Ayesha Saleem
Batch - 61

Day: _____   Date: _____

Section · I

QNO·4

(A)

⇒ Structure of Eye:

Eyelid

Iris

Pupil

Cornea

Sclera

Retina

Fovea

Choroid

Optic nerve

Macula

Lens

Vitreous humor
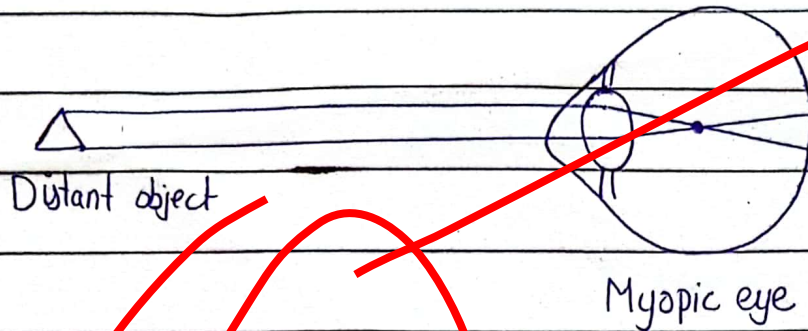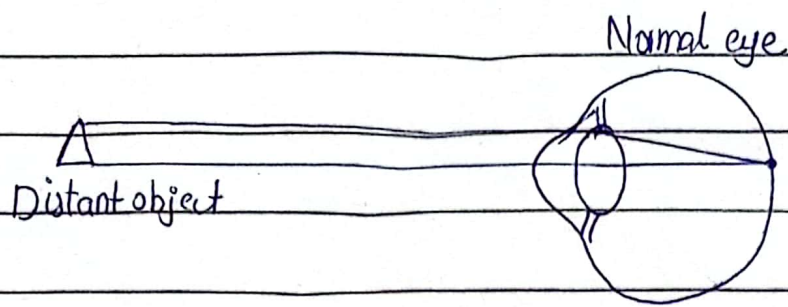
⇒ Myopia:

Myopia is one of the disorders of the eye. It is a condition in which nearby objects are seen more clearly than the far objects and it is also called as nearsightedness. This phenomenon occurs because the light is focused in front of retina and not on it.

Normal eye

Distant object

Distant object

Myopic eye

How it can be corrected:

Myopia can be corrected with the help of a concave lens.

Distant object   Concave lens
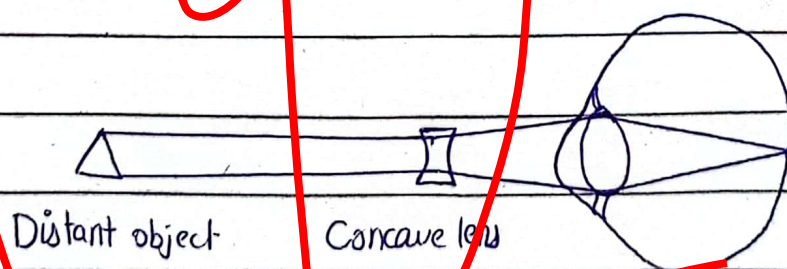
⇒ **Hyperopia:**

It is the ~~Disorders~~ of eye which is also known as far-sightedness. In this condition the eye is able to see the far objects clearly but the

near objects seem blur. It is because of the phenomenon that light rays fail to converge on the retina and converge after it.

Near object   Hypermetropic eye.
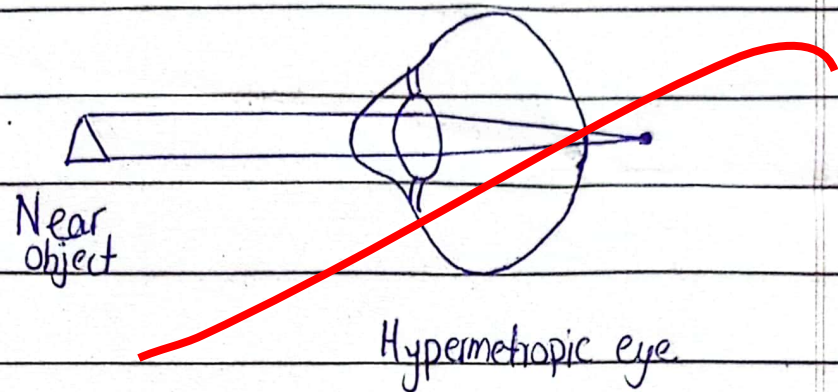
How it can be corrected:

A hypermetropic eye can be corrected with the help of convex lens which converge the light rays a bit before entering the eye.

Near object   Convex lens
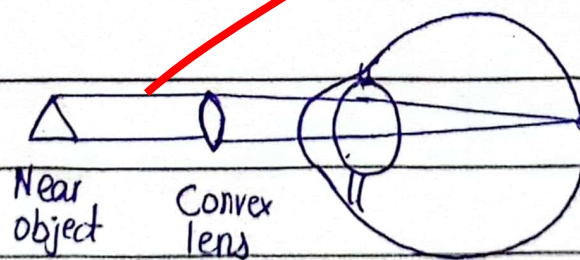
(b)

Human cell:

Cell is the basic unit of structure and function of all living things. Cell cannot be seen with naked eye. Different units of a human cell are as

① Cell membrane:

The outermost boundary of a cell is called the cell wall membrane. It is a lining that separates the cell from the outer environment.

• **Structure of cell wall membrane:**

It consists of different molecules such as carbohydrate, Proteins, phospholipids and cholesterol. The proportion of these molecules vary with the cell type.

Eg: Myelin contains 18% protein - 76% lipid

Mitochondrial inner membrane contains 76% protein - 24% lipid

• **Functions:**

→ Allow transport of various materials in and out of cell

→ Allow selective materials to pass through the cell.

→ Regulates the flow of material and ions, thus maintains the concentration gradient.

→ Intakes food material by infolding of membrane known as endocytosis.

→ Cell membrane of neuron is involved in transmission of nerv impulses.

→ carbohydrate part of glycoprotein

→ transport proteins

→ phospholipid

→ cholesterol

proteins   glycoproteins
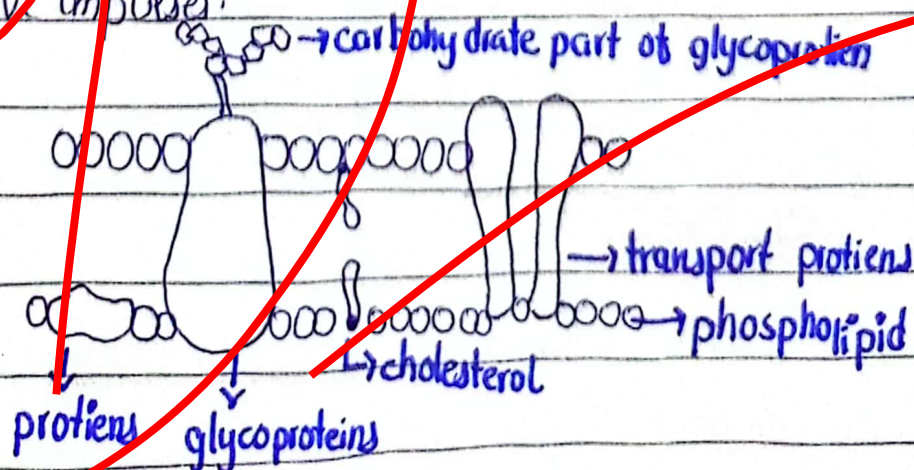
② Cytoplasm:

Living content of protoplasm between plasma membrane and nucleus is cytoplasm. The cytoplasm has 2 parts organelles and cytosol.

Organelle: Contains different cell organelles like mitochondria, golgi body, endoplasmic reticulum, lysosome. It also contains insoluble waste and storage products.

Cytosol:

The soluble part is called cytosol. It has about 90% water and contains all the fundamental molecules of cell.

Functions:

↳ It acts as a storage house for compounds like starch.
↳ Some metabolic processes like glycolysis take place.
↳ Contains organelles like mitochondria, golgi, endoplasmic reticulum which perform important functions.
↳ Shows streaming movements.

③ Nucleus:

It controls activities of the cells. Present in the centre of animal cell and has a large vacuole. Some cells might be mononucleate and some might be binucleate.

Structure:

Nucleus contains a nuclear membrane which separates nuclear material from cytoplasm. The outer and inner nuclear membrane form pores called nuclear pores which allow

Nucleolus is within the nucleus and it synthesizes and stores ribosomal RNA.

Nucleus contains the chromatin material and changes into chromosome during cell division. Each chromosome has two chromatids attached with eachother at the centromere. Different species have different no. of chromosomes.

• Functions:

↳ Controls all activities of cells
↳ Controls the transfer of hereditary characters from parents to offspring.
↳ The types of RNA are synthesized in nucleus.

Diagram of nucleus labelled: Nuclear pores, Nucleolus, Nuclear membrane, Chromatin.

(c)
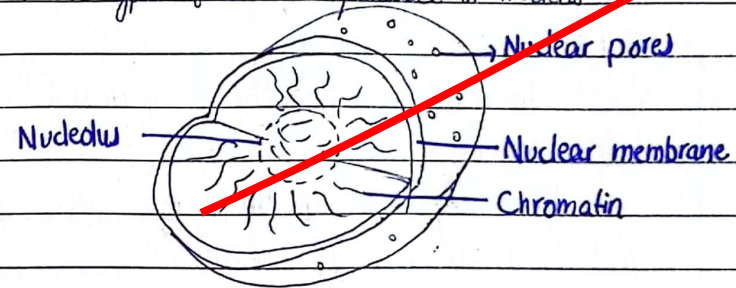
Galaxies:

A galaxy is a gravitationally bound substance system of stars, interstellar remnants, dust and dark matter. There are about 100-200 billion galaxies in universe which range in size from dwarfs to giants.

Types:

The types of galaxies are based on its morphology.

↳ Spiral:

These are flat, rotating spiral structures.

e.g Andromeda

↳ Elliptical:

They have an elliptical profile giving them an ellipsoidal appearance.

e.g: M49 and M59.

↳ Lenticular

An intermediate form having properties of both

↳ Irregular:

An galaxy that does not fit into any category and its structures is not allign.

e.g: Small & large megallanic clouds.

Galaxies are continuously moving. And it can be proved with the Bing Bang theory. An galaxy moving away from earth, its light shifts to longer, redder wavelength an effect known as **red shift**.

Sun	Earth
• Sun is a star and it has 3 regions Interior, atmosphere, and visible surface of sun.	• Earth is a planet and it is divided into
① __Interior:__ ↳ **Core** = It is at the centre and the hottest region where nuclear fusion reaction takes place. Extends from centre to 25% of radius.	① __Earth's crust:__ It is the outmost layer of earth. Comprises continents and oceans. It has a thickness of 40-70 km in continents and 5-10 km in oceans. It is composed of aluminio-silicates and temperature ranges 870°C.
↳ **Radiative zone:** The radiative material is hot and dense enough that thermal radiation transfers the intense heat of core outwards.	② **Mantle:** It is composed mainly of ferro-magnesium silicates and about 2900 km deep. Upper mantle is
↳ **Convective zone:** In this layer thermal convection occurs.	about 400 km deep and composed of iron & magnesium. The transition zone is 400-670 km deeps and it is called transition because they change structure in a process. Lower mantle is more than 670 km deep.
② __Atmosphere:__ It is also called chromosphere and appears bright red when viewed during solar eclipse. Uppermost portion of sun's atmosphere is called corona	③ **Outer and inner core:** Outer core is liquid and 2300 km thick. It consists of nickel-iron alloy and controls the magnetic field of earth.
③ __Visible surface of sun:__ It is boundary between sun interior & atmosphere called photosphere.	The inner core is solid and 1200 km thick and composed of iron only.

(A)

Formation of Cyclone:

All storms have 2 things in common; low atmospheric pressure at centre and winds created by high pressure air outside the storm. Air pouring into an area of low pressure from all sides rises because it doesn't have any else place to go. As air rises it cools and condensation takes place that makes clouds. Under right conditions tiny water drops merge to fall as large water drop from cloud. This is why storms bring clouds.

Condition for formation of cyclone:

They produce sustained winds of 120 km/h. Following environmental conditions are necessary:

↳ Warm ocean water throughout a sufficient depth (>80°F).

↳ Atmosphere which cools fast enough with height such that it is potentially unstable to moist convection.

↳ Relatively moist layers near the mid troposphere.

↳ A minimum distance of at least 500 km from the equator.

↳ A pre-existing near-surface disturbance with sufficient vorticity and convergence. They cannot be generated vigorously.

↳ Low values of vertical wind shear b/w the surface and upper atmosphere.

Having these conditions met is necessary, but no sufficient as many disturbances appear.

- Stages of development:
  1. Tropical disturbance: Wind weak and unorganized
  2. Tropical depression: Winds less than 34mph
  3. Tropical storm: Winds 39 to 74 mph
  4. Tropical cyclone: Winds greater than 74 mph.

(B)

| Covalent Bond	Ionic bond
⇒ It is type of chemical bond that is formed when 2 atoms share their unpaired electrons with eachother	⇒ It is type of chemical bond that is formed due to donation of atoms, resulting in the attraction b/w positively and negatively charged ions.
⇒ Occur when the atoms are electrostatically attracted towards eachother	⇒ Occurs when the electrons are shared b/w the atoms involved in formation
⇒ Occur through interaction of neutral atoms	⇒ Occur through interaction b/w cations and anions.
⇒ Quite weak bond, so most compounds exist in gaseous phase	⇒ Strongest type of chemical bond, so most compounds remain solid with very high melting points.
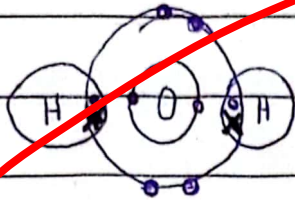
Eg of covalent bond   Eg. of Ionic bond
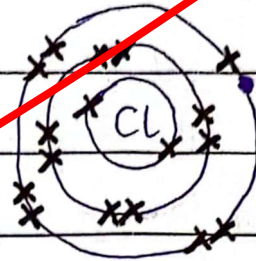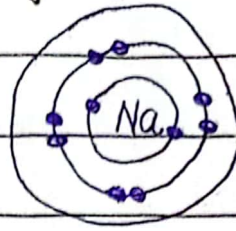
(C)

Uses of Gamma rays:

① Used in medical imaging. A gama scen is obtained by injecting a radioactive tracer which concentrates in area of body being investigated. Gamma rays emitted from this area are detected by a gamma camera.

② Used to sterilize medical equipment because they are highly penetrating and kill all living cells.

③ Even more penetrating than X-rays and can be used to examine metal casting and welded structures.

④ Used to cure cancer with Gamma-knife surgery.

⑤ Used as nuclear weapons.

⑥ Used to kill bacteria and viruses in crops.

Uses of X-ray:

① Used for medical analysis. Dentists use them to find cavities and impacted teeth.

② Used in industrial radiography and CT scanning

③ Helps in studying the fracture anatomy.

④ Used in cancer treatment to kill malignant cells

⑤ In science used to analyze arrangement of atoms in many kind of substances.

Uses of radiowaves:

① They are used in radio communication over long distances.

② Used in wifi devices

③ Mostly used in hospital equipment.

④ Used in universal remote controls such as RC cars.

⑤ They are used in televsoin.

(D)

Tides:

Tides are the rise and fall of sea levels caused by the combined effect of the gravitational forces exerted by moon and are also caused by the Earth and Moon orbiting one another.

Stages in tidal cycle:

- **Low tide** Water stops falling, reaching a local minimum

- **Flood tide** Sea level rises over several hours, covering intertidal zone.

- **High tide** Water stops rising, reaching a local maximum.

- **Ebb tide** Sea level falls over several hours, reveling the intertidal zone.

Light emitting diode:

It is one of todays most energy efficient and rapidly developing lighting technologies. Quality LED bulbs last longer, more durable, use less energy.

LED consists of a chip of semiconding material doped with impurities to create p-n junction. Current flows from p to n side. Charge carrier electrons and holes flow into the junction from electrode with different voltages. When an electron meets hole, falls into lower energy level and releases energy in form of photon. The wavelength of light emitted and thus its color depends on band gap, energy of materials forming p-n junction. Electrons dissipate energy in form of heat. If semiconductor is

translucent, junction becomes source of light as it is emitted, thus becoming a LED.

Advantages:

1. Energy efficient - Capable of outputting 135 lumen/watt
2. Long lifetime - 50,000 hours or more
3. Light instantly in seconds
4. Not affected by cold temperatures
5. Directional- you can direct light where you want.
6. Environment friendly - contain no mercury.
7. Controllable - can be controlled for brightness
8. LED do not washout colours like other light sources.

P-type | N-type

⊕ | ⊖

Hole | electron

No current flows across this junction.

Battery
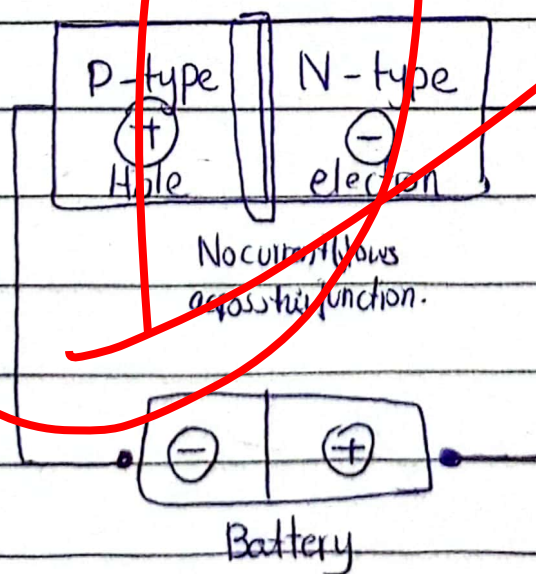
Section II

QNO.7

(A)

Suppose the no. to be multiplied is $= 15$

So,

$$15 \times \frac{3}{5} = 9 \ (\text{wrong answer})$$

$$15 \times \frac{5}{3} = 25 \ (\text{answer that was expected})$$

So error $25 - 9 = 16$

Percentage error will be $\Rightarrow \dfrac{\text{Error}}{\text{Expected answer}} \times 100$

$$= \frac{16}{25} \times 100$$

$$= \boxed{64\%}$$

(B)

Ratio of chocolates to ice-cream cones = 5 : 8

No. of chocolates = 30

No. of ice-cream cones = x

$$5 : 8 = 30 : x$$

$$5 \times x = 8 \times 30$$

$$x = \frac{8 \times 30}{5}$$

$$\boxed{x = 48}$$

(C)

MilliGrams of medication in a tablet = 30mg

Milligrams of medication required = 240 mg

No. of tablets needed = x

$$x = \frac{240}{30} = \boxed{8 \text{ tablets}}$$

(D)

Average of 50 numbers = 20

If 2 no. 37 & 43 removed then remaining average

$$\frac{48(x \cdot 20) + 37 + 43}{50} = 20$$

Sum of two numbers = 37 + 43 = 80

Sum minus the total = 20 × 50 − 80

= 920

Remaining average → $\frac{920}{48} = \boxed{19.17}$

$\boxed{Q NO·3}$

(A)

Formula of I.Q = $\dfrac{\text{Mental age}}{\text{Chronological age}} \times 100$

Factors affecting I·Q =

① Heriditary: Evidences come from following observations:

↳ Intelligence tends to run in families

↳ Adopted children resemble to their biological parents in intelligence.

② Env. influences:

↳ Biologically unrelated children raised in same environment has similarity in I.Q.

→ IQ declines in children overtime raised in deprived environments such as orphanages.

→ IQ tests performance increases in industrialized countries.

③ Race & Nationality:

Black, Native Americans, Hispanicans score lower, on average, that white people on standardized IQ tests.

④ Sex and intelligence:

Men and women have the same average IQ. Women perform better on memory & verbal while men perform better on mathematical and spatial ability.

⑤ Age:

A person who is bright or dull in childhood tends to remain the same throughout life.

⑥ Socio-economic conditions:

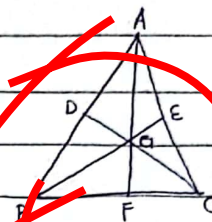Home plays a significant role in early development year. The financial status, neighbours, environmental conditions also effect the intelligence.

⑦ Health and physical development:

Physical inactivity and poor health may engage with a poor IQ level. Diseases also affect intelligence. Unfavourable health effects mental status of individual.

(b)

No of triangles = 16

① ∆ABC ② ∆AEF ③ ∆ACF ④ ∆EBC
⑤ ∆EBA ⑥ ∆DCA ⑦ ∆DEB ⑧ ∆CGA
⑨ ∆BGC ⑩ ∆AGD ⑪ ∆AGD ⑫ ∆AGE
⑬ ∆BGD ⑭ ∆BGF ⑮ ∆CGF ⑯ ∆CGE

(c)

Probability of getting vowel:

Total no. of alphabets = 14
Total no. of vowels = 5
Probability = $\dfrac{5}{14}$

(D)

Total amount = Rs 4320

Share of Zain = 2 parts
Share of Aslam = 3 " "
Share of Ashraf = 7 parts
Total parts = 2+3+7
= 12 parts

Hence,
Share of zain = $\dfrac{2}{12} \times 4320 =$ Rs.720

Share of Aslam = $\dfrac{3}{12} \times 4320 =$ Rs.1080

Share of Ashraf = $\dfrac{7}{12} \times 4320 =$ Rs.2520