts as suction pump in leech?

Muscular pharynx.

8. What does CNS stand for?

CNS →→ Central Nervous System.

9. Why is the teeth of rabbit called heterodont?

In Rabbit teeth are of different types

10. How does leech suck blood from the host?

Leech make a triadiate or Y shaped incision in the skin of the host and the blood is sucked by Muscular pharynx.

11. Why are the rings of cartilages found in trachea of rabbit?

Tracheal walls are supported by rings of cartilage, which helps in the free passage of air.

12. List out the parasitic adaptations in leech.

Blood is sucked by pharynx.

The three jaws inside the mouth, caused a painless y shaped wound in the skin of the host. The salivary glands produced hirudin which does not allow the blood to coagulate.

Parapodia and setae are completely absent.

14. TRANSPORTATION IN PLANTS AND CIRCULATION IN ANIMALS

1. Name two layered protective covering of human heart. Pericardium

2. What is the shape of RBC in human blood? Biconcave and disc shaped.

3. Why is the colour of the blood red ? Presence of haemoglobin in RBC

4. Which kind of cells are found in the lymph? Lymphocytes

5. Name the heart valve associated with the major arteries leaving the ventricles.

Semi - lunar valves

6. Mention the artery which supplies blood to the heart muscle. The coronary artery

7. What causes the opening and closing of guard cells of stomata during transpiration?

- The opening and closing of the stomata is due to the change in turgidity of the guards cells.
- When water enters into guard cells, they become turgid and the stoma open.
- When the guard cells lose water, it become flaccid and the stoma closes.

8. What is cohesion?

The force of attraction between molecules of water is called cohesion.

9. Trace the pathway followed by water molecules from the time it enters a plant root to the time it escapes into the atmosphere from a leaf.

Root hair ---> Root --->Xylem ---> Stem ---> Leaf ---> Stomata ---> Water is evaporated

10. What would happen to the leaves of a plant that transpires more water than its absorption in the roots?

- If the leaves of a plant transpires more than its absorption in the roots,
- The plant will get dehydrated and it affects plant growth, photosynthesis and transpiration

11. Describe the structure and working of the human heart.

The structure of the human heart

- The human heart is four chambered. There are two atrium and two ventricles.

Working of the human heart

- The right atrium receives deoxygenated blood from different parts of the body
- The right and left articles pump blood into the right and left ventricles respectively.
- From the right ventricle arises the pulmonary trunk, which bifurcates to form right and left pulmonary arteries.
- The right and left pulmonary arteries supply deoxygenated blood to the lungs of the respective side.
- The left ventricle gives rise to aorta. The oxygenated blood is supplied by the aorta to various organs of the body.

12. Why is the circulation in man referred to as double circulation?

- For Human it is double circulation because the heart contains completely separated four chambers
- The Oxygenated blood do not mix with the deoxygenated blood

13. What are heart sounds? How are they produced?

- The rhythmic closure and opening of the valves cause the sound of the heart.
- The first sound LUBB is longer duration and produced by the closure of the tricuspid
- The second sound DUPP is of a shorter duration and produced by the closure of semilunar valves

14. What is the importance of valves in the heart?

- Regulate the flow of blood in a single direction
- Prevent back flow of blood.

15. **Who discovered Rh factor? Why was it named so?**

- Rh factor was discovered by Landsteiner and Wiener in Rhesus Monkey.
- So it is named as Rh factor.

16. How are arteries and veins structurally different from one another?

Artery	Vein
• Distributing vessel	Collecting vessel
• Pink in colour	Red in colour
• Deep location	Superficial in location
• Blood flow with high pressure	Blood flow with low pressure
• Wall of artery is strong thick and elastic	Wall of vein is weak, thin and non-elastic
• All arteries carry oxygenated blood except pulmonary arteries	All veins carry deoxygenated blood expect pulmonary veins
• Internal valves are absent	Internal valves are present

17.**Enumerate the functions of blood.**

Functions of blood

- Transport of respiratory gases
- Transport of digested food materials to the different body cells.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

15. NERVOUS SYSTEM

1.Define stimulus.

