①

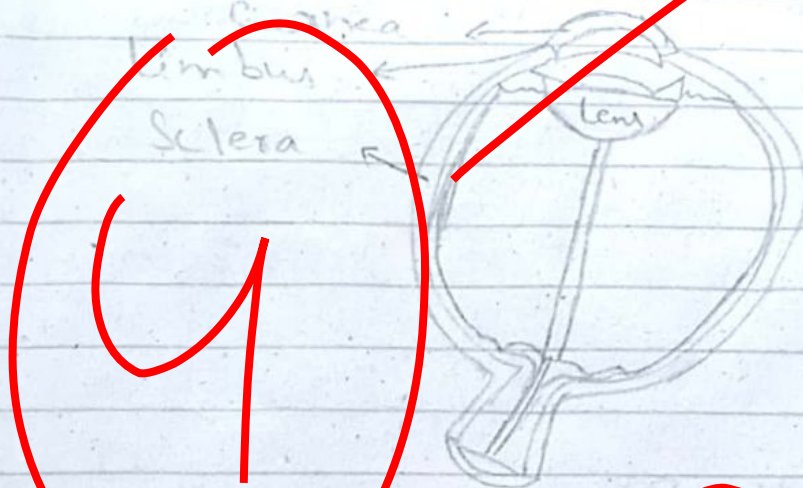## Q. No. 03

a.

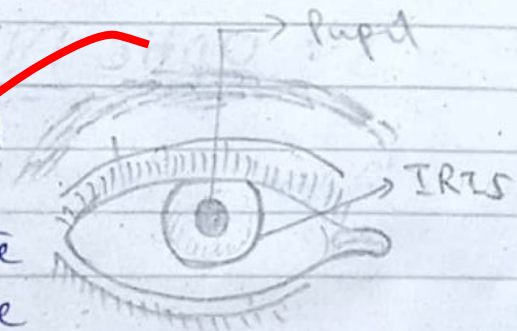### The Key Parts of the Eye & their Role In Vision

1- Cornea: The Clear, outmost layer that bends light entering the eye.

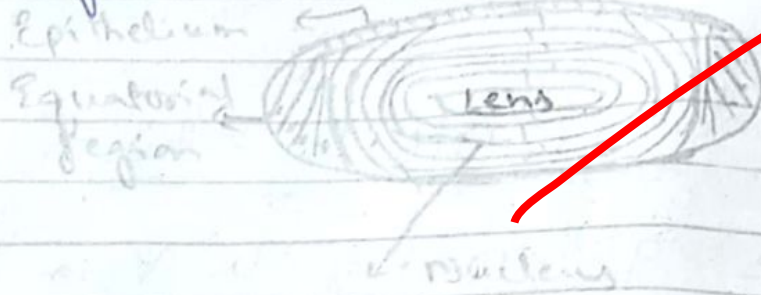Limbus

Sclera

Lens

2- Iris: The colored Part that adjusts the size of the Pupil, controlling the amount of the light onto they entering

Pupil

IRIS

①

3- **Lens:** A transparent structure that focuses light onto the retina.

Epithelium
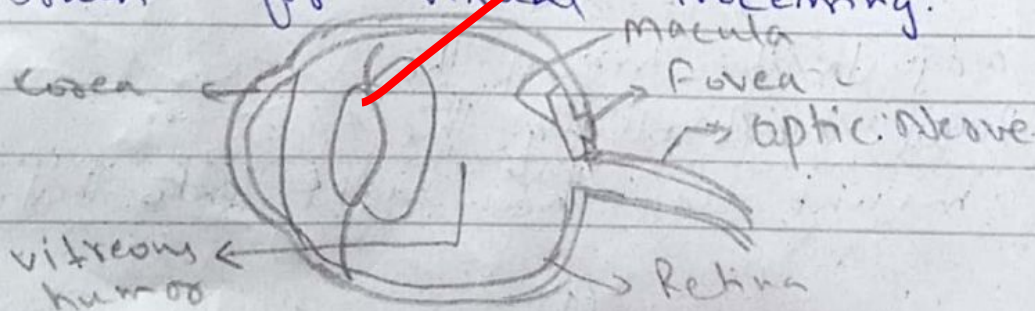
Equatorial region

Lens

Nucleus

Anatomy Structure of Eye lens.

4- **Retina:** The inner most layer containing light-sensitive cells (rods and cones) that convert light into electrical signals.

