

~ (PART - II) ~

~ (SECTION: A) ~

~ (Q NO : 02) ~

~ (a) ~

Describe the structure of the universe according to big bang theory

Definition: The Big Bang theory states that the universe originated from a singular, extremely hot and dense point about 13.8 billion years ago.

Expansion of the universe: The universe began expanding rapidly in an event called the big bang, spreading matter and energy throughout space.

Formation of matter: As expansion continued, the universe cooled, forming fundamental particles, atoms, stars, and galaxies.

Large scale structure: Galaxies group into clusters and superclusters, linked by cosmic filaments and separated by voids, forming a cosmic web.

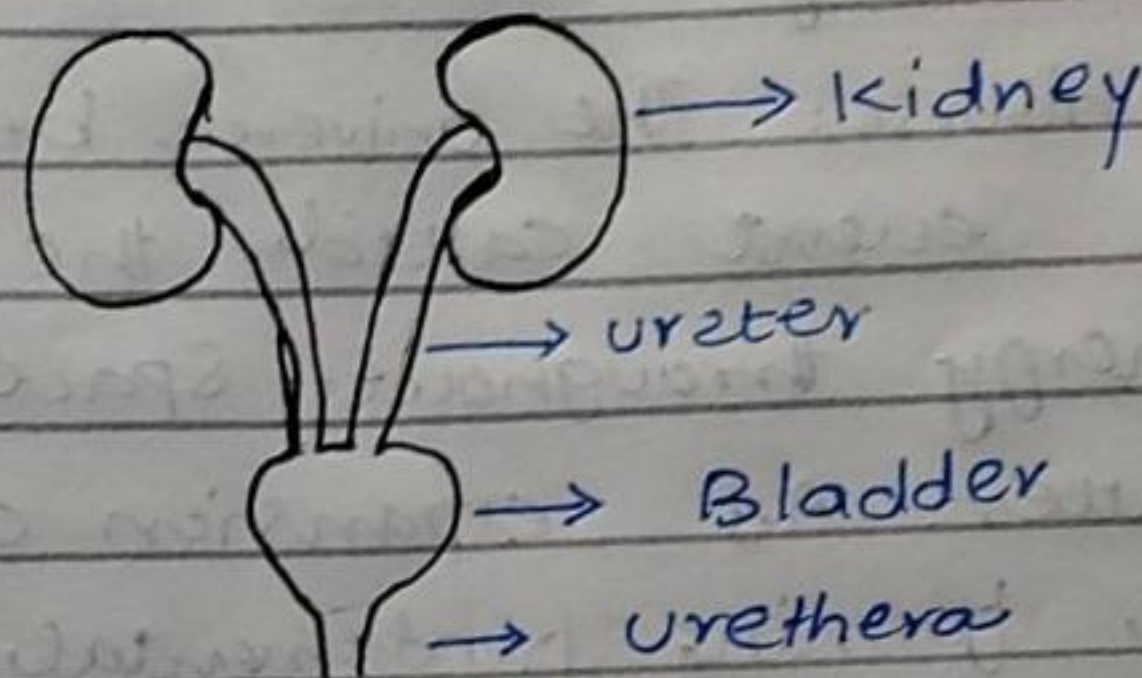
Composition:

The universe consists of dark energy, dark matter, and ordinary matter, and continues to expand today.

Define Urinary System and explain the working of Nephron

Urinary System:

The Urinary System, also called the excretory system, is responsible for removing waste products and excess fluids from the blood, maintaining water and electrolyte balance, and regulating acid-base balance in the body. It mainly includes the kidneys, ureters, urinary bladder, and urethra.



NEPHRON:

Definition:

The nephron is the functional unit of kidney, where blood filtration and urine formation occur.