It refers to the changes in the environmental condition.

2. Name the parts of the hind brain.

(i) cerebellum (ii) pons (iii) medulla oblongata.

3. Give an example for conditioned reflexes.

- Playing harmonium by striking a particular key on seeing a music note is an example of conditioned reflexes.

4. Which acts as a link between the nervous system and endocrine system?

Hypothalamus

5.Define reflex arc.

The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.

6.What are the structures involved in the protection of brain?

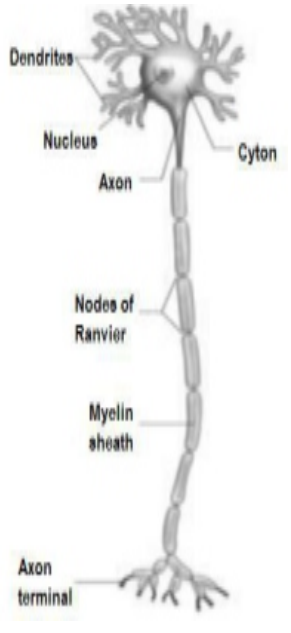
(i) Duramater (ii) Arachnoid (iii) Piamater

7.With a neat labelled diagram explain the structure of a neuron.

A neuron typically consists of three basic parts: Cyton, Dendrites and Axon.

(i) Cyton: (cell body or perikaryon)

❖ It help in transmission of nerve impulses to and from the cell body.



(ii) Dendrites:

❖ These are the numerous branched cytoplasmic processes that project from the surface of the cell body.

❖ They conduct nerve impulses towards the cyton.

(iii) Axon:

❖ The axon is a single, elongated, slender projection.

❖ The axons may be covered by a protective sheath called **myelin sheath**

❖ **myelin sheath** is further covered by a layer of **Schwann cells** called **neurilemma**.

❖ Myelin sheath breaks at intervals by depressions called **Nodes of Ranvier**. The region between the nodes is called as **internode**

16. PLANT AND ANIMAL HORMONES

Short Answers

1. Which hormone promotes the production of male flowers in Cucurbits? Gibberellin

2. Write the name of a synthetic auxin. 2,4 D

3. Which hormone induces parthenocarpy in tomatoes? Gibberellin

4. What is the hormone responsible for the secretion of milk in female after child birth?

Prolactin or lactogenic hormone

5. Name the hormones, which regulates water and mineral metabolism in man.

Mineralocorticoids - Aldosterone

6. Which hormone is secreted during emergency situation in man? Adrenaline or Epinephrine

7. Which gland secretes digestive enzymes and hormones? Pancreas

8. Name the endocrine glands associated with kidneys. Adrenal

9. What are synthetic auxins? Give examples.

- Artificially synthesized auxins that have properties like auxins are called as synthetic auxins. ***Example:*** 2, 4 D (2,4Dichlorophenoxy Acetic Acid)

10. What is bolting? How can it be induced artificially?

- Sudden shoot elongation followed by flowering is known as **bolting**.
- It can be artificially induced on rosettle plants by the treatment of Gibberellin

11. Bring out any two physiological activities of abscisic acid.

- ABA promotes – Abscission
- During water stress and drought conditions ABA causes stomatal closure.

12. What will you do to prevent leaf fall and fruit drop in plants? Support your answer with reason.

Auxins **prevent** the formation of **abscission layer**

13. What are chemical messengers?

Hormone.

14. Write the differences between endocrine and exocrine gland.

Endocrine glands	Exocrine glands
Without ducts	With ducts
Secrete hormones	Produce enzymes
Ex. Pituitary, Thyroid	Salivary glands, Gastric glands

17. Reproductive in plants and Animals
18. Genetics
19. Origin and Evolution of Life

1.Define triple fusion

- In plants, during fertilization one sperm fuses with the egg to form a diploid zygote (2n)
- The other sperm(n) fuses with the secondary nucleus(triple fusion)

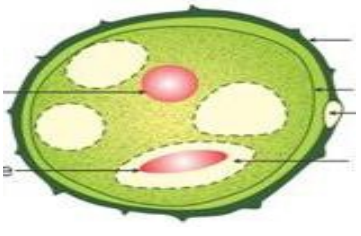
2.Name the secondary sex organ in male.

