

organs → tissues → cells.

MUHAMMED HAMZA NAZIR

Robert Hooke in 1665

Biological Sciences

Biology → study of life.
→ cells combine together to perform.

1

Notes not allowed
Only mock papers

→ Cells are known as building blocks of life.

→ Organisms can be classified as

(i) unicellular → single cell, bacteria, amoeba

(ii) multicellular → plants and animals

→ organisms are made of various organs.

organs → tissues → cells



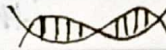
→ Robert Hooke 1665 → examined dead cells of a tree → he named the compartment as cell.

→ All cells have three things in common

① (i) cell membrane

② (ii) cytoplasm → Jelly like substance

③ (iii) DNA → genetic material of cell



→ cells are of various shapes.

→ cells get its shape from a cell membrane.

↳ Nerve cell is long in structure, while RBC are spherical

↳ very small, microscope. (0.1 - 0.5 mm) → smallest cell.

→ Size of a cell is based upon the function it performs and not on the size of the organism.

→ like nerve cell will be of same size in both elephant and rat.

→ elephant will have a more no. of cells than rat.

→ cells have property of Regeneration for ex wound → healing due to body immunity.

→ Two categories

(i) Eukaryotic cells

↳ organelles include nucleus and other special parts.

↳ more advanced and complex cells. Plants and animals

(ii) Prokaryotic cells

↳ They don't have nucleus or membrane closed organelles.

↳ They do have genetic material but not contained within a nucleus.

↳ unicellular, one-celled



Prokaryotic

Eukaryotic

Prokaryotic | Eukaryotic

Prokaryotic Prokaryotic Eukaryotic

Eukaryotic

Eukaryotic Prokaryotic

What are organelles.

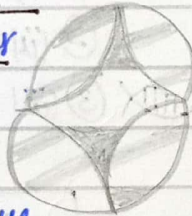
↳ mean little organ

↳ specialized part of the cell

which have unique jobs to be performed.

① Nucleus → control system, contains DNA or genetic material. what the cell is going to do and how it will do it?

• Chromatin → spread out form of DNA, found inside Nuclear membrane



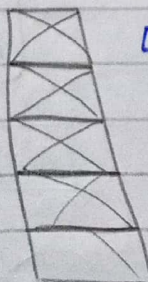
Nucleus also contain Nucleolus where Ribosomes are made.

↳ Ribosomes are a cell structure that make protein. Protein is needed for many cells functions such as repairing damage or directing chemical processes. When Ribosomes leave the nucleus they have important job of synthesis and making proteins.

↳ Both Eukaryotic and Prokaryotes require protein

* Outside the nucleus, the Ribosomes and rest of the organelles float around in cytoplasm which is the jelly like substance.

↳ Endoplasmic reticulum is a membrane in closed passed way to transport material such as proteins synthesis by Ribosomes.



↳ Proteins emerge from endoplasmic reticulum in vesicle where the golgi apparatus (Golgi body) receives them. ↳ golgi body turns protein into useable shape, may also attach lipids or carbohydrates.

↳ Vacuoles are sack like structure that store material.

↳ Lysosome → garbage collector, filled with enzyme that break down them.

↳ Mitochondria → Power house for both animal and plant cells.

↳ During a process called cellular respiration, make molecules that provide for all of the cells activities.

↳ cells that need more energy need more mitochondria. ↳ cells have the ability to produce more mitochondria as needed.

↳ Plants have Chloroplast → where photosynthesis happen. It is green because it has a green pigment.

↳ only human cell that has a flagellum is a sperm cell.

↳ Both plant and animal cell have mitochondria.

Handwritten signature or name at the bottom left corner.

* Plant Cell

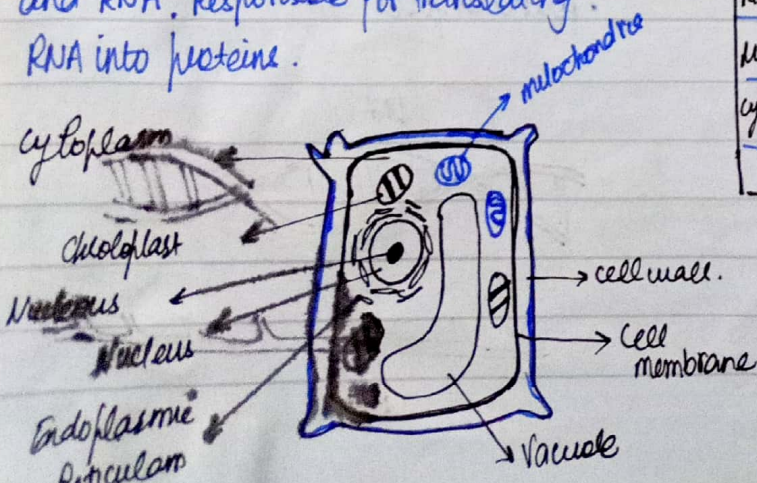
→ cell wall → provide strength and structural structure to the cell and plant as a whole.
 → Allows fluid to move freely through it.

→ Cell membrane → separates the cell from the environment outside the cell.
 → Has various structures for material transport. inflow or outflow of water and other material.

→ cytoplasm → everything within the confine of cell membrane including proteins, organelles and other structures.

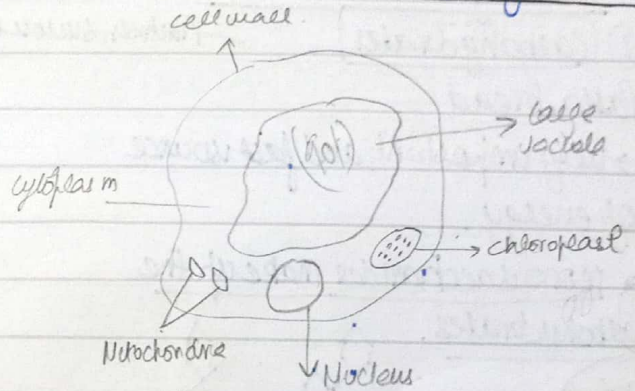
→ central vacuole → plays a role in plant shape and stability, used for storage, also plays a large role in plant shape and stability.

→ Ribosomes → made of proteins and RNA. Responsible for translating RNA into proteins.



→ Chloroplast → they convert energy from sunlight and use it to form basic carbohydrate compounds.

→ source for all living organisms.

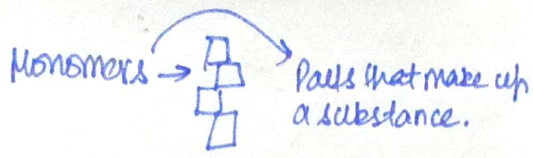


★ starch is reserve food in plant cell.
 starch

Differences and Similarities

	Animal Cell	Plant cell
cell wall	X	✓
shape	Round (irregular shape)	Rectangular (fixed shape)
Vacuole	one or more small vacuoles	One large vacuole, taking upto 90% of cell volume.
chloroplast	Absent X	Have chloroplast to make their own food.
Ribosomes	✓	✓
Mitochondria	✓	✓
cytoplasm	✓	✓

→ starch is reserve food in plant cell.
 → starch is reserve food in plant cell.