Working of Nephron:

Filtration:

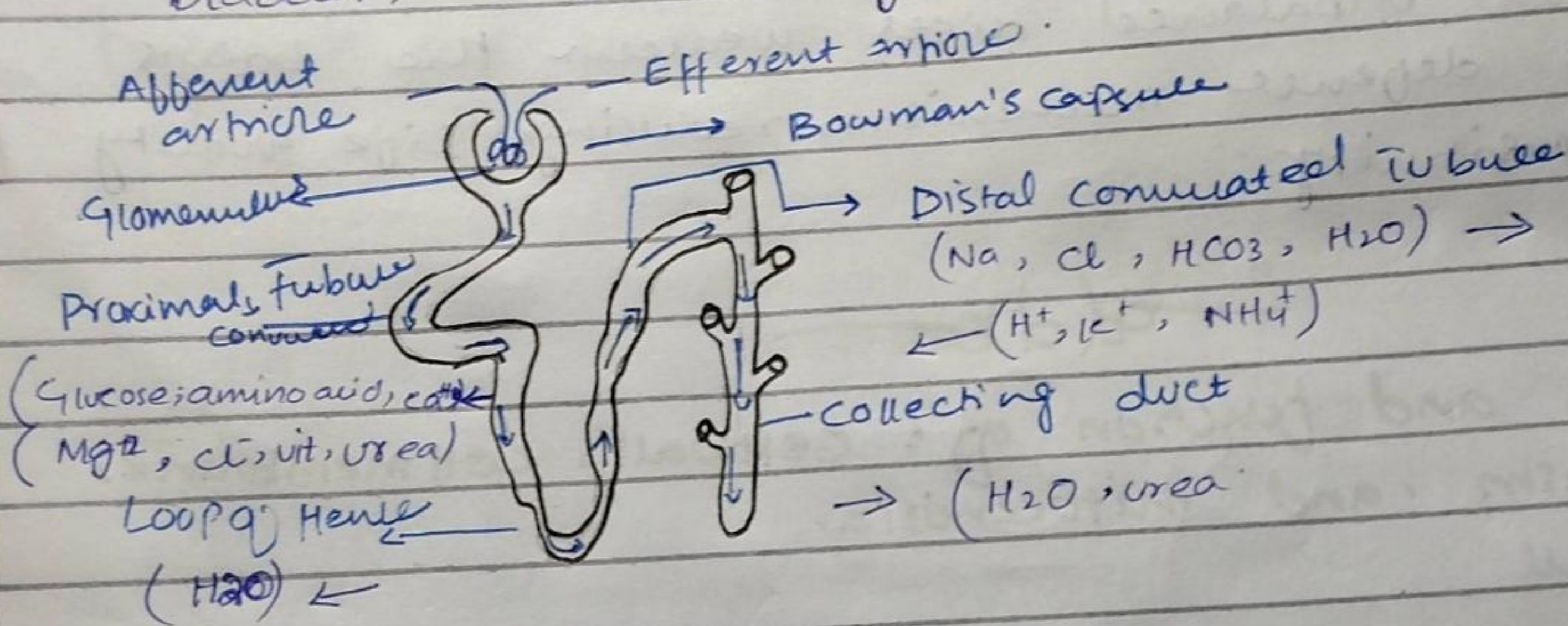
- Blood enters the glomerulus under high pressure. Water, salts, glucose, and urea are filtered into the Bowman's capsule, forming the glomerular filtrate.

Reabsorption (Tubules)

- Useful substances like glucose, amino acids, and most water are reabsorbed in the proximal convoluted tubule (PCT) and loop of Henle back into the blood.

Secretion (Distal Tubule and collecting duct)
 Additional waste products, hydrogen ions, and excess potassium are excreted into tubules

Excretion: (Collecting Duct)
 The remaining filtrate, now called urine, passes into the collecting ducts, then into the ureters, bladder, and finally is excreted via urethra.



Un-Balanced Diet ? How it affects the healthy living?

Un-Balanced Diet

An unbalanced diet is one that does not provide the body with proper proportion of nutrients such as carbs, proteins, fats, vitamins, mineral required for optimal health.

Effects on H-Livings

Malnutrition :

Lack of or excess of essential nutrients can lead to undernutrition or overnutrition, causing weak immunity, fatigue, and stunted growth.

Increased risk of Disease:

Diets high in sugar, fats, salts increase the risk of obesity, diabetes, hypertension, CVD, Metabolic syndrome

Poor Physical and mental Performance
Deficiency in key nutrients like iron, iodine, or vitamin B can lead to anemia, cognitive impairments, and poor concentration.

Digestive Problems:

low fiber intake may cause constipation, bloating, and other gastrointestinal issues.