- Penis
- Vas deferens
- Epididymis
- Seminal vesicles
- Prostate gland

3.Write the characteristics of insect pollinated flowers.

- To attract insects these flowers are brightly coloured
- Have smell and nectar
- Pollen grains are larger in size

4.Identify the parts A,B,C and D



A - Exine
B - intine
C - vegitatine nucleus
D - generatine cell

5.Why did Mendel select pea plant for his experiments?

- Short life span,.
- It is easy to cross pollinate
- The flowers are bisexual.

6.What do you understand by the term phenotype and genotype?

- Phenotype -The External expression of a particular in an organism.
- Genotype -The genetic expression of a particular in an organism.

7.What are allosomes?

- Chromosome which responsible for determining the sex of an individual.
- They also called as sex chromosome or hetero chromosomes.

8.What are the okazaki fragments?

- During replication of DNA molecule,
- Lagging strand short segments of DNA are synthesized.
- Short segments of DNA are called okazaki fragments

9.What is the biological significance of DNA?

- Transmission of hereditary information from one generation to next generation
- It contain information required for the formation of proteins

10.Define ethnobotany and write its importance.

- Ethnobotany is the study of regions plants
- practical uses through the traditional knowledge of the local culture of people.

Importance of Ethnobotany

- It provides traditional uses of plants.
- It gives information about certain unknown and known useful plants.

12.Why is Archaeopteryx considered to be a connecting link?

- Fossil bird
- Connecting link between reptiles and birds

13.How can you determine the age of the fossils?

- The age of fossils is determined by radioactive elements present in it .
- they may be carbon , uranium

20 BREEDING AND BIOTECHNOLOGY

1) Define genetic engineering

Genetic engineering is the manipulation and transfer of genes from one organisms to another organisms to create a new DNA called as recombinant DNA (rDNA).

2) Name the types of stem cells

- Embryonic stem cells
- Adult stem cells (or) somatic stem cells

3) what are the transgenic organisms?

Plants or Animals expressing a modified endogenous gene or a foreign gene are also known as transgenic organisms.

4) Distinguish between:

S.No	Somatic gene therapy	Germ line gene therapy
1	It is the replacement of defective genes in somatic cells	It is the replacement of defective genes in germ cells such as egg and sperm
2	Corrected gene may not be carried to the next generation	Corrected gene may be carried to the next generation

S.No	Undifferentiated cells	Differentiated cells
1	They are unspecialised cell	These are specialised cell
2	Eg: earlier stage of embryo	Eg: muscle cell, blood cell and nerve cell

S.No	Out breeding	In breeding
1	The breeding of two unrelated animals	The breeding of closely related animals
2	The hybrids are stronger and vigorous than their parents.	Continued inbreeding reduces fertility and productivity.

5) Discuss the importance of biotechnology in the field of medicine

- Insulin used in the treatment of diabetes.
- Growth hormone used for treating children with growth deficiencies
- Development of vaccine against various diseases like hepatitis B and rabies

21 Health and Diseases

1) What are psychotropic drugs ?

Drugs that act on brain and alter the behaviour ,consciousness, power of thinking and perception are called psychotropic drugs or mood altering drugs

2) Mention the diseases caused by tobacco smoke.

i) Lung cancer ii) Bronchitis iii) Oral cancer iv) Emphysema

3) what are the contributing factors for Obesity ?

i) Genetic factors ii) physical inactivity iii) Excessive eating
iv) Endocrine factors

3) What is Metastasis ?

The cancerous cells migrate to distant parts of the body and affect new tissues.

4) How is cancer cell different from a normal cell ?

S.No	Normal cell	Cancerous Cell
1	They have controlled cell division	They have uncontrolled cell division
2	Normal growth	Abnormal growth

5) Differentiate between Type 1 and Type 2 diabetes mellitus.