* Biomolecules

↳ Food is a source of large molecules that are needed for life. called biomolecules, building components of life

↳ Four major biomolecules

① Carbohydrates

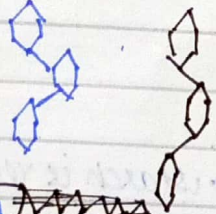
Fructose, sucrose

Pasta, bread

↳ very important and fast source of energy.

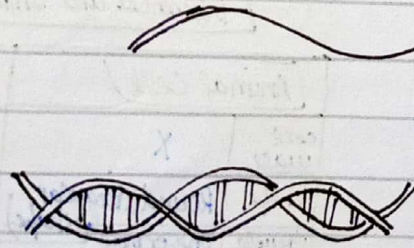
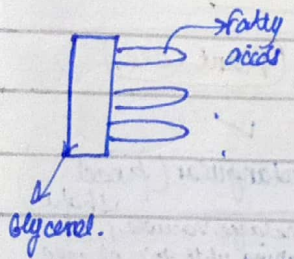
↳ monosaccharides make up the carbohydrates.

3 types



② Lipids (Fats)

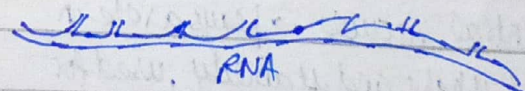
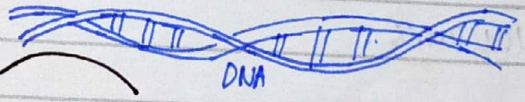
- ↳ (i) Glycerol ✓
- ↳ (ii) Fatty acids ✓



④ Nucleic acid

→ include DNA and RNA

↳ include DNA and RNA.



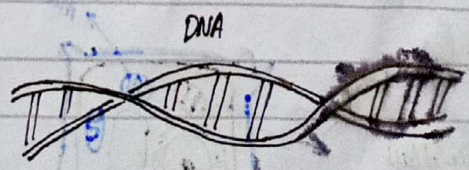
monomer called Nucleotides

- coding of traits.
- found in food

ex. Butter, cholesterol, oil.

↳ Fats are a great source of long term energy.

↳ excess amount can be hard.



Nucleus

↳ was discovered by Robert Brown in 1831.

↳ shape irregular or spherical

↳ (i) Mononucleate → cells with one nucleus

(ii) Binucleate → cells with two nuclei

↳ Nucleolus → synthesizes and stores ribosomal RNA (rRNA):

↳ The ribosomes are assembled in the nucleolus. These ribosomes are exported to cytoplasm through nuclear pores.

↳ Man has 2 **46 chromosomes**

↳ Frog has **26 chromosomes**

↳ Onion has **16 chromosomes**

Functions of nucleus.

1. It controls all the activities of the cells.
2. Controls the transfer of hereditary characters from parents to offspring.
3. The three types of RNA's; mRNA, tRNA, rRNA.

Plasma membrane

↳ all cells have this

↳ It is a barrier that separates a cell from its surrounding environment.

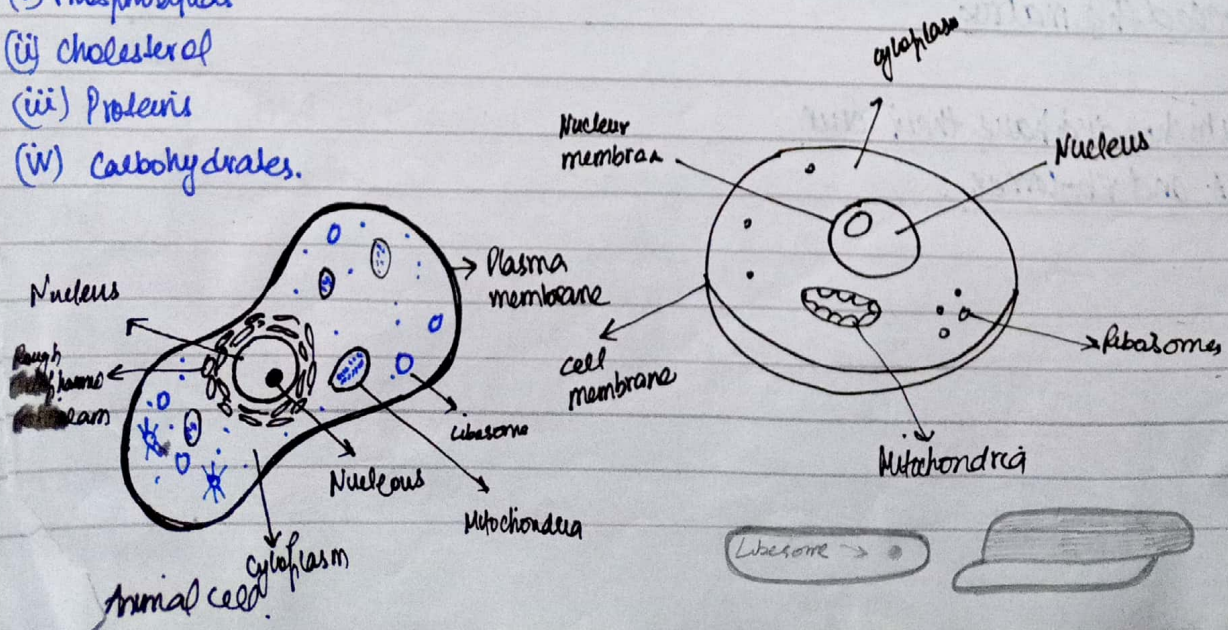
↳ composed of 4 molecules.

(i) Phospholipide

(ii) cholesterol

(iii) Proteins

(iv) Carbohydrates.



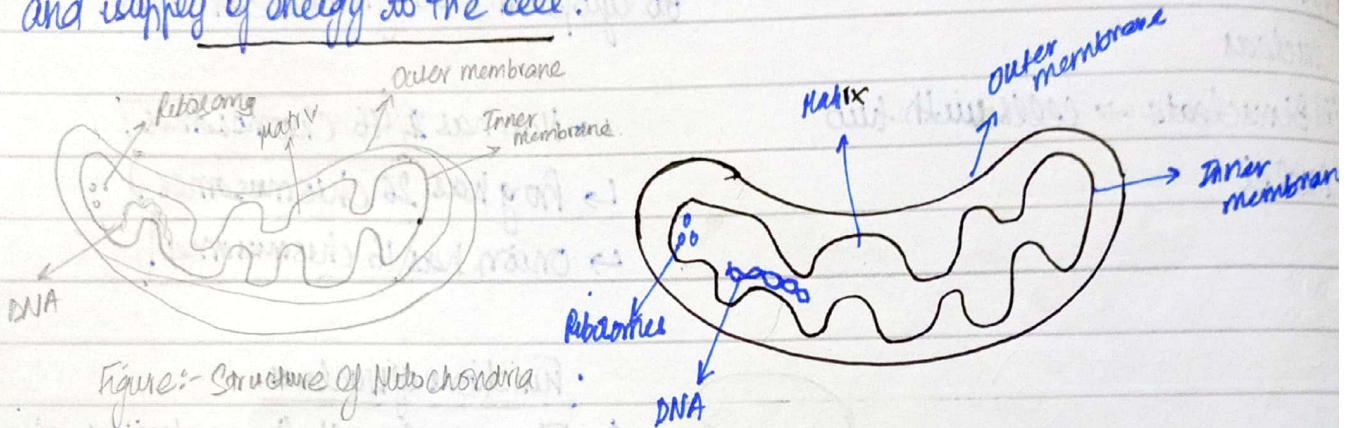
* Mitochondria → small organelles floating freely in a cell.