Overall health decline:

long-term unbalanced diets weaken the body's natural defence mechanisms, reducing life quality and longevity.

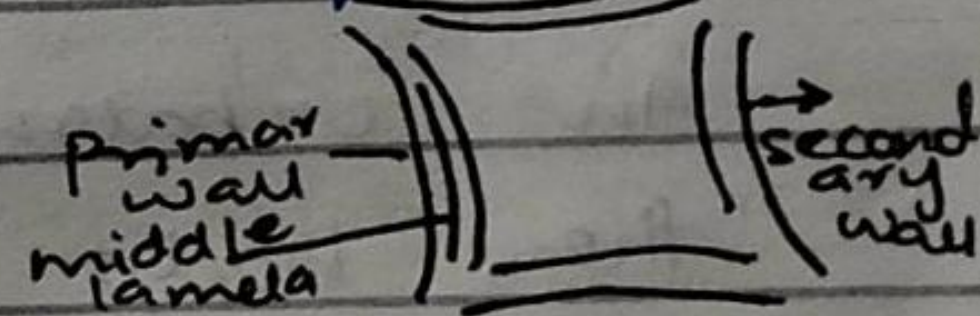
~~o(d)er~~

Structure and function of: cell wall, cell membrane, cytoplasm, and mitochondria

Cell wall

Structure:

- Found in Plants, fungi, and bacteria (absent in animal cell).
- Made up of cellulose in plants, chitin in fungi, and peptidoglycan in bacteria.
- Rigid and semipermeable, providing shape and support.



Functions:

- Provides structural support and protection.
- Maintains cell shape and prevents excess water intake.
- Act as a barrier against pathogens.

Cell membrane

- Structure:
- Present in all cells, composed of phospholipid bilayer with embedded proteins (fluid mosaic model).
- Semi permeable, allowing selective transport of substances.

Functions:

- Control entry and exit of substances.
- Provides protection against and support
- Involved in cellular communication, signaling, and recognition.

Cytoplasm:

Structure:

- Jelly-like substance filling the cell between the cell membrane & nucleus.
- Composed of cytosol (water + dissolved substances) and organelles.

Functions:

- Act as a medium for chemical reactions.
- supports and suspends organelles.
- helps in transport of materials within cell