Factors	Type 1 Insulin dependent	Type 2 Non - Insulin dependent
Prevalence	10-20%	80-90%
Age of onset	< 20years	> 30 years
Body weight	Normal	Obese

6) **Suggest measure to overcome the problems of an alcoholic.**

- Education and counselling
- Physical activity
- Seeking help from parents and peer groups
- Medical assistance

7) **What precautions can be taken for preventing heart diseases ?**

- Diet management
- Physical activity
- Addictive substance avoidance (alcohol consumption and smoking)

22 ENVIRONMENTAL MANAGEMENT

1) **What will happen if tree are cut down ?**

- Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of biological cycle

2) **What are the agents of soil erosion ?**

- High velocity wind
- Air currents
- Flowing water
- Land slide

3) **Why fossil fuels are to conserved**

- Fossil fuel are non –renewable sources of energy
- The fossil fuel are formed slowly over millions of years
- They should be conserved by limiting their use

4) **What are the importance of rainwater harvesting ?**

- To meet the increase in demand of water
- Reduce flood and soil erosion
- Overcome the rapid depletion of water levels.
- Water stored in ground is not contaminated by human

5) **What are the advantages of using biogas ?**

- It burns without smoke
- Causes less pollution
- An excellent way of rid of organic wastes like bio-waste and sewage material
- It is safe and convenient to use

6) **How does rainwater harvesting structures recharge ground water?**

- Roof top rainwater harvesting
- Recharge pit

7) **How will you prevent soil erosion ?**

- Retain vegetation cover ,so that soil is not exposed
- Cattle grazing should controlled
- Crop rotation and soil management improve soil organic matter
- Wind speed can be controlled by planting trees in the form of a shelter belt

23. VISUAL COMMUNICATION

1. What is Scratch?

'Scratch' is a software used to create animations, cartoons and games easily. Scratch, on the other hand, is a visual programming language.

2. Write a short note on editor and its types?

The script editor has three main parts: **Script area** Where you build scripts.

Block menu	Where you choose the category of blocks (programming statements) to use.
Block palette	Where you choose the blocks to use. When the Costumes tab is chosen, the costume editor.

3. What is Stage?

- Stage is the background appearing when we open the scratch window.
- The background will most often be white. You can change the background colour as you like.

4. What is Sprite?

- The characters on the background of a Scratch window are known as Sprite.
- Usually a cat appears as a sprite when the Scratch window is opened.
- The software provides facilities to make alternations in sprite.