Retina

Rod

Cone
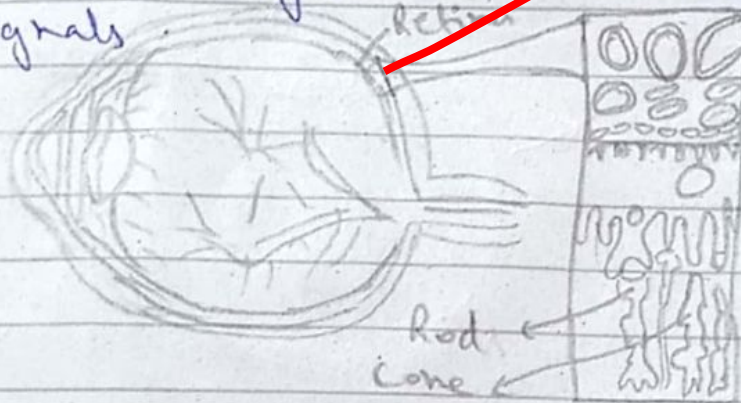
5: **Optic Nerve:** Transmits signals from the retina to the brain for visual processing.

Cornea

Macula

Fovea

Optic Nerve

vitreous humor

Retina

Nearsightedness

Nearsightedness, or myopia, is the inability to see distant object and is corrected with a diverging lens to reduce power.

Short-Sightedness

Short Sightedness (myopia) is a very common eye condition where you cannot see objects far away clearly. It's usually corrected with glasses or contact lenses.

Far Sightedness (or)

Farsightedness can be corrected with eyeglasses, contact lenses, or refractive surgery. Eyeglasses are the simplest and safest way to correct farsightedness. Your eye care professional can prescribe lenses that will help correct the problem and help you see your best.

Retina

f

Far Point of this eye

Image is formed on the retina
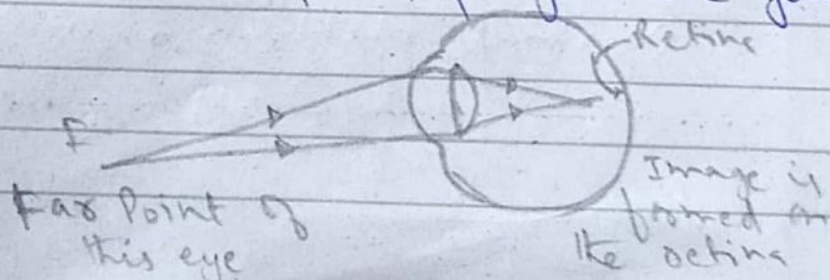
B:

Kidney work:

1- Filtration:

- Blood enters the kidney through the renal artery.
- The nephrons, the functional units of the kidney, filter blood in tiny clusters called glomeruli.
- Filtration allows water, salts, and other small molecules to pass into the renal tubules, forming filtrate.

Afferent and efferent arterioles

Glomerulus

Bowman's Capsule

Proximal tubule

Distal tubule

Collecting duct
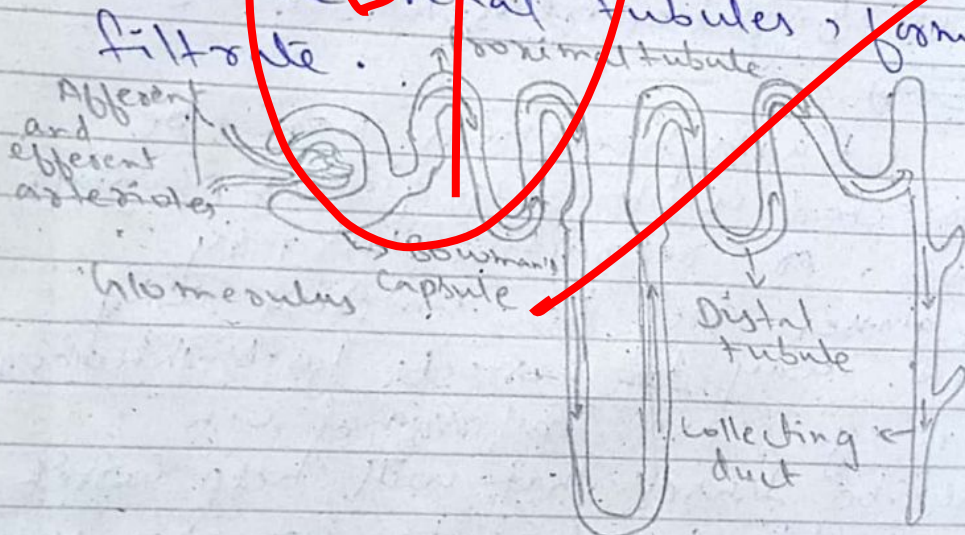
Normal filtration in kidney.

2: Reabsorption:

- In the renal tubules, essential substances like water, glucose, and ions are reabsorbed back into the bloodstream.

- This process ensures that vital elements are retained while waste products continue through the tubules.