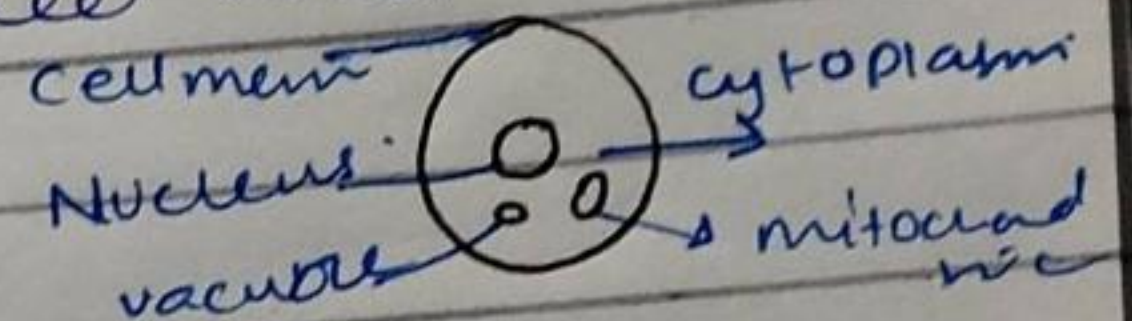
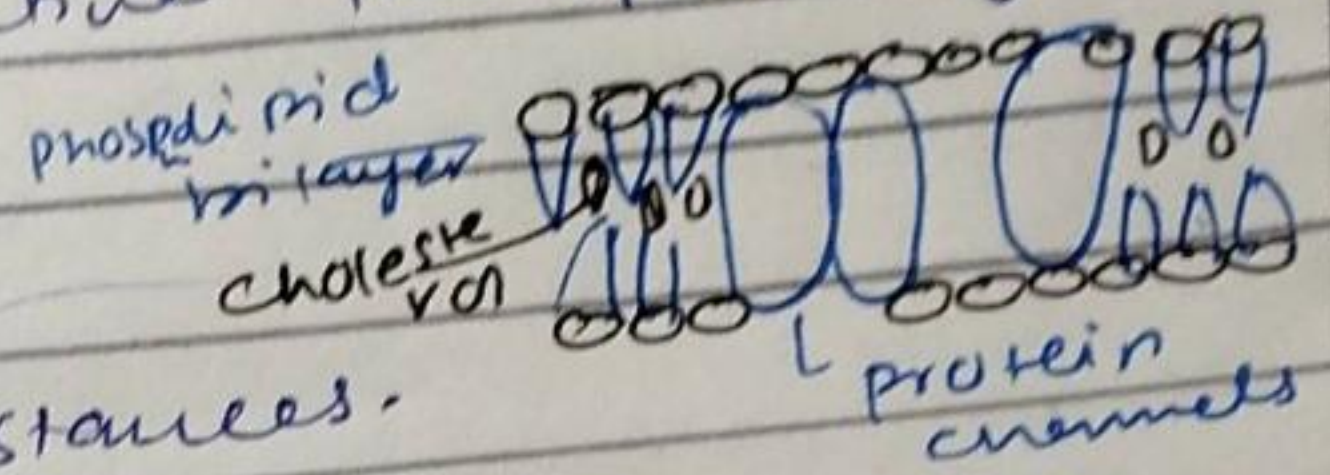
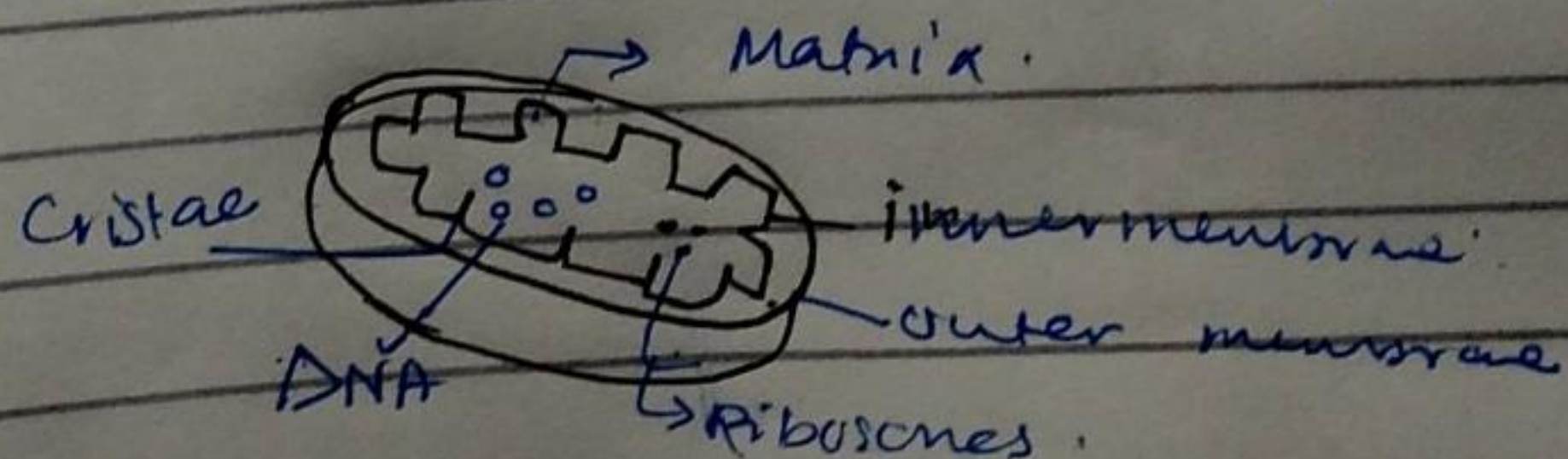
Mitochondria:

Structure:

- oval-shaped, double-membrane organelle.
- inner membrane form cristae, increasing surface area.
- Contains its own DNA and ribosomes.

Functions:

- Known as the "power house of the cell".
- Produces ATP through cellular respiration
- Regulate cell metabolism and energy supply.



Q NO: 04

Role of heart and blood vessels in circulation

Role of Heart:

- Pumps blood throughout the body.
- Send oxygenated blood to the body and deoxygenated blood to the lungs.
- Maintains blood pressure and ensures one-way flow.

