

BIOLOGICAL SCIENCE NOTES

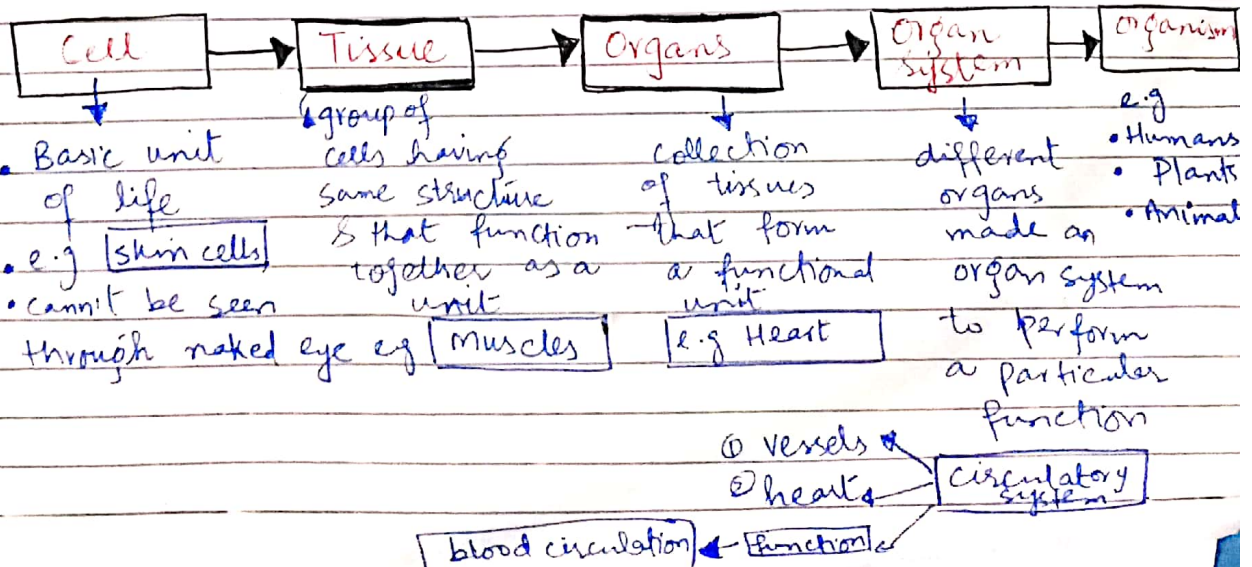
→ Biology

↓
life to study

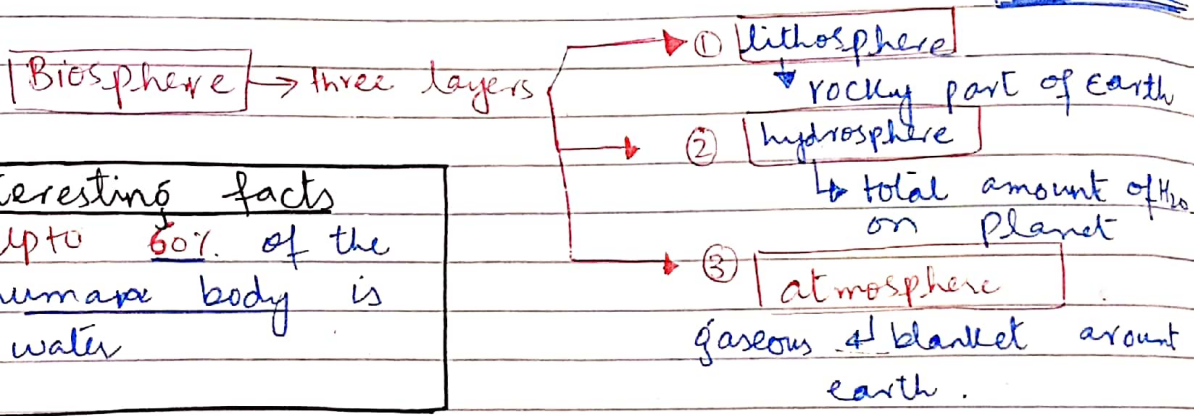
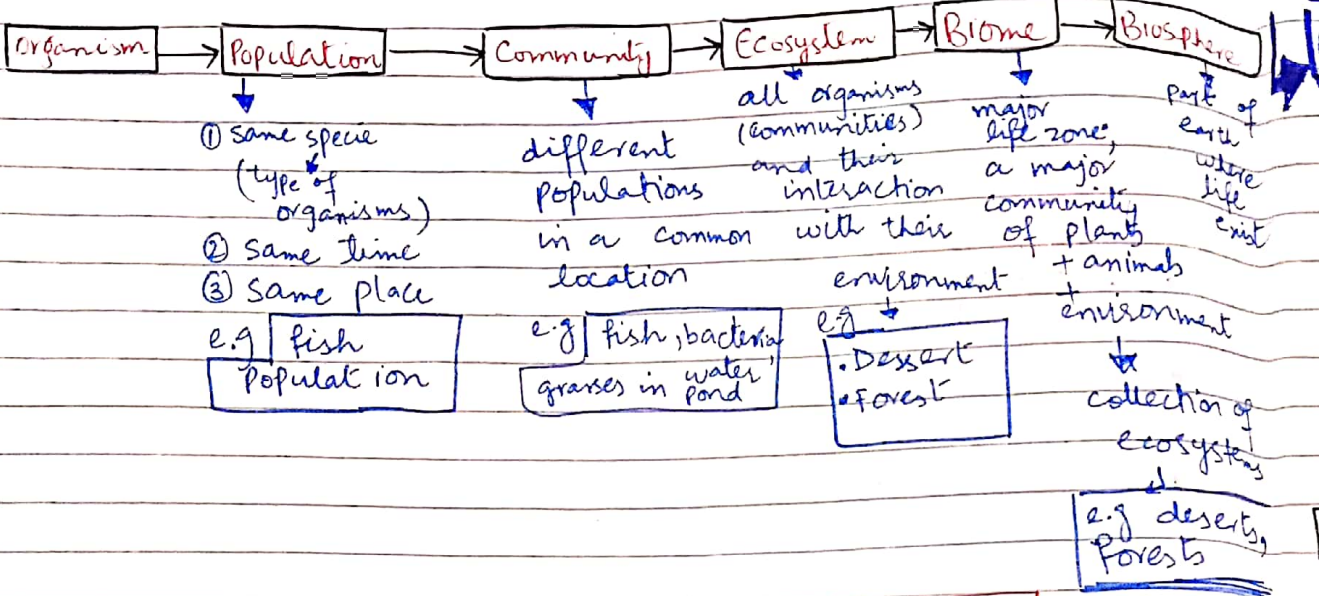
→ Important Definitions:

- **Zoology**: Study of animals
- **Botany**: study of plants
- **Physiology**: study of how the human body works (functions study)
- **Anatomy**: Description of the structures of human body
- **Pathology**: Branch of biology deals with origin and cause of disease
- **Histology**: study of tissue and their structure
- **Biotechnology**: exploitation and utilization of biological processes for the benefit of mankind; vaccination formation.

→ LEVELS OF ORGANISATION OF A HUMAN BODY:



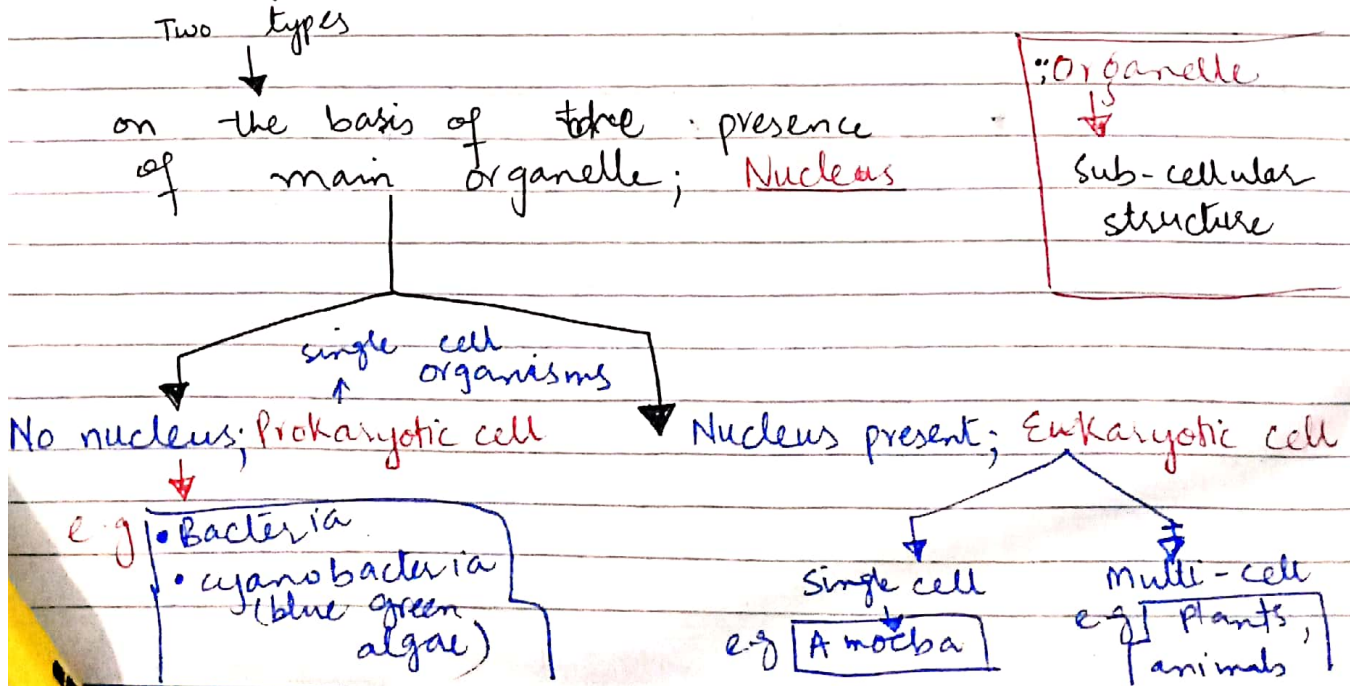
LEVELS OF ORGANIZATION IN AN ECOSYSTEM



Interesting facts

- Upto 60% of the human body is water

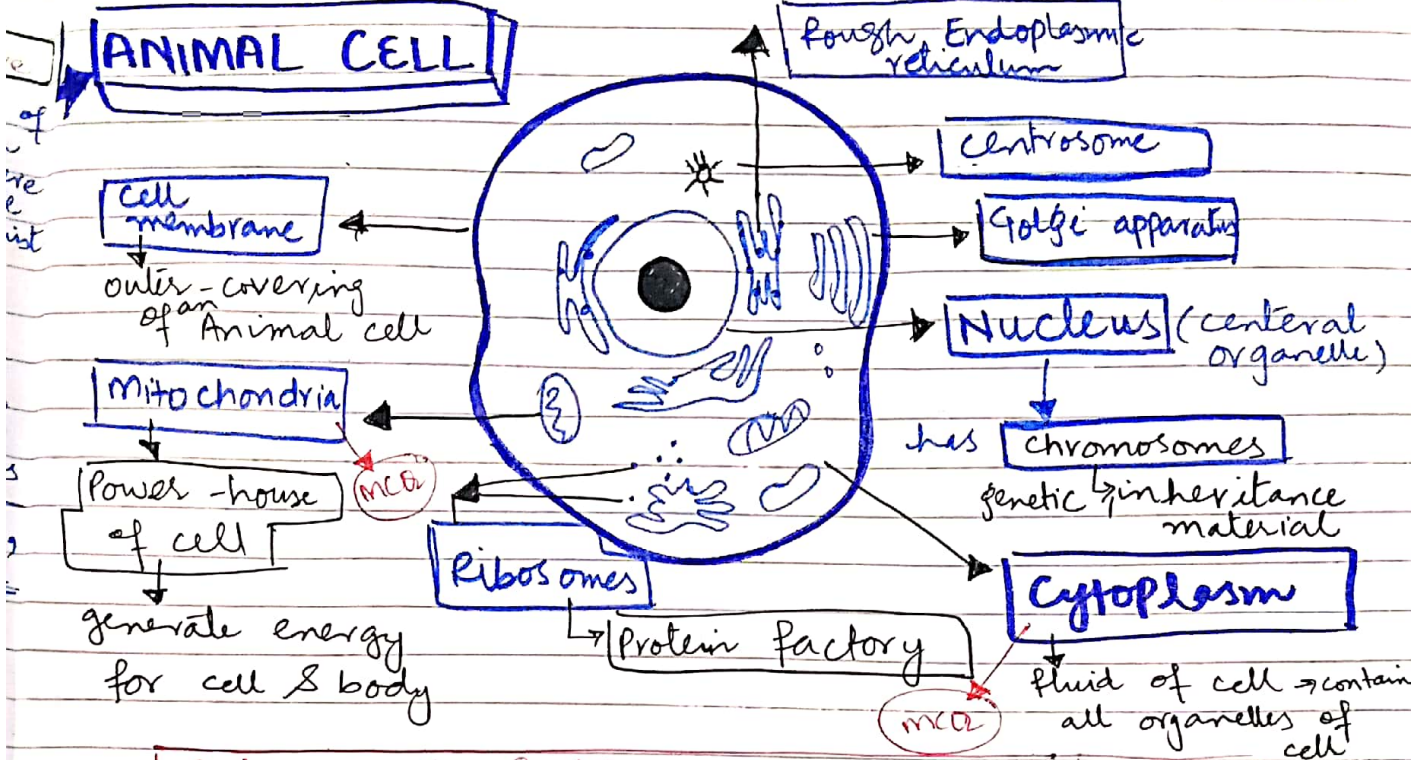
CELL; BASIC UNIT OF ALL FORMS OF LIVES



Organelle
↓