3: Secretion:

- Additional substances, such as certain ions and drugs, are actively transported from the blood into the filtrate.

- This enhances the elimination of waste and helps maintain proper balance.
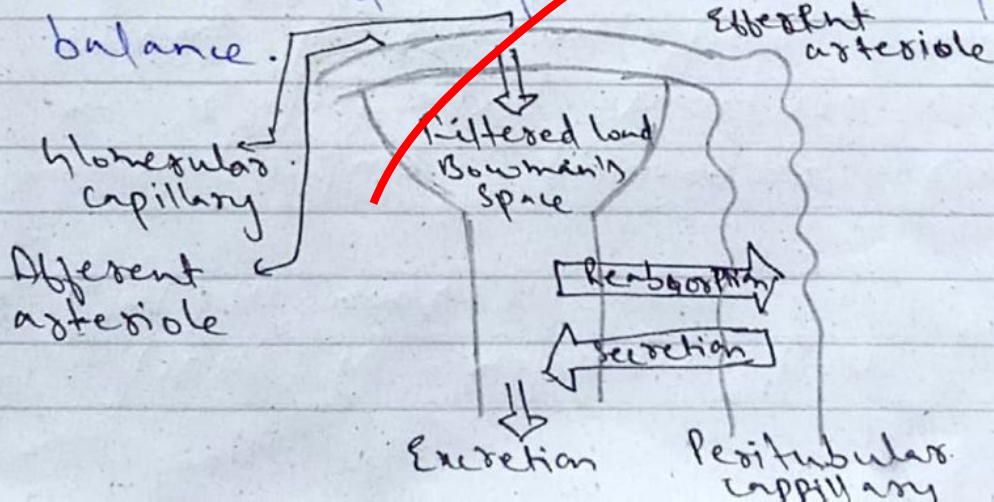
4: Concentration:

- The remaining fluid, now urine, flows through the collecting ducts.

- The kidney adjusts water reabsorption to concentrate or dilute urine based on the body's hydration needs.

5: Excretion:

- The concentrated urine enits the kidney through the ureter and is stored in the bladder until elimination. This complex process helps regulate the body's fluid balance, electrolytes, and eliminates waste.

C

A Balanced Diet

A balanced diet is essential for maintaining good health and well-being. It involves consuming a variety of foods in proper proportions to provide the necessary nutrients, including carbohydrates, proteins, fats, vitamins and minerals. This helps support growth, energy levels, and overall body function. A well-balanced diet incorporate a mix of fruits, vegetables, whole grains, lean proteins, and healthy fats while limiting processed foods, sugars, and excessive salt intake. Regularly choosing a diverse range of foods ensures that the body receives the nutrients it needs for optimal function.

Balanced diet chart

Proteins | Fruit and vegetables | fats | Fiber-rich carbohydrates
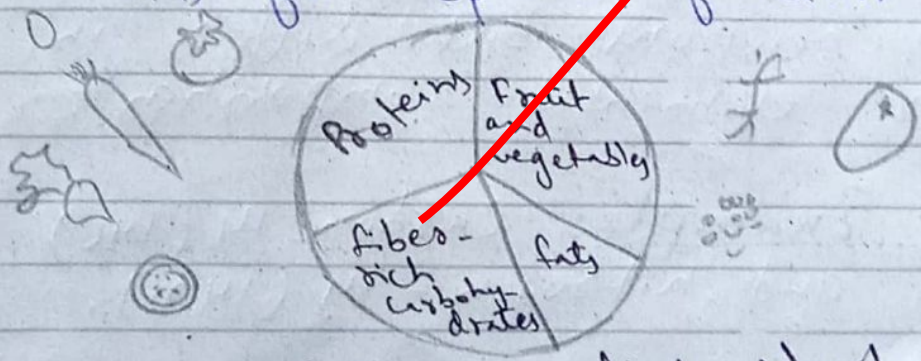
D:

Isotopes :

Isotopes are atoms of the same elements with the same number of protons but different numbers of neutrons. They have identical chemical properties but may vary in atomic mass.

For Example, hydrogen has three isotopes : Protium (1 Proton), deuterium (1 Proton and 1 neutron), and tritium (1 Proton and 2 neutrons).