Role of blood vessels

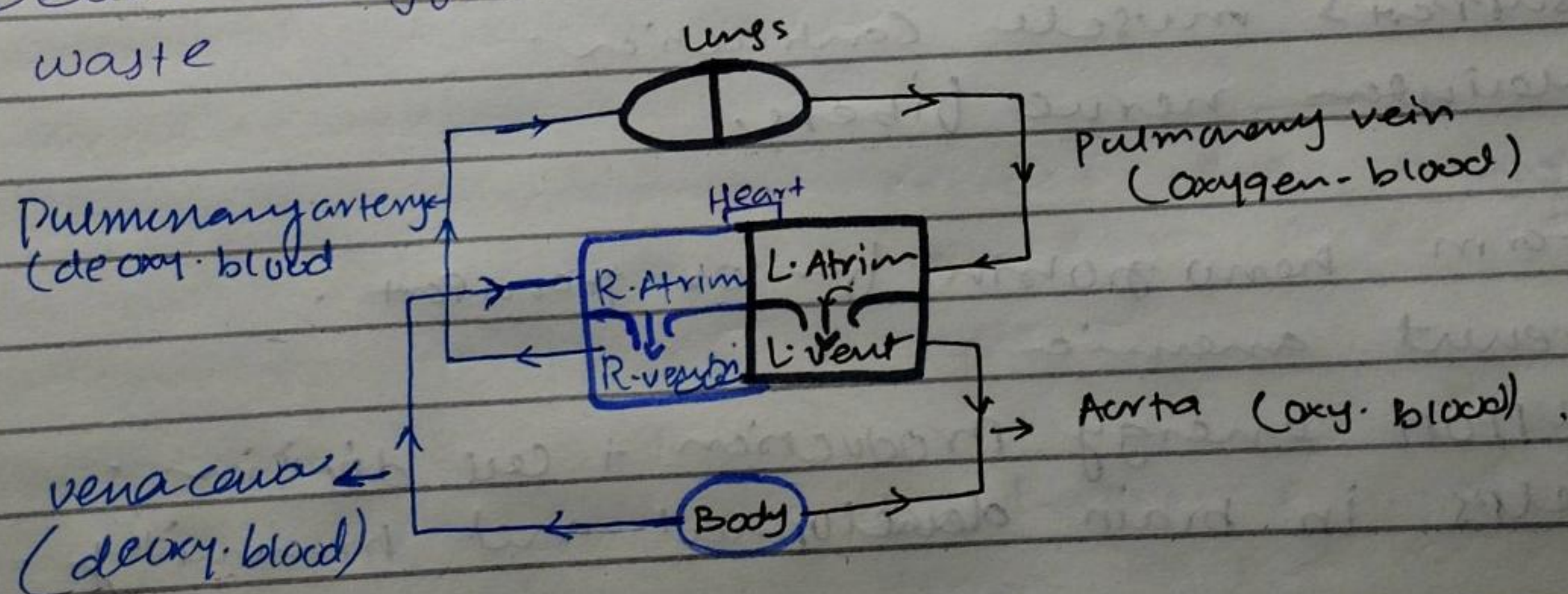
Arteries: Carry ~~oxygen~~ blood from the heart to body
(all arteries carry oxygenated blood except pulmonary artery)

Veins: Carry blood from body to the heart
(all veins carry deoxygenated blood except pulmonary vein)

Capillaries: Allow exchange of oxygen, nutrients, & wastes with tissues.