↳ very important organelles.

↳ only in Eukaryotic cells.

→ Plant and Animals → have nucleus and other parts

↳ are involved in the manufacturing and supply of energy to the cell.



↳ Bound by two membrane

(i) outer membrane cover the organelle.

↳ most of the chemical reactions of the cellular respiration process happens in the inner membrane of the mitochondria due to high concentration of enzymes.

Matrix → fluid inside mitochondria

↳ The fluid in the mitochondria is called the matrix.

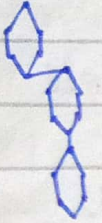
↳ Mitochondria have their own DNA and ribosomes.

→ 3 types energy source
light, bread

Fatty acids, glycerol

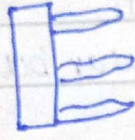
→ DNA and RNA

① Carb



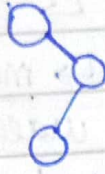
CHO

② Lipid



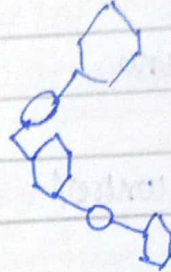
CHO

③ Proteins



CHON

④ Nucleic acid



CHONP

C = Carbon
H = Hydrogen
O = Oxygen
N = Nitrogen
P = Phosphorus

Carb	Lipid	Protein	Nucleic acid
CHO	CHO	CHON	CHONP

* The Five Kingdom in classification

"The scientific practice of identifying, naming and grouping of living organisms is called classification."

"The scientific practice of identifying, naming and grouping of living organisms is called classification"

↳ Sequence of classification

Do Keep Ponds Clean or Frogs Get Sick

• Kingdom → 1969 → 5 system.

- ① Prokaryota (Monera)
- ② Protista
- ③ Fungi
- ④ Plantae
- ⑤ Animalia

→ mainly based upon differences in nutrition.

→ These characteristics are based on whether they are Eukaryotic, Prokaryotic and the way they get nutrition.

• Kingdom Plantae

• Kingdom Animalia

↳ They are Eukaryotes

↳ multicellular and have no cell walls.

↳ Nervous and hormonal control system.

↳ Heterotrophic → an organism that can produce its own food.

↳ have a digestive system

↳ Motile → they move.

↳ cell division which enables growth happens in the tissue.

• Kingdom Plantae

↳ Eukaryotic

↳ multicellular, but have a cell wall

↳ Autotrophic nutrition → makes its own food.

↳ some cells have chloroplasts and photosynthesis.

↳ non motile.

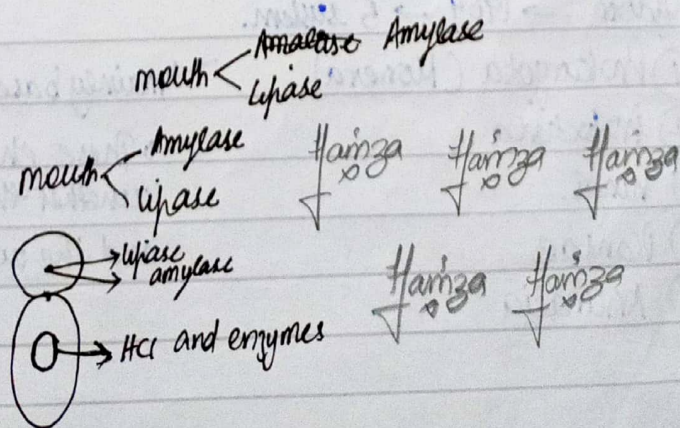
↳ Chloroplast → makes its own food.

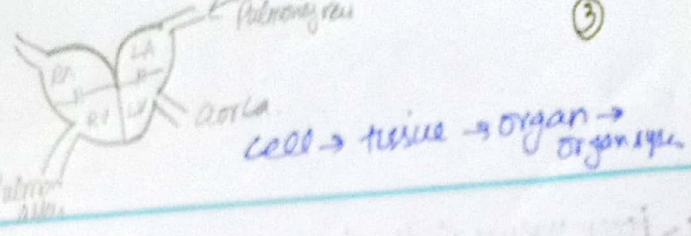
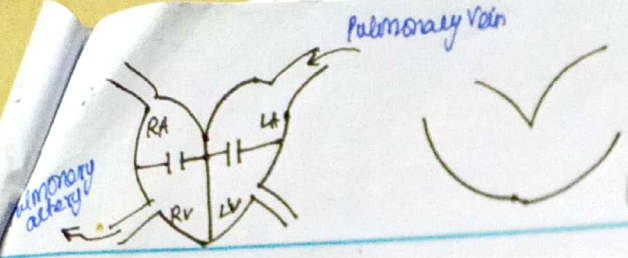
* Protein Digestion

→ Protein digestion begins when you first start chewing. There are two enzymes in your saliva called amylase and lipase. They mostly break down carbohydrates and fats.

→ Once a protein source reaches your stomach, hydrochloric acid and enzymes called proteases break it down into smaller chains of amino acids. Amino acids are joined together by peptides, which are broken by proteases.

→ from your stomach, these smaller chains of amino acids move into your small intestine. As this happens, your pancreas releases enzymes and a bicarbonate buffer that reduces the acidity of digested food. This reduction allows more enzymes to work on further breaking down amino acid chains into individual amino acids.





Cell → tissue → organ → Organ system

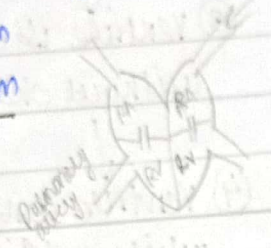
* Human Physiology

is the scientific study of various functions of the human body in its normal state.

↳ Blood is Red, but the shade of Red can vary slightly due to amount of oxygen present.

→ Major systems of the body

1. Circulatory system
2. Respiratory system
3. Digestive system
4. Urinary system
5. Immune system
6. Reproductive system
7. Musculoskeletal system



• Human Heart

↳ Human heart is a fist-sized, muscular organ that pumps blood through the body.

↳ Four chambers:

- ★ ↳ Two upper chambers called the Left and Right Atrium.
- ★ ↳ Two lower chambers called the left and right Ventricle.
- ★ ↳ The heart is divided into left and right side. This division protects the oxygen rich blood with oxygen poor blood.

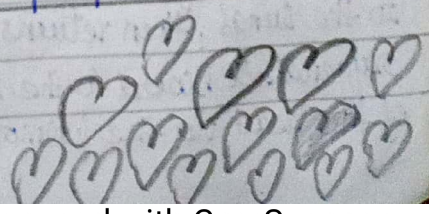
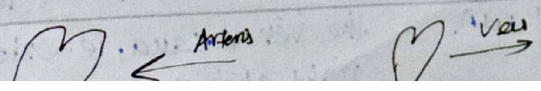
• Cell → Tissue → Organ → Organ system

↳ Organ system don't work in isolation. like cultures don't work in isolation

① Circulatory system

- ↳ blood → carries oxygen, transport nutrients.
- ↳ Heart is the machine that transports the blood around.
- ↳ Arteries → carry blood away from the heart. ♥ →
- ↳ Veins → carry blood back to the heart. ♥ ←
- ↳ capillaries are tiny blood vessels throughout your body.