SOME IMPORTANT SCIENCE DIAGRAMS

1. OXYSOMES.

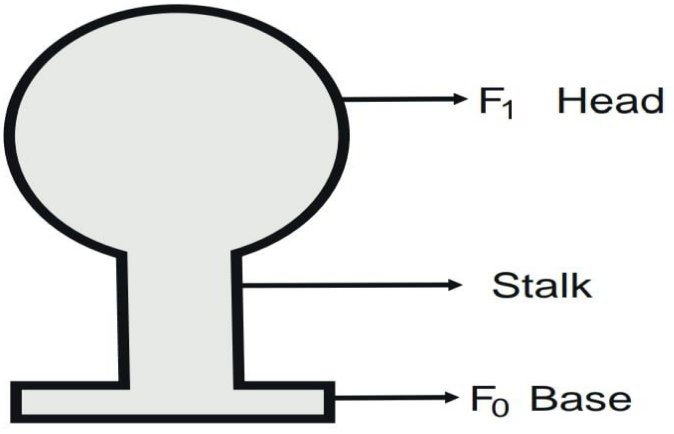


Figure 12.11 Structure of Oxysomes

2. GUARD CELL

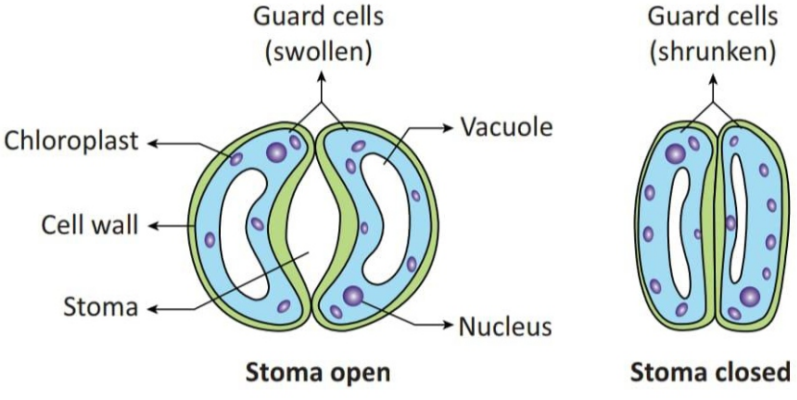


Figure. 14.7 Guard cell in turgid and flaccid condition

3. SPERM CELL

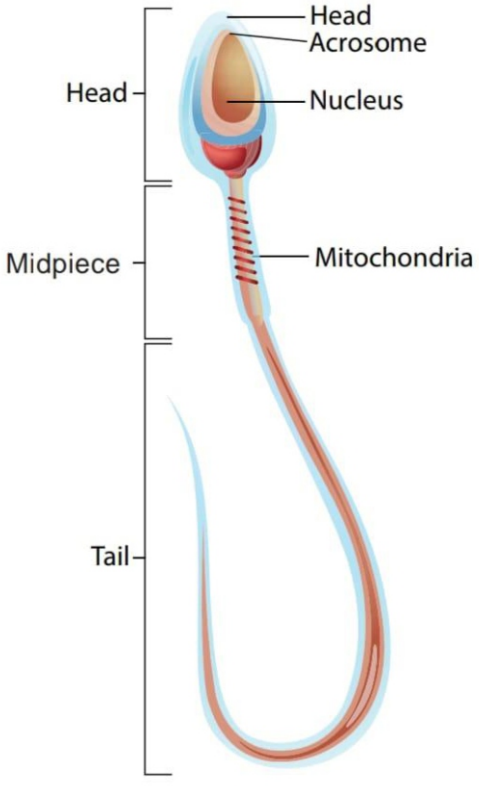
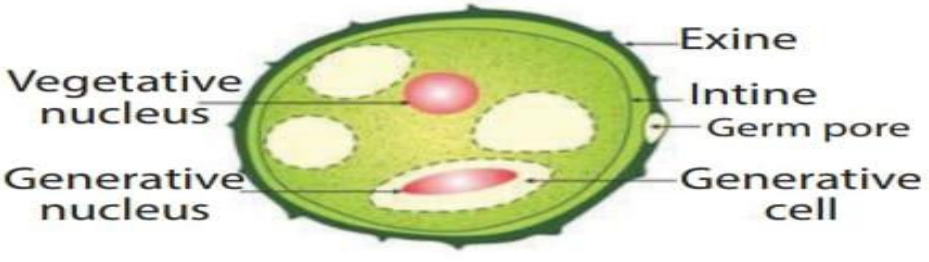