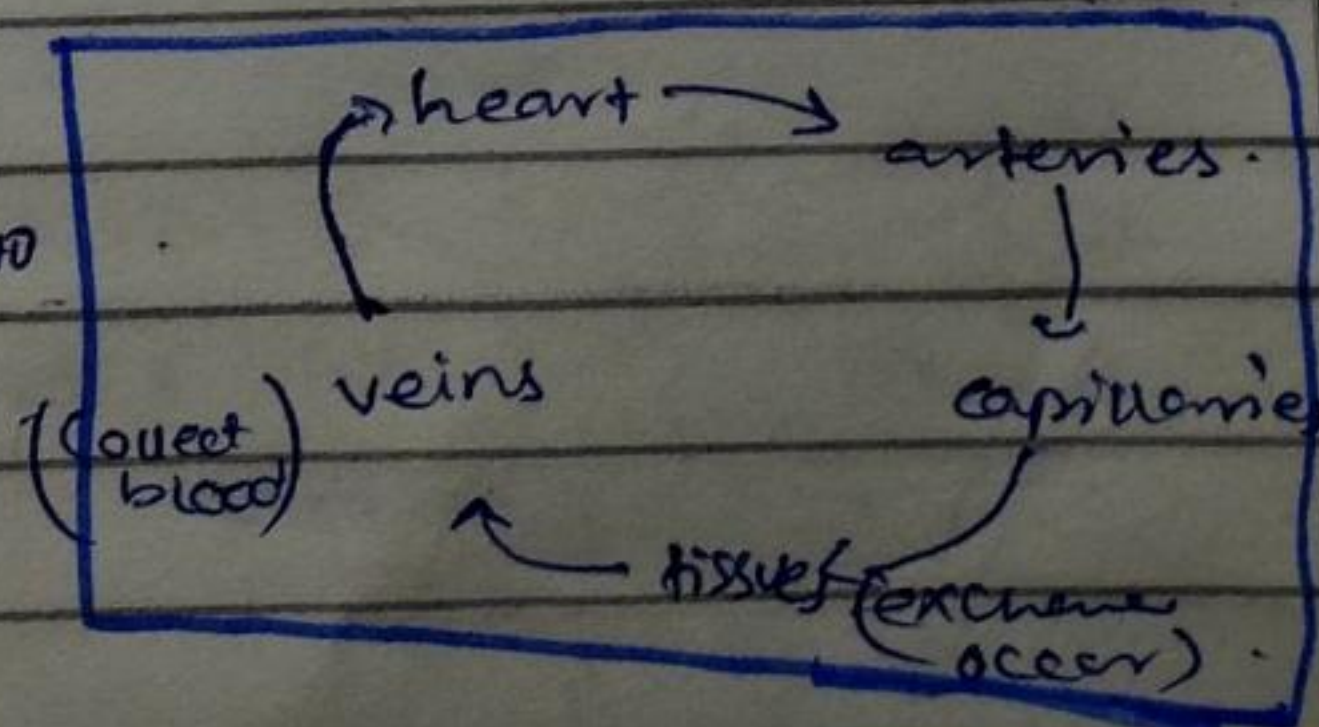
Overall functions:

- Ensures continuous circulation of blood.
- Deliver oxygen and nutrients to cells & remove waste



How they work Together.

- heart pump blood into arteries → branches into capillaries → exchange occur in tissues → blood collect into veins → veins return blood to the heart.



- it ensures O_2 , nutrients, and hormones reach body cells while removing CO_2 & other wastes.

Enlist the functions of:

Carbohydrates:

(4 kcal/g)

- Provide energy for body & brain
- Spare proteins from being used as energy.
- helps in fat metabolism.
- Regulate blood sugar levels.

Proteins.

- Build and repair body tissues
- Make enzymes, hormones, antibodies.
- support growth
- Provide energy in absence of carbs & fats. (4 kcal/g)

Fats

- Provide concentrated energy (9 kcal/g)
- Store fat soluble vitamins (A, D, E, K)
- Protection to vital organs.
- Maintain body temperature.

Calcium

- Builds strong bones & teeth.
- helps in blood clotting.
- supports muscle contraction.
- Maintain nerve fibers.

Iron

- Form hemoglobin for O₂ transport.
- Prevent anemia.
- Support energy production + cell division.
- helps in brain development and immunity.