- ★ ↳ 100,000 times / day (beats)
- ★ ↳ Oxygen poor blood (blue blood) returns to the heart after circulating through your body.
- ★ ↳ Right side (Atrium and Ventricle) collects and pumps the blood to the lungs through the pulmonary arteries.
- ★ ↳ The lungs refresh the blood through a supply of oxygen making it turn Red.
- ★ ↳ Oxygen rich blood enters into the side which is the pumped to the body through Aorta.



↳ Four valves in the heart keep the blood moving in the right way.

- ① Tricuspid valve
- ② mitral / bicuspid valve } Right
- ③ Pulmonary valve
- ④ Aortic valve } Left

↳ These four valves prevent blood from flowing backward in the heart, open and closes once per heart beat.

↳ Beating heart contracts and relaxes → makes one complete cycle.

↳ Contraction is called systole and relaxing is called diastole.

↳ cardiac cycle completes in 0.8 seconds.

↳ The heart circulates blood through two pathways

- (a) the pulmonary circuit
- (b) the systematic circuit

(a) In the pulmonary circuit, deoxygenated blood leaves the right ventricle of the heart via the pulmonary artery and travels to the lungs, then returns as oxygenated blood to the left atrium of the heart via the pulmonary vein.

(b) In the systematic circuit, oxygenated blood leaves the body via the left ventricle to the aorta, and from there enters the arteries and capillaries where it supplies the body's tissues with oxygen. Deoxygenated blood returns via veins to the venae cavae, re-entering the heart's right atrium.

① Heart is relaxed



② Atrium contracts to push blood into the ventricle.



③ Ventricle start contracting without changing volume



④ Ventricle continue contracting while empty.



⑤ Ventricle stop contracting and relaxing.

• Cycle Repeats •

Blood → 55% Plasma → maintains water & electrolyte blood levels.
 → Rest (45%)
 WBC RBC Platelets

① carries oxygen from the lungs to all other tissues in the body.

② waste products are carried to kidney from where they are transferred to urine

③ responsible for the responsiveness of the immune system.

(Diff in the book)

• Heart Failure → occurs when your heart muscle does not pump blood as it should.
 ↳ also known as congestive heart failure

↳ Symptoms *

- (i) Shortness of breathe
- (ii) Fatigue and weakness
- (iii) Rapid or irregular heartbeat
- (iv) Chest pain if your heart failure is caused by a heart attack

- Symptoms
- ① Pressure, tightness, pain
 - ② Nausea
 - ③ Fatigue
 - ④ Cold sweats

• Heart attack → blocked artery, painful, can lead to death.

- ↳ when the flow of blood to the heart is blocked.
- ↳ The block is most often a buildup of fat, cholesterol and other substances.

- * can be prevented through
- (i) not smoking
 - (ii) Balanced diet
 - (iii) Keeping diabetics under control.

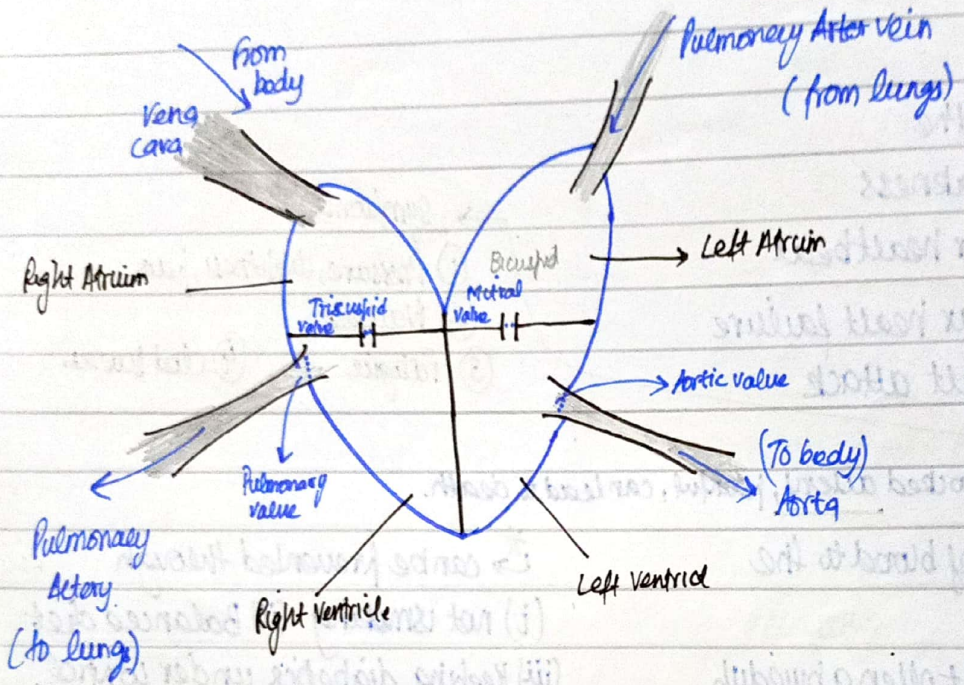
↳ A heart attack is the death of a segment of heart muscle caused by a loss of blood supply. The blood is usually cut off when an artery supplying in the heart muscle is blocked by a blood clot.

- Causes
- (i) Age
 - (ii) Angina → causes chest pain due to lack of oxygen or blood supply to the heart.
 - (iii) smoking

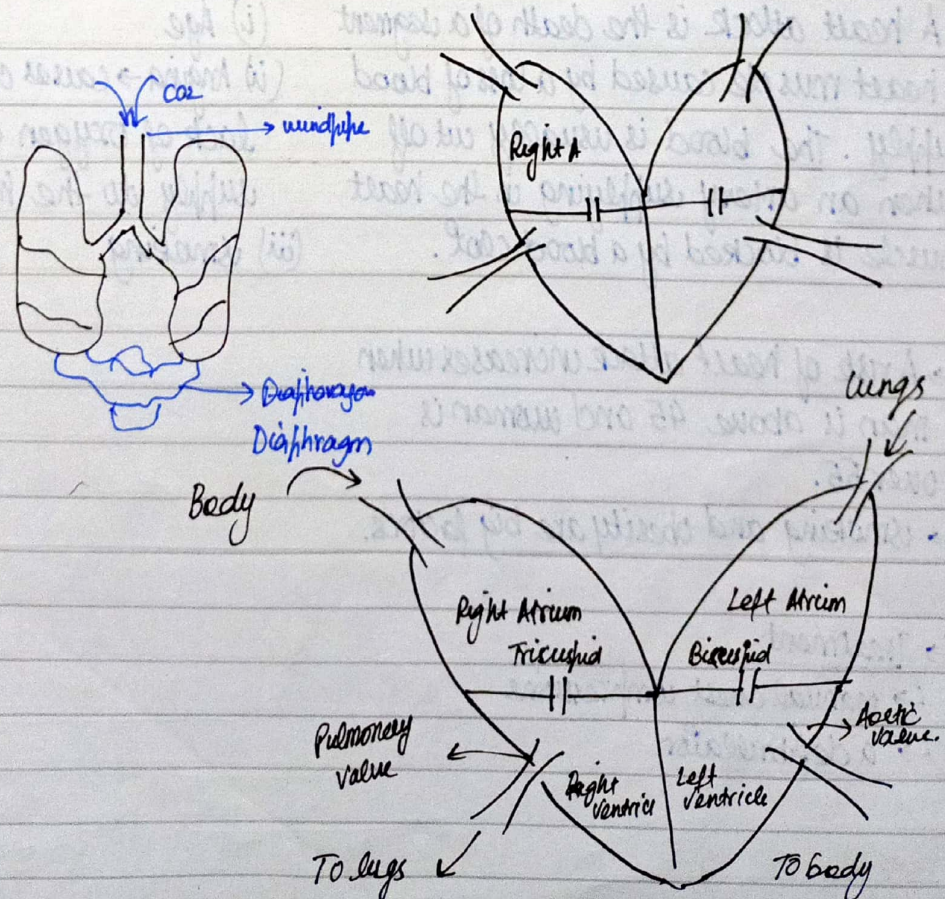
- ↳ A risk of heart attack increases when man is above 45 and woman is over 55.
- ↳ smoking and obesity are big factors.