Sub-cellular structure

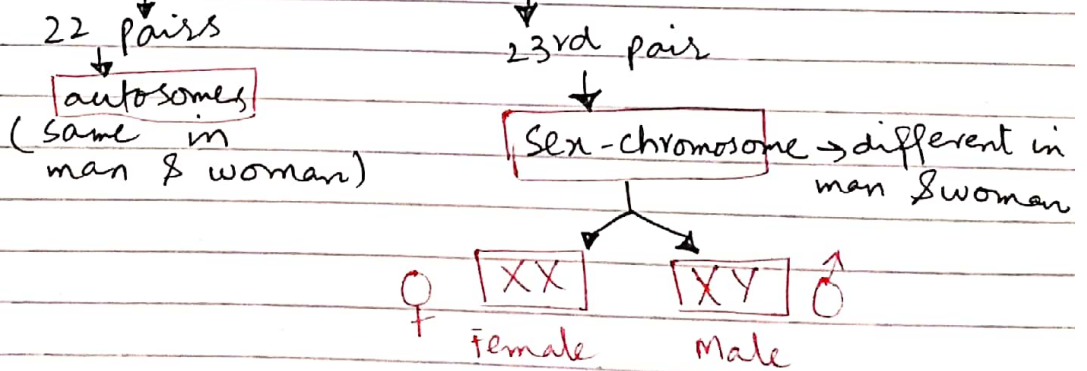
Animal and Plant cells are different

ANIMAL CELL



Interesting facts:

Nucleus -> has genetic material called as **Chromosome** -> 23 pairs (total 46) of chromosomes are in human body.