Isobars :

Isobars are atoms with the same mass number but different atomic numbers. This means they have the same total number of Protons and neutrons but differ in their elemental composition.
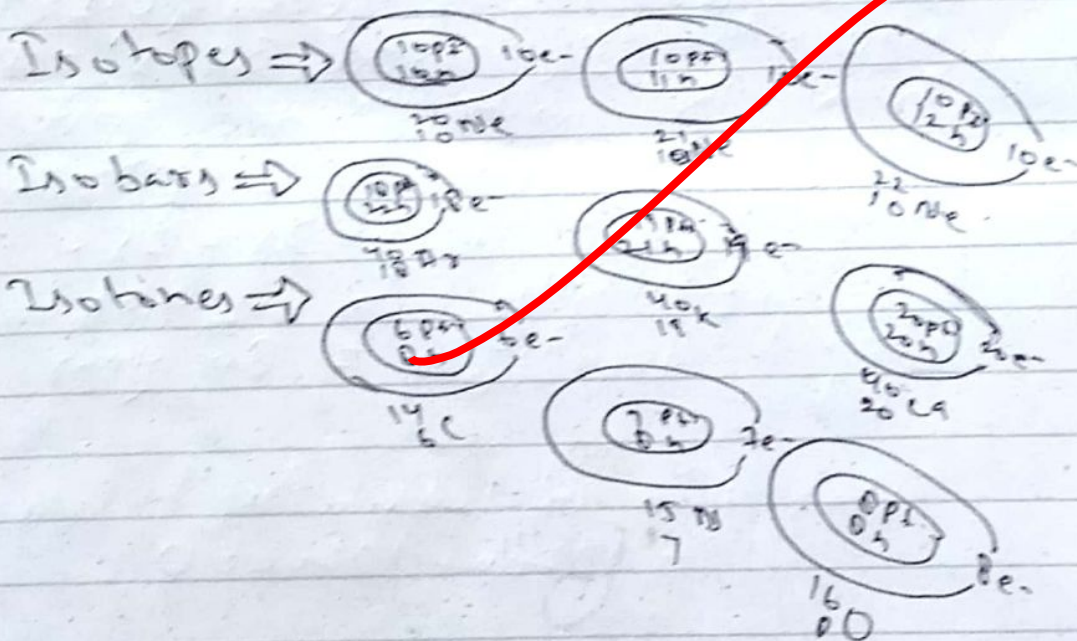
An Example: Carbon-14 (^{14}C) and nitrogen-14 (^{14}N).

Isotones:

Isotones are atoms with the same number of neutrons but different numbers of protons. They have similar nuclear properties but belong to different chemical elements.

An Example is: helium-4 (^4He) and lithium 6 (^6Li).

Isotopes ⇒

Isobars ⇒

Isotones ⇒

Section II

Q. No: 06

"a"

If the Son is 30 years old now and five year ago, his age was $(30-5) = 25$, then the father's age five years ago was three times, that, which is $3 \times 25 = 75$. Currently, the father would be $75 + 5 = 80$ year old.

"B"

The mean of $10, 30, Y,$ and 50 is given as 50. To find Y, sum up the numbers and divide by the count: $(10 + 30 + Y + 50)/4 = 50$.

Solving for Y gives $Y = 60$

"C"

(i) The pattern is a geometric sequence with a common ratio of 3. So, the missing term is $54 \times 3 = 162$.

(ii) The pattern is a geometric sequence with a common ratio of $5/8$. So, the missing term is $256 \times (5/8) = 160$.

"D"

Let the two numbers be x and y, where the product $xy = 320$ and the ratio $x : y = 1:5$. This implies that $x = 40$ and $y = 8$. The difference between the squares of these two numbers is $(x^2 - y^2) = (40^2 - 8^2) = 1520$.

Q. No. 07

"a"

let's calculate the profit or loss percentage:

For the first scooty, with a 20% profit:

Profit = 20% of 96000 = 0.2 × 96000
= 19200

for the second scooty, with a 20% loss:

loss = 20% of 96000 = 0.2 × 96000 = 19200

Total gain or loss = Profit - loss = ~~18000~~
= 19200 - 19200 = 0

Since the total is zero, there is neither gain or loss.

'B'

The total work done is constant, so the product of the number of men, hours worked per day, and days should remain the same. Let x be the number of men needed to finish the job in 15 days working 13 hours a day.

$$195 \times 10 \times 20 = x \times 13 \times 15$$

Solving for x gives $x = \dfrac{195 \times 10 \times 20}{13 \times 15}$

"C"

A' (complement of set A) includes all elements in U (universal set) that are not in A. Since A contains vowels A' will contain all consonants in the English alphabet.

"द"

The volume of a Square Pyramid is given by the formula $V = \frac{1}{3} Bh$, where B is the area of the base. Here, the volume is given as 372 cm^3, and the height is 3 km (which needs to be converted to cm). Once the base area is found, the perimeter can be determined.

$372 = \frac{1}{3} \times \text{Base Area} \times 300000$

Solving for the base Area, we can find the side length of the square base. Once the side length is known, the perimeter can be calculated.