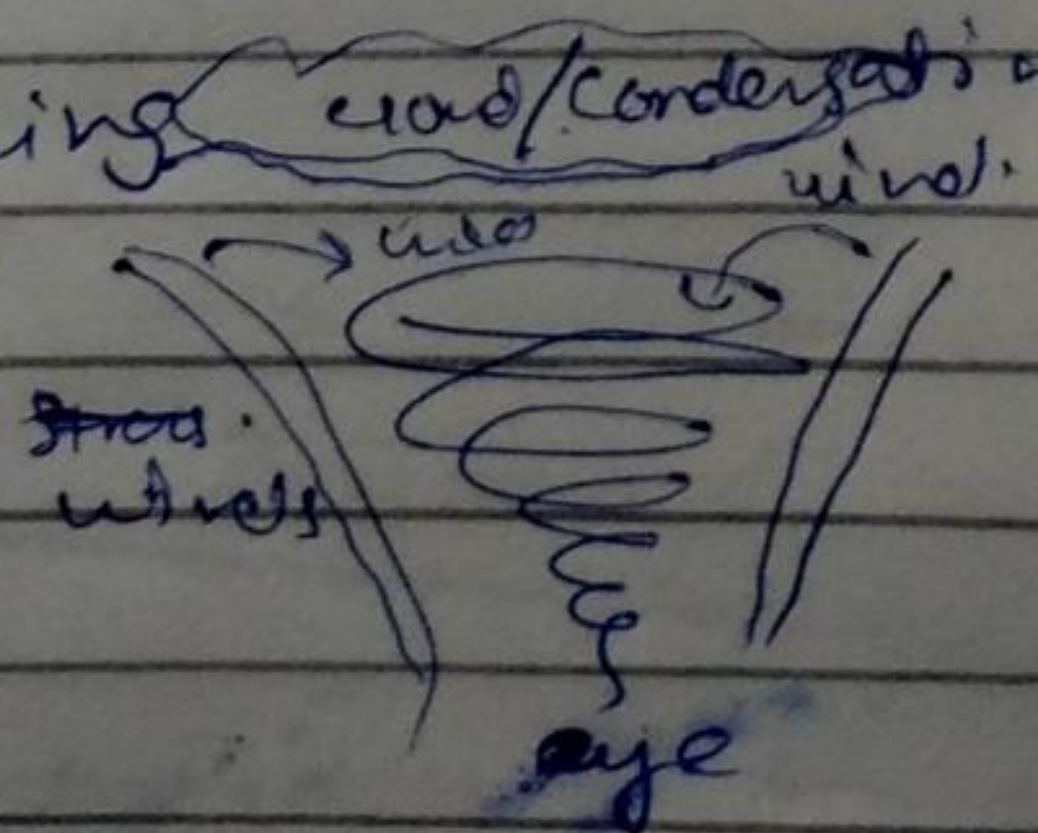
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Cyclone

Cyclone is a large scale, rotating storm system characterized by low pressure at the center, strong winds, and heavy rainfall. It forms over warm oceans and can cause floods, strong winds, and coastal damage.

Formation:

- 1: Warm ocean water - cyclones form over oceans with temperature above $26-27^{\circ}\text{C}$ which provides the energy and moisture.
- 2: Evaporation and condensation: warm water evaporates, rises and condenses to form clouds, releasing latent heat that fuels cyclone.
- 3: low pressure area - Rising warm air creates a low pressure zone at the surface.
- 4: Coriolis effect: The earth's rotation causes the wind to spiral around the low-pressure area forming a rotating system.
- 5: cyclone maturity - winds intensify, clouds thicken, and a well defined eye may form at the centre.
- 6: Movement - cyclones are steered by prevailing winds and move towards coastal areas bringing heavy rain & strong winds.



Q8(SECTION: 02)

Q8(QNO: 6)

Q8(A)

Pointing to a woman, and Ahsan said, "Her granddaughter is the only daughter of my brother" How is the woman related to Ahsan?

Let the woman be 'W' and her Granddaughter 'G'
Ahsan's "Her granddaughter (G) is the only daughter of my brother"

$\Rightarrow G = \text{Ahsan's brother's daughter} = \text{Ahsan's niece}$

$\Rightarrow G$ is the granddaughter of W.

W is the grandmother of 'G'.

Since G is Ahsan's niece, the grandmother of Ahsan's niece is Ahsan's mother.

$\therefore$ The woman is Ahsan's mother.

Q8(B)

Given:

Ratio of length to breadth = $3:2 \Rightarrow l = 3x, b = 2x$ (m)

Speed of cyclist = 12 km/hr .

Time to complete 1 round = 8 minutes .

To find: Area of park in sq. meter.

Solution:

Convert speed into m/min.

$1 \text{ km} = 1000 \text{ m}, 1 \text{ hr} = 60 \text{ min}$.

$12 \text{ km/hr} = 12 \times 1000 / 60 = 200 \text{ m/min}$.