↳ Treatment

- ↳ manual chest compressions
- ↳ a defibrillator

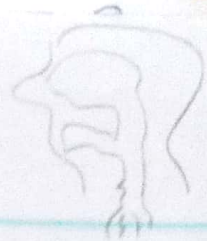


* Diagram of Heart





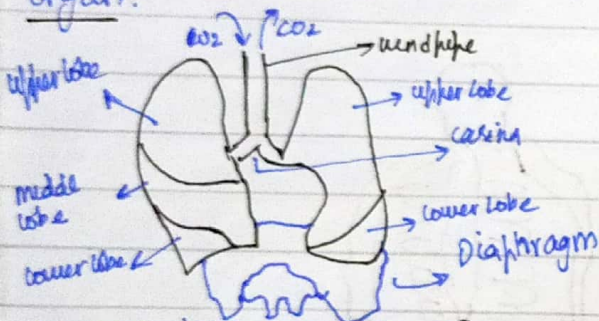
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* Respiratory System

↳ The breakdown of organic compounds into simpler compounds accompanied by the release of energy in the form of ATP.

↳ Lungs are the main respiratory organ.



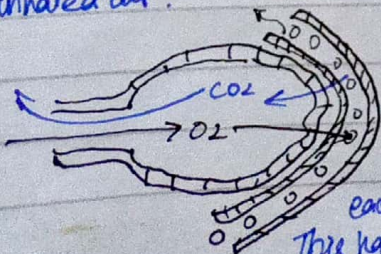
↳ main job is gas exchange
 ↳ pulling oxygen into the body and getting rid of carbon dioxide.

↳ During an inhalation, diaphragm contracts, and chest muscle contract to pull open the chest. → suck in air like a vacuum.

↳ During the exhalation, muscle relax, allowing the lung muscle spring back to normal size.

• about 500,00,000 in lungs.

→ This is the final destination of the inhaled air.



The CO₂ diffuses out from the deoxygenated blood into the air of Alveoli each breath in, O₂ enters the alveoli and freely diffuses into the blood. This happens with every breathe in and out.

① ↳ The respiratory system starts from nose that encloses the nasal cavity. The air enter through the nostrils

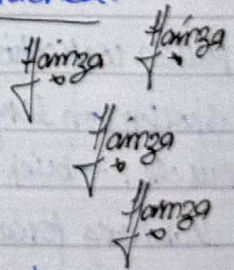
↳ Nasal cavity cells release mucus which are salty and sticky and have Lysozymes which help kill bacteria.
 ↳ Nose hairs in the nasal cavity get coated with that mucus that help trap dust, pollen particles.

② The air then goes into Pharynx (throat)
 ↳ common to food and air
 ↳ Epiglottis is normally pointed upwards, but during the passage of solids and liquids from the mouth into the oesophagus, the epiglottis is folded down the glottis, the opening between vocal cords, to prevent food from passing into the trachea.

③ Larynx → voice box

④ Trachea :- windpipe

Splits into two stem Bronchus.
 Right main stem Bronchus Left main stem Bronchus



⑤ Alveoli are tiny sacs within our lungs that allow oxygen and carbon dioxide to move between the lungs and blood stream.

Alveola

* Muscular System

↳ it is made up of three muscles.

- ① Skeletal muscle → Voluntary control
 - ② Cardiac muscle → only in heart.
 - ③ Smooth muscle
- ↳ involuntary control.

→ All three are made up of muscle cells, also known as fibers, bundled tightly together.

→ These bundles receive signals from the nervous system that contracts the fibre, that contract the fibre that generate force and motion.

↳ Sperm cells, hair like cilia are not part of this.

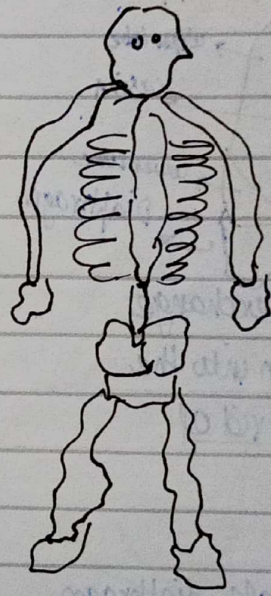
↳ Muscle contraction.

(i) shorten or lengthen the muscle. → biceps triceps

(ii) stabilizing force. → muscles are rigid, also maintain posture.

↳ The skeletal muscle system provides form, support, stability and movement to the body.

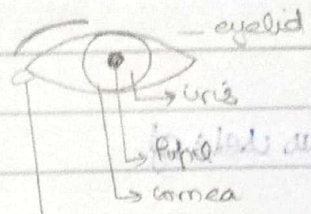
↳ made up of 206 bones.



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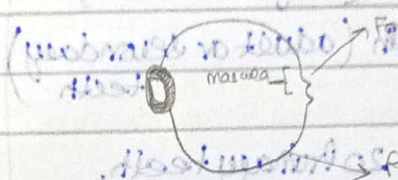
* Human Eye

↳ eye is asymmetrical globe, about 1 inch (2.5 cm) in diameter.



↳ Iris → colored part of the eye, controls the size of the pupil.

The pupil dark circle inside the centre of the eye. the pupil large when light is low or it is dark outside and tiny when it is very sunny or bright.



↳ Cornea → clear covering over the pupil and iris. the cornea provides 66% of the optic power that the overall eye has.

Disorders

① Nearsightedness

(Myopia) → a condition where nearby objects are seen more clearly than distant objects.

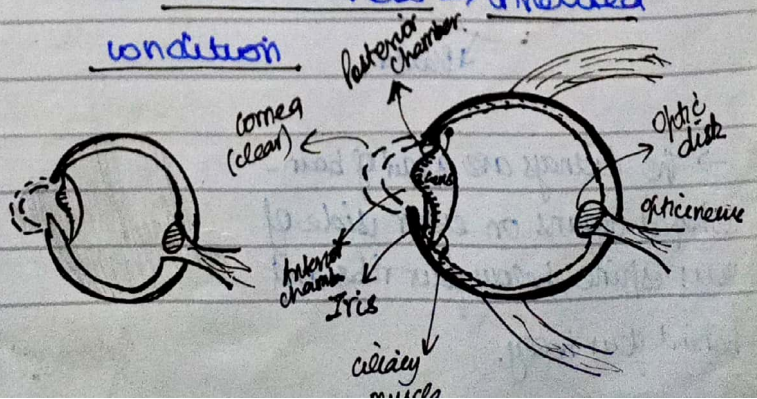
↳ The sclera is the white part of the eye that we see in the mirror that becomes pink or red when we are tired or have sneezed so hard that our eyes become bloodshot.

② Farsightedness (Hyperopia) →

It is a condition in which distant objects are seen more clearly than nearby objects because light is focussed behind the retina, not on it.

↳ The eyeball is held in place by the eyelid, which is the first protective layer.

③ Color blindness → inherited condition



(Ear in book)

• Bl
↳
↳
a
b
a

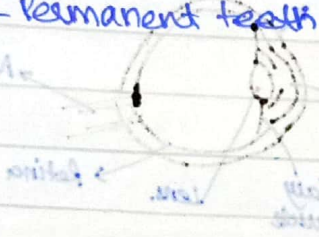
→ Teeth

→ People have two sets of teeth

- (i) Primary teeth (baby, milk teeth)
- (ii) Permanent teeth (adult or secondary teeth)

→ Children have 20 Primary teeth.
→ Adults have 32 Permanent teeth.

Incisors	8
Canines	4
Premolars	8
Molars	12



→ Each kidney is about 4-5 inches long, rough, a size of a large fist

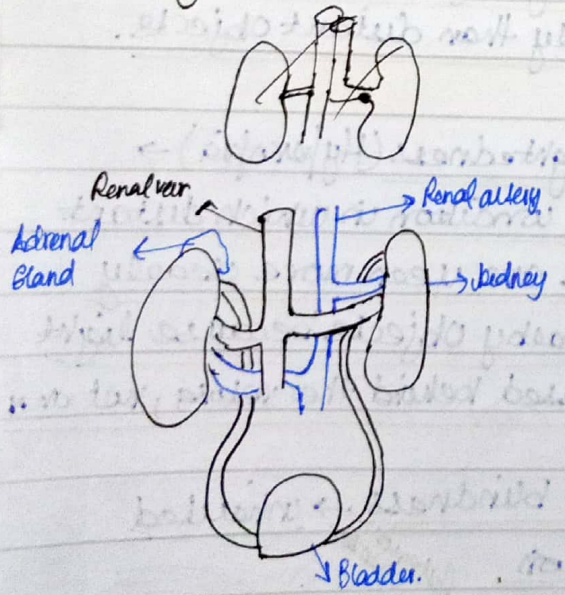
→ The kidney's job is to filter your blood. They remove wastes, control the body's fluid balance, and keep the right levels of electrolytes.

→ Blood comes into the kidneys, waste gets removed, and salt, water, and minerals are adjusted.

→ The filter blood gets goes back into the body. Waste gets turned into urine, which is collected in the bladder.

* Kidney

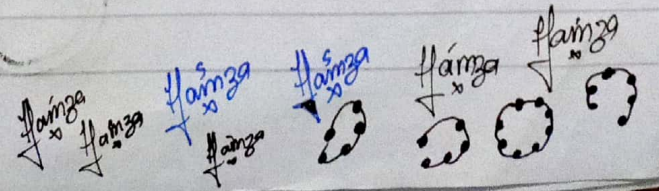
→ Each kidney has around a million tiny filters called nephrons. You could have only 10% of your kidneys working, and you may not notice any symptoms or problems.



→ If blood stops flowing into a kidney, part of or all of it could die. That can lead to kidney failure.

Each kidney has around a million

→ The kidneys are a pair of bean-shaped organs on either side of your spine, below your ribs and behind your belly.



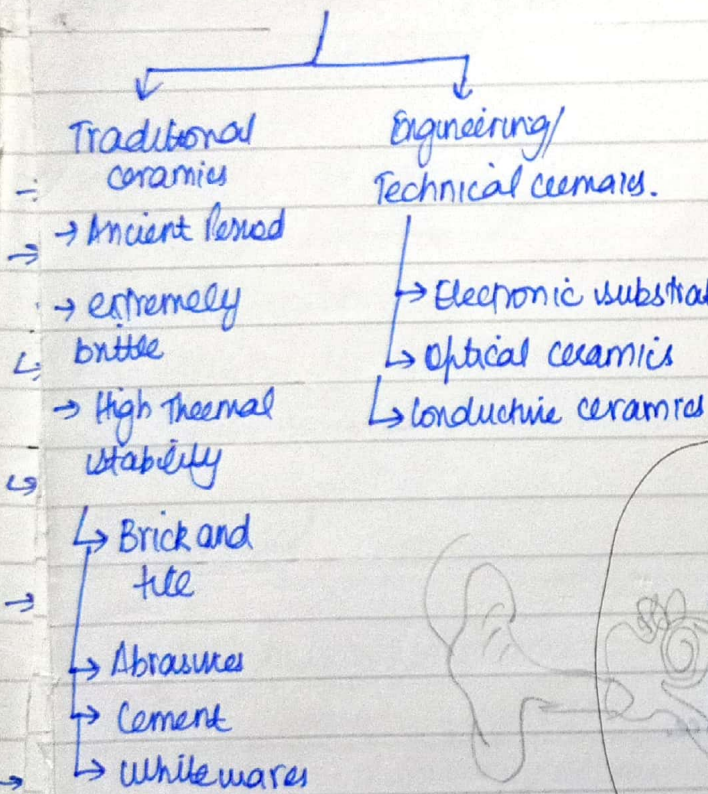
→ derived from the word
 peremikes → Bunt stuff.

• Ceramics → has high burning capacity

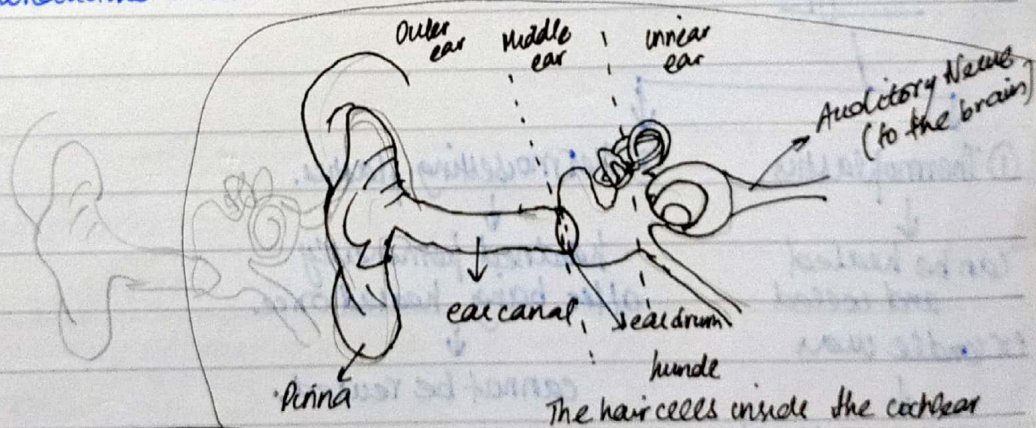
• inorganic non-metallic solid made up of clay that have been shaped and then hardened by heating to high temperatures.

• ex tile, bricks, glass and tablets.

- Hard, extremely strong,
- wear-resistant and durable.
- corrosion-resistant
- oxides, carbides, nitrides, borides and silicates.
- brittle having little elasticity



- Computer parts → Resistors, insulators, superconductors
- Building and construction → bricks, tiles, piping, and other construction materials



Ear → Outer ear catches the waves which travel through ear canal, the sound waves reach the eardrum, they make the ear drum vibrate, which in turn vibrates three tiny bones called the malleus, incus, and stapes

These bones amplify or increase sound vibration and send them to cochlea.

↓
 filled with fluid. sound vibrations make the fluid ripple → waves.

The hair cells inside the cochlea turn these movement into electrical signals.

→ Auditory nerve to brain

* Plastics

→ Plastics are material made up of large organic molecules that can be formed into a variety of products.

→ They are lighter than many materials of comparable strength unlike metals and wood

→ have lower density than of metals.

→ electrical insulators

→ Not Brittle.

Two Types

① Thermoplastics

↓
can be heated and cooled
exactly same

↓
can be used and re-used

② Thermosetting plastics.

↓
hardened permanently
after being heated once

↓
cannot be reused.

(+) light in weight and can be easily moulded

(+) very good strength and toughness

(+) possess good thermal and electrical insulating property.

(+) Plastics is a recyclable material and it does not decompose.

* Plastic Waste Management

→ 3R strategy: Reduce, Reuse and Recycle.



• Fertilizers → is any organic or inorganic material of natural or synthesis origin that is added to soil to supply one or more nutrients essential to the growth of plants."

→ most important are nitrogen,

phosphorous and potassium. (NPK).

→ if any of these are missing, they would effect the growth of the plant

→ can be classified into micro and macro-nutrients.

→ Environmental Hazard of Fertilizers

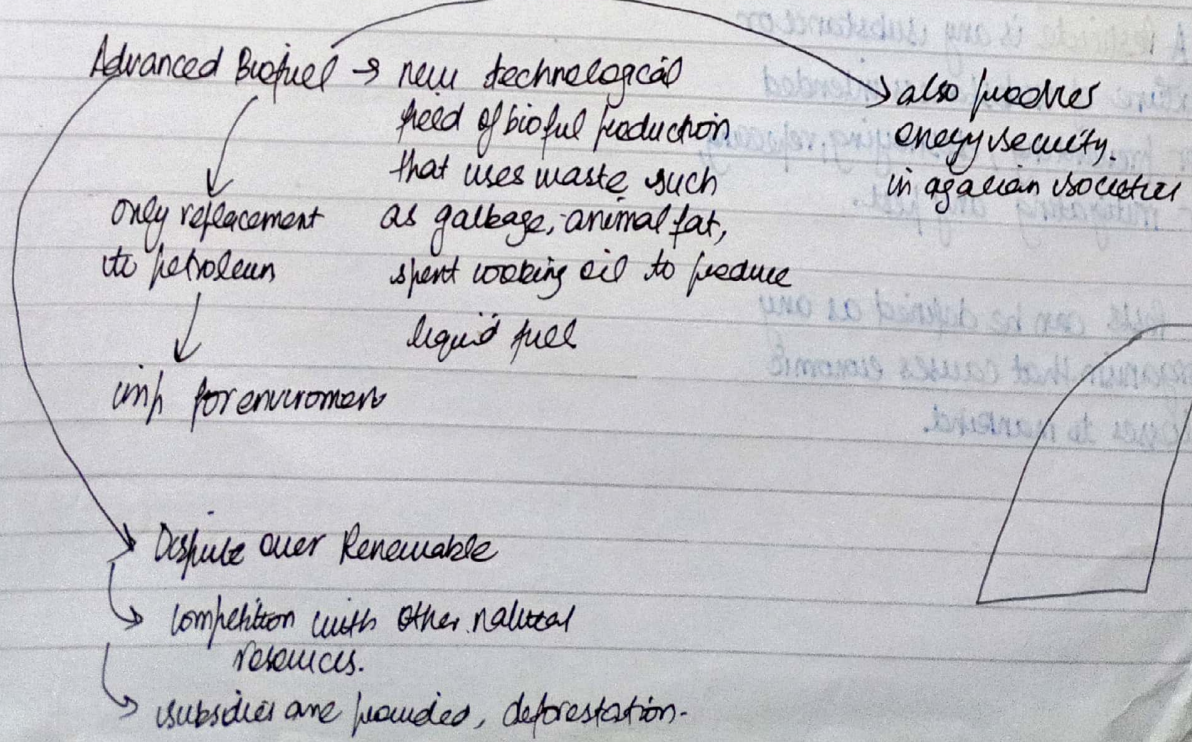
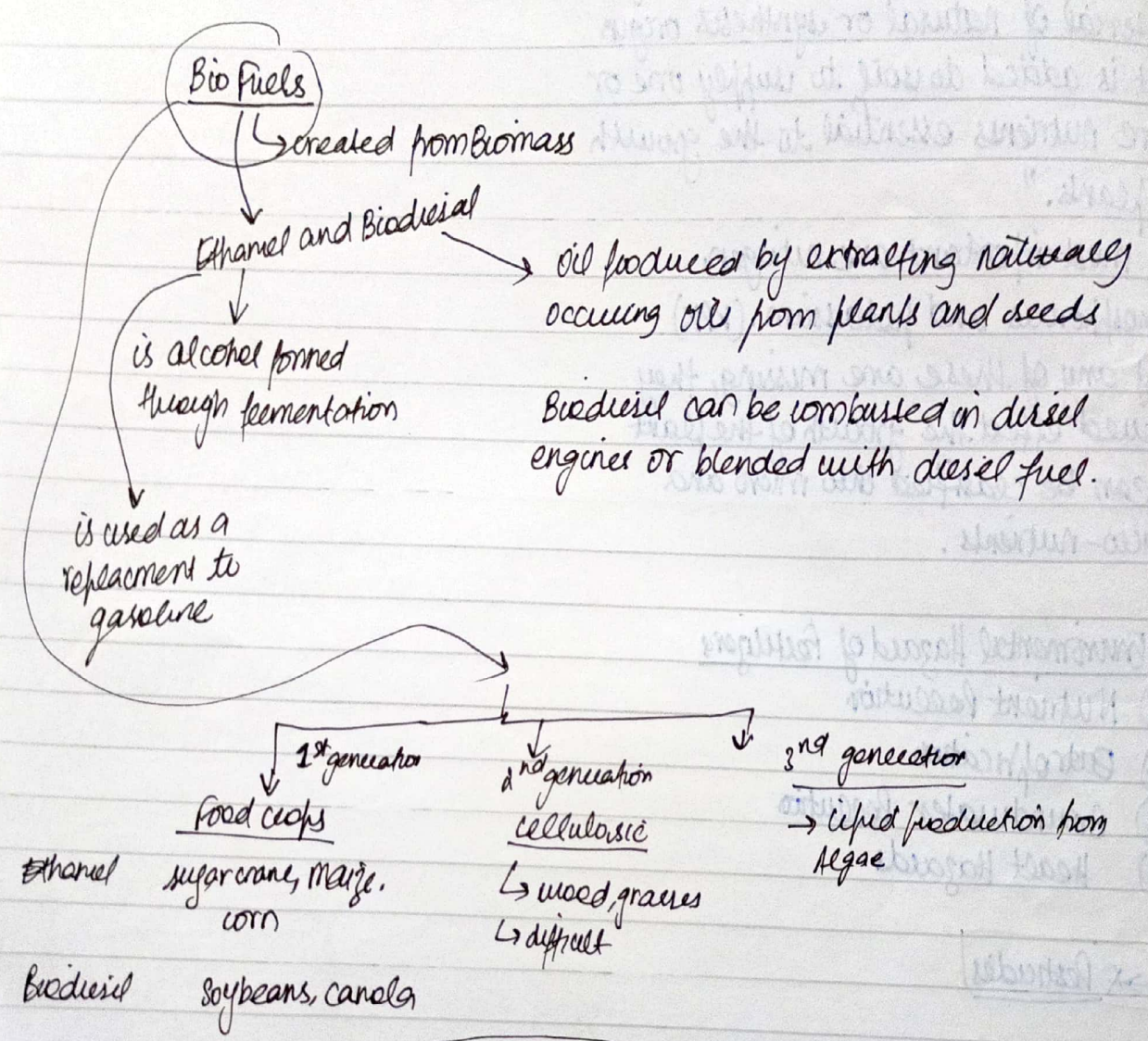
- ① Nutrient Pollution
- ② Eutrophication
- ③ Groundwater Pollution
- ④ Heat Hazards

→ Pesticides

→ A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

→ Pests can be defined as any organism that causes economic losses to mankind.

• B
↳
↳
o
b
a



Information Technology

input, output, storage and processing devices.

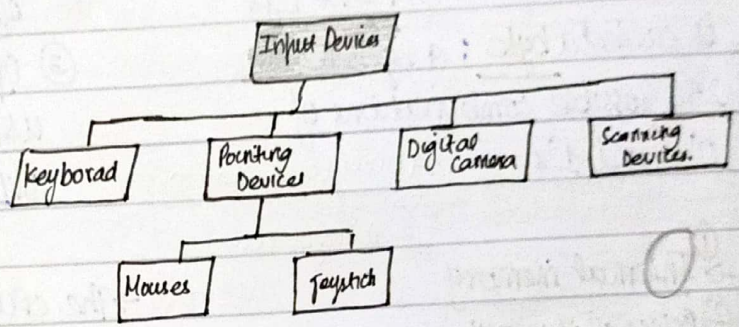
* Information Technology

IT is defined as processing and distribution of data using computer hardware and telecommunications and digital electronics

Hardware - Physical parts of the computer and related devices. Hardware is used to run the software.

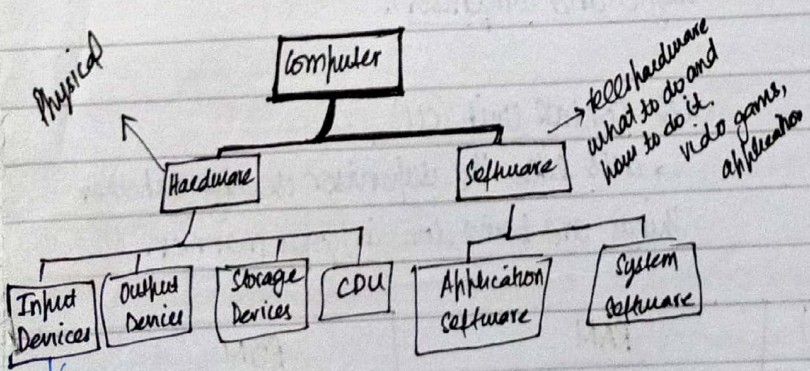
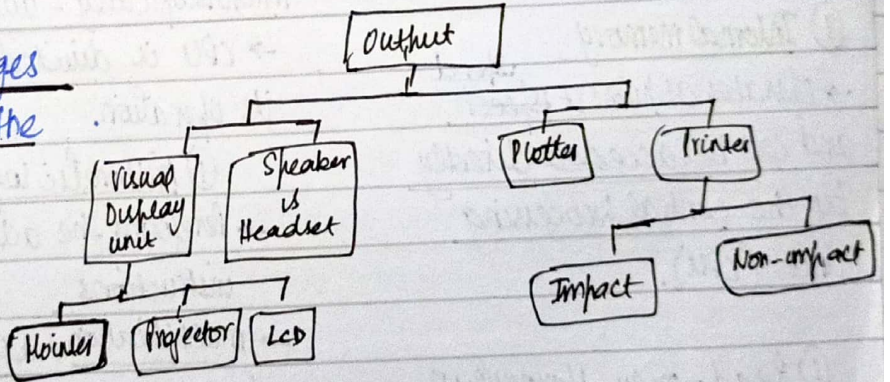
Computer can be defined as "an electronic machine, operating under the control of instructions stored in its own memory that can accept data, manipulate the data according to specified rules, produce results and store the results for future use."

External devices of computer are also called Peripheral devices.



Computers work in three stages

- 1 It accepts input through the input devices
- 2 Processes it
- 3 Gives us the output



Hardware hardware motherboard video and sound cards.

Both need each other to function. If hardware -> no software The physical thing won't work.

Hardware and software serves as a foundation in I.T.

mechanism stores data by a computer

• Computer memory and storage devices

Bit → most memories represent data with the binary number system.

→ Bits have two possible representation ("0" and "1")

→ The combination of Eight bits is called a byte; a byte has 256 possible combinations of 0's and 1's.

A kilobyte is equal to 1024 bytes
A megabyte

① Internal memory

② External memory

① Internal memory

→ Operates at highest speed and can be accessed directly by the central processing unit (CPU).

① Read-only-Memory (ROM)

→ is a memory containing hard wired instructions that the computer uses when it boots up (starts up).

② Random-access-Memory (RAM)

→ received its name from its ability to directly access any memory cell.

→ RAM is temporary storage as data only remains there when the machine is running.

② External memory

④ either magnetic or optical.

① Magnetic disk, that includes Floppy Disk and Hard disk drive.

② Magnetic tape, used for tertiary and off-line storage.

③ Optical forms currently in common use are: CD, DVD, CD-R, DVD-R, DVD, etc.

→ The CPU is a microprocessor chip that is, a single piece of silicon containing millions of tiny, microscopically-wired electrical components.

→ CPU is divided into separate units for its operation.

① Arithmetic logical Unit (ALU)

→ performs the actual processing of data and instructions

→ multiplication, addition, subtraction, division, logic and comparison.

② Control Unit (CU)

→ acts like the supervisor seeing whether things are being done in proper manner.

RAM	ROM
• Random-access-memory	• Read-only-memory
• Read-write memory	• Read only memory
• Volatile memory	• Non-Volatile memory
• Temporary storage <small>used in computer to temporarily store files</small>	• ROM is often used to store the BIOS program on computer.
• RAM chips often range in storage capacity from 1 to 256 GB.	• ROM chips often have a storage capacity of 4 to 3 Kb.

Hamza
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Computer Software

→ is that part of a computer system that consists of encoded information or computer instructions.

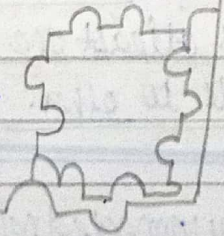
→ The term Software was first proposed by Alan Turing (WWII-man)
↳ British

→ Computer software is all information processed by computer systems, programmes and data.

→ Computer hardware and software both require each other to function.

→ Computer software can be divided into

- ① Application software
- ② System software



① Application software → that uses the