Figure 17.15 Structure of sperm

4. POLLEN GRAIN



Pollen Grain

5. ADRENAL GLAND

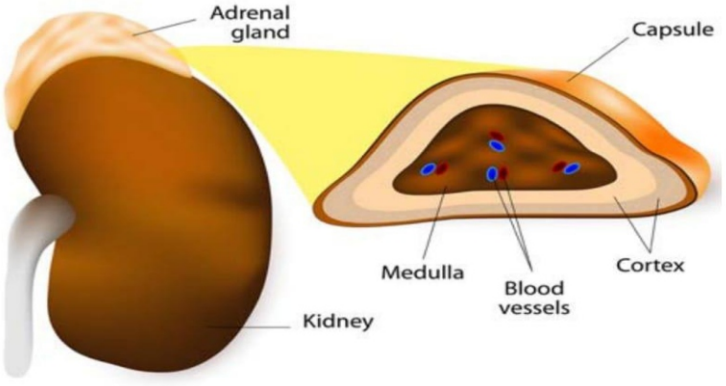


Figure 16.11 Adrenal Gland

6. PANCREAS

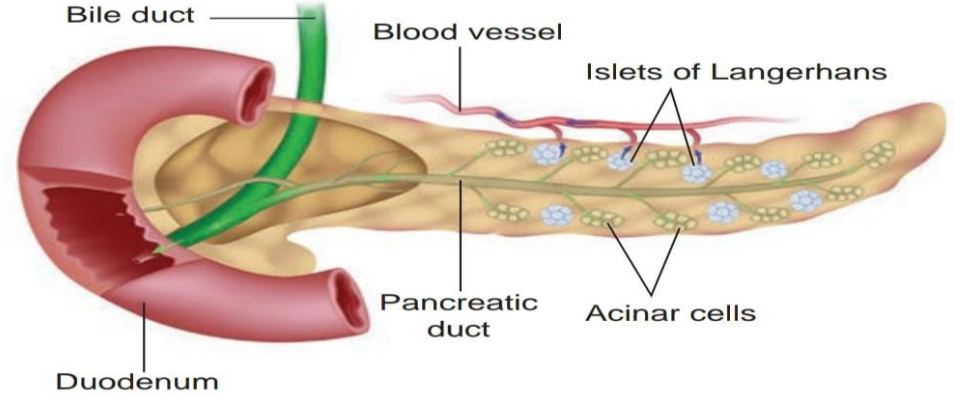


Figure 16.10 Pancreas

7. MITOCHONDRIA

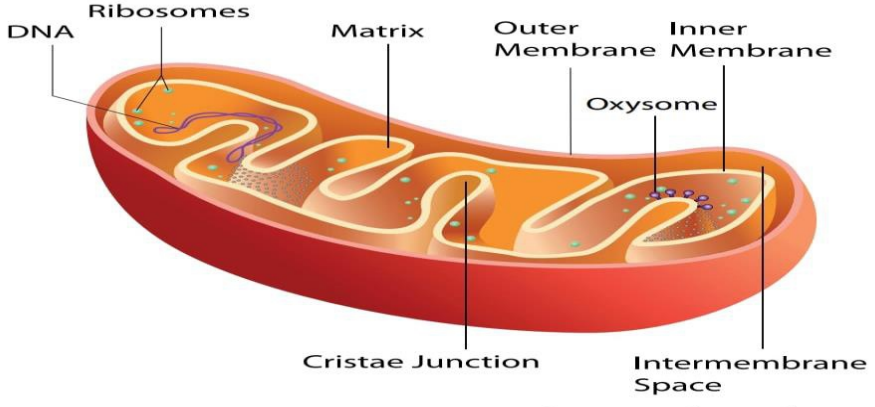


Figure 12.10 Structure of Mitochondria

8. CHLOROPLAST

Figure 12.8 Ultrastructure of Chloroplast

9. THYROID GLAND