Find perimeter: Speed $\times$ time

Perimeter: $200 \times 8 = 1600 \text{ m}$

Perimeter of rectangle = $2(\text{length} + \text{breadth})$

$$2(3x + 2x) = 2(5x) = 10x$$

$$10x = 1600 \Rightarrow x = 160 \text{ m}$$

$$\text{length} = 3x = 3 \times 160 = 480 \text{ m}$$

$$\text{breadth} = 2x = 2 \times 160 = 320 \text{ m}$$

find area =

$$\text{Area } L \times B =$$

$$= 480 \times 320 = 153,600 \text{ m}^2$$

So,

The area of the park is $153,600 \text{ m}^2$.

~~Qd)~~

LCM of 2 Number = 48

Numbers are in ratio of 2:3

Sum of Number is?

Let the number be:

Numbers = $2x$ & $3x$ (since ratio 2:3)

LCM $\times$ GCD = product of the numbers.

LCM = 48, Numbers = $2x$ & $3x$

$$(2x \times 3x) / \text{GCD} = 48 \Rightarrow 6x^2 / \text{GCD} = 48$$

Since numbers are in ratio 2:3, their GCD = x

$$6x^2 / x = 6x = 48 \Rightarrow x = 8$$

Find the numbers -

$$\therefore \text{First number} = 2x \times 8 = 16$$

$$\text{Second number} = 3 \times 8 = 24$$

Sum of numbers:

$$16 + 24 = 40$$

So the ~~two~~ sum of ^{two} numbers ^{whose} LCM is 48 and were in 2:3 is "40"

Sum is 40

~~Q NO: 07~~

~~Q 10~~

40% of a number is equal to $\frac{2}{3}$ of another number. what is ratio of 1st number to the second number.

Let the numbers be.

First number = x , Second number = y

Given:

$$40\% \text{ of } x = \frac{2}{3} \text{ of } y.$$

$$0.4x = \frac{2}{3}y.$$

Find the $x:y$

$$x/y = \frac{2/3}{0.4} = \frac{2/3}{2/5} = \frac{2}{3} \times \frac{5}{2} = \frac{5}{3}$$

So,

The ratio of the first number to the second number is $5:3$

~~Q 10~~

Selling 17 ball at 720, Loss equal to the cost of 5 balls.

Cost of 1 ball = ?

Cost price of ball

Given:

Selling 17 ball = 720 Rs. , Loss = Cost of 5 balls.

Let the Cost price of 1 ball = x Rs.

Total cost of 17 balls = $17x$, Loss = Cost of 5 balls = $5x$.

Selling price = Cost price - Loss $\Rightarrow 17x - 5x = 720$

$$x = 720/12 = 60$$

So, the cost price of one ball = Rs 60

Q(C)

Given:

Father 24 years older than Son

In 2 years, Father's age = $2 \times$ Son's age

To find:

Son's present age = ?

Let,

Son's present age = x years, Father's age = $x + 24$.

Step 02: after 2 years.

$$x + 2 + 24 = 2(x + 2)$$

$$\Rightarrow x + 26 = 2x + 4 \Rightarrow x + 26 - 4 = 2x$$

$$\Rightarrow 22 = 2x - x = x$$

$$x = 22 \text{ years.}$$

So,

The age present age of Son is = 22 years

Q(d)

Given:

Rashid: 32 Pages in 6 hours $\Rightarrow$ Speed = $32/6 = 16/3$ pages/hr

Kamran: 40 Pages in 5 hours $\Rightarrow$ Speed $40/5 = 8$ page/hr.

Total Pages = 110.

$\therefore$ They work together on separate computers $\Rightarrow$ Speed add.

To find: Time they take, working together on 2 different computers:

Combine Speed:

$$\text{Combined Speed} = \frac{16}{3} + 8 = \frac{16}{3} + \frac{24}{3} = \frac{40}{3} \text{ page/hr.}$$

Time to complete 110 pages.

$$\text{Time} = \frac{\text{Total Pages}}{\text{combined speed}} = \frac{110}{40/3} = 110 \times \frac{3}{40} = \frac{825}{40} \text{ hr.}$$

So,

The time taken by Rashid and Kamran to complete 110 page is (8.25 hours) 8 hours & 15 minutes.