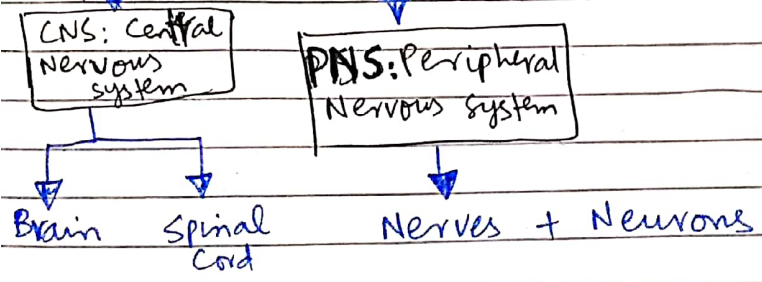


Plant cell

- Outer-covering = cell wall
- 2nd membrane = cell membrane
- Chloroplast = chlorophyll containing organelle
 - only present in plants
 - pigment for photosynthesis
 - food making process

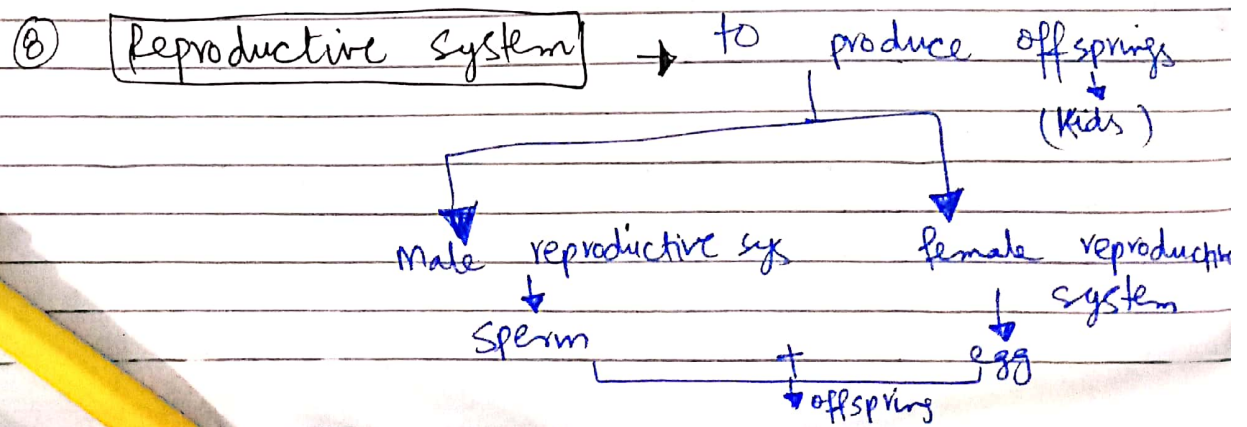
→ NAMES OF DIFFERENT ORGAN SYSTEMS OF HUMANS AND THEIR FUNCTIONS:

- | NAME | FUNCTION |
|---------------------------------|---|
| ① <u>Circulatory system</u> | pump blood for the transport of oxygen and nutrients in the body (to all cells) |
| ② <u>Air Respiratory system</u> | respiration process $O_2 \rightarrow$ inside of body $CO_2 \rightarrow$ out of the body |
| ③ <u>Immune system</u> | Protection of body (Army of the body) → through WBCs + Antibodies |
| ④ <u>Nervous system</u> | for the coordination system of body |



Subsidiary

- ⑤ Urinary system: to remove nitrogen waste from body in the form of urine
- ⑥ Digestive system: food digestion + solid waste removal
- ⑦ Muscular system: for movement



⑤

→ VITAL ORGANS OF HUMAN BODY

① Heart

② Lungs

③ Kidneys

④

Liver

⑤

Spleen

- detoxify substances
- produce many new substances

→ Names of different types of cells of human body:

① Brain cells : neurons + glia

② Liver cells : Hepatocytes

③ Kidney cells : Nephron (functional unit)

④ Bone cells : osteoblast + osteoclast

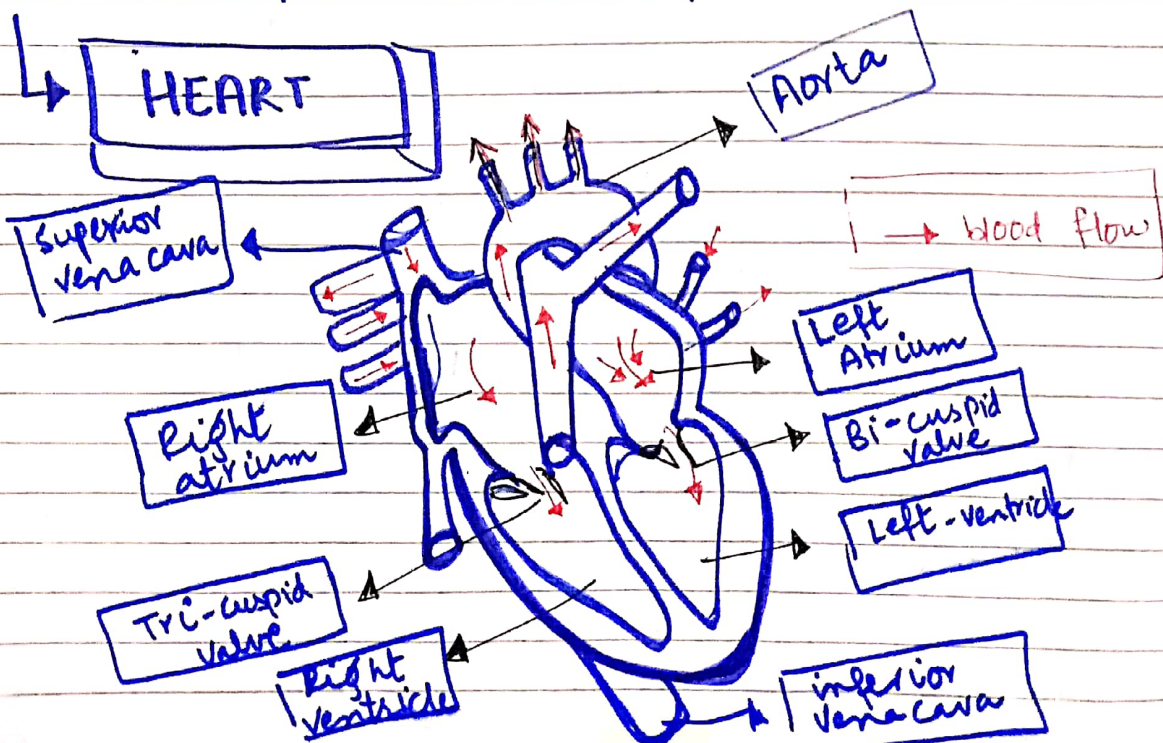
bone forming cells

Bone dissolving cells

⑤ Heart cells

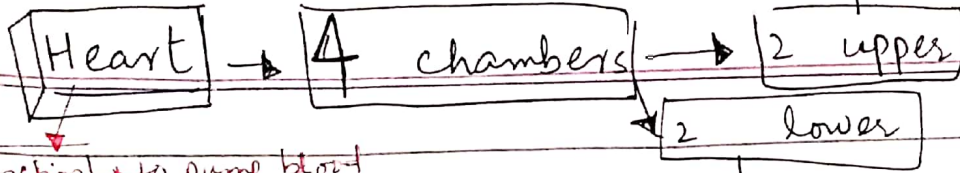
Myocytes

→ ANATOMY AND PHYSIOLOGY OF HUMAN ORGANS AND ORGAN SYSTEM:



⑥

right & left atria



function -> to pump blood for continuous supply of oxygen & nutrients

- > Bicuspid valve = b/w left atrium & ventricle
- > Tricuspid valve = b/w right atrium & ventricle

- > Aorta : carry blood (oxygen rich blood) from heart to body
- > Venacava : vein carry blood from body to heart

INTERESTING FACTS

- Normal Blood Pressure range -> 120/80 mmHg
- Heart beat normal rate -> 70-73 per minute
- Normal oxygen saturation in blood -> 95% or higher than it

CIRCULATORY SYSTEM

-> for blood circulation

Composed of

- > Heart
- > Vessel system

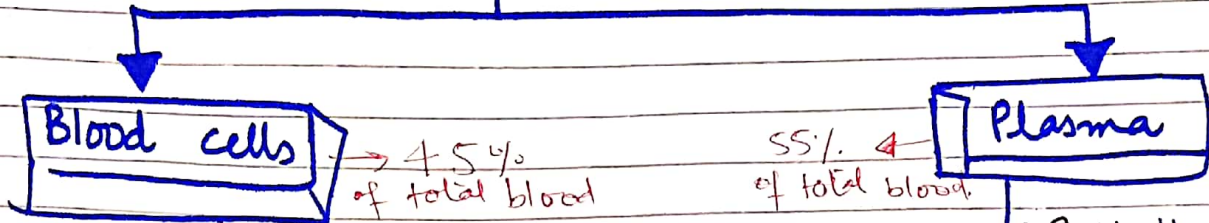
3 types



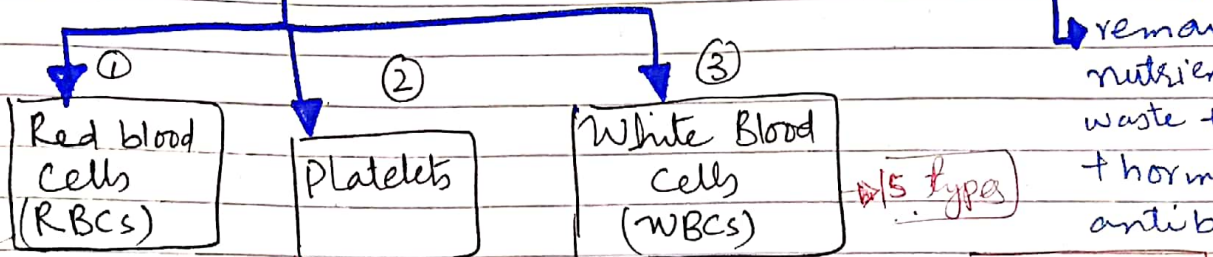
| | Arteries | Capillaries | Veins |
|-------------|--------------------|-------------------------------|--------------------|
| carry blood | from heart to body | material exchange with tissue | from body to heart |
| Pressure | High ↑↑ | Low ↓↓ | Low ↓↓ |
| valves | No | No | Yes |
| wall layers | Three | one | Three |
| Thickness | Thick | Extremely thin | Thin |

HUMAN BLOOD → transport liquid (red color) pump by heart

Composition



3 types



- 90% H₂O
- 7-8% blood proteins
- remaining nutrients + waste + gases + hormones + antibodies

also called as Erythrocytes
 → contain Hb

also called as thrombocytes

also called as leukocytes

Red pigment

no pigment

life span: ≈ 120 days

life span: 3-7 days

life span: 13-20 days

Total number

| | |
|-------------------------------|-------------------------------|
| for men | for women |
| 4.7 - 6.1 million per μ L | 4.2 - 5.4 million per μ L |

Total no. 1,50,000 - 4,50,000 per μ L

Total number 45,000 - 11,000 per μ L (microliter)

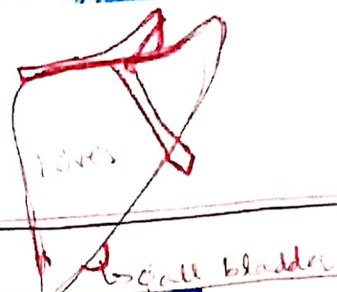
Function: Hb carries oxygen

Function: blood clotting

Function: make Defence system of body

⑧

FUNCTION OF LIVER:



Detoxification of harmful chemicals

Bile production & excretion

Synthesis of plasma proteins

Excretion of hormones & drugs

Storage of ~~glucose~~ glycogen

glycogen

MACROMOLECULES OF HUMAN BODY:

↓ large

Organic in nature → made-up of C, H, & Oxygen

FOUR

MAJOR

MACRO-

MOLECULES

OF

HUMAN

BODY

Carbohydrates

→ major & immediate source of energy
↳ e.g. → glucose, glycogen

Proteins

→ major structural component of the body → nail, hair & muscles

Lipids

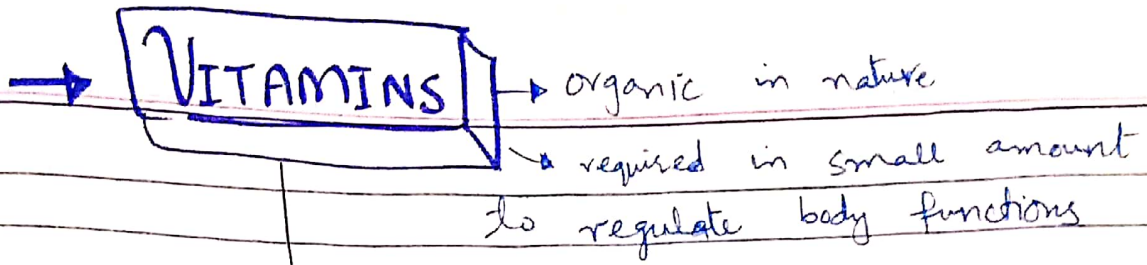
→ for insulation & energy reservoirs e.g. ~~fat~~ fat layer of skin

Nucleic Acids

→ DNA
→ RNA

↓
3 types

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Types → two

Fat soluble

e.g. A, D, E, K

Water soluble

B complex, C

| | Vitamin Name | Sources | Function | Deficiency Disease |
|----------------|-----------------------|---|---|---|
| FAT SOLUBLE | Vitamin A | Carrots, eggs, butter, fish oil | Eye vision, reproduction, skin health maintenance | Night blindness |
| | Vit D | Skin (through sunlight), yolk, milk | Ca ²⁺ absorption ↳ bone formation | • Rickets in children • Osteomalacia in women |
| | Vit E | vegetable oil, nuts, seeds | Antioxidant → protect heart + other cells | Hemolytic anemia |
| | Vit K | green leafy vegetables, fish, liver, eggs | Blood clotting | no blood clotting / or it's time of clotting increase |
| WATER SOLUBLE | Vitamin C | Citrus fruits, green vegetables, potatoes | Antioxidant, co-enzyme | Scurvy |
| | Vitamin B-Complex | | | |
| | B ₁ | whole grains, legumes, yeast | important component of nervous tissues | Beri-Beri |
| | B ₂ | milk, egg, green vegetables | Coenzyme (FAD, FMN) | |
| | B ₃ | grains, cereals | Co-enzyme (NAD, NADP) | Pellagra → +D disease |
| | Biotin vit-H | Liver, milk, yolk | Co-enzyme | |
| | B ₅ | Egg, liver, yeast | Co-enzyme A | |
| B ₆ | Wheat, corn, egg yolk | Co-enzyme | | |

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| | | | |
|-----------------|--|--------------------------------------|----------------------------|
| B ₉ | green vegetables, liver, whole grains | metabolic role ↓ DNA synthesis | megaloblastic anemia |
| B ₁₂ | milk, liver, chicken + intestinal bacteria | metabolic role | anemia + brain disorder |