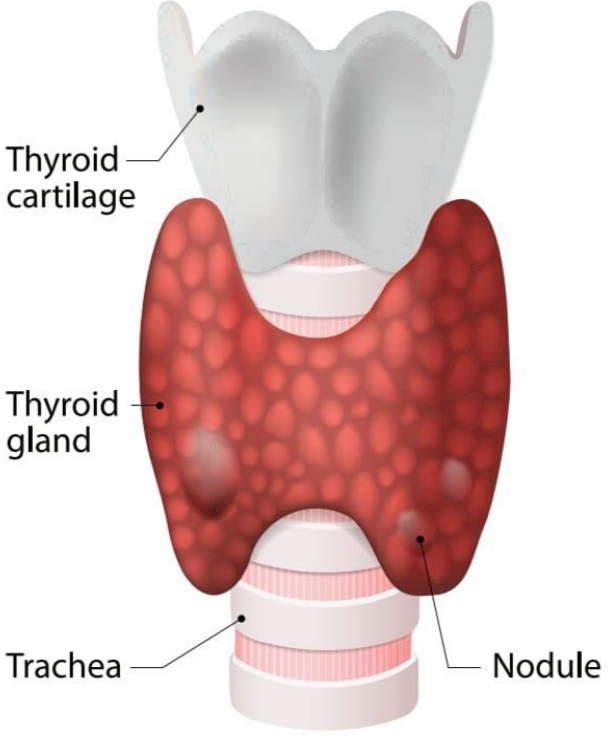


Figure 16.8 Thyroid Gland

10. NEURON DIAGRAM

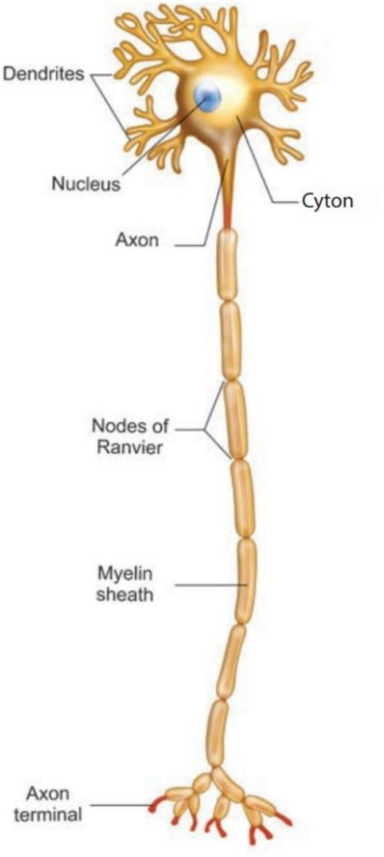


Fig. 15.1 Structure of Neuron

11. TYPES OF CHROMOSOMES

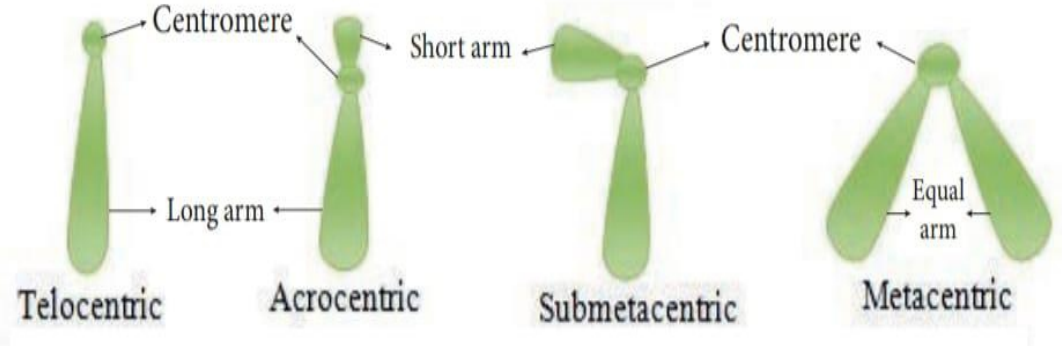


Figure 18.4 Types of chromosomes based on position of centromere

12. STRUCTURE OF DNA

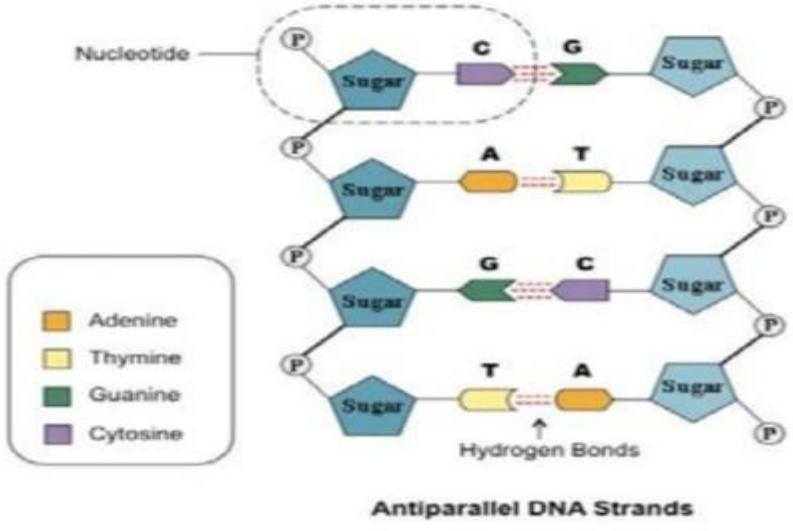


Figure 18.7 Nucleotides in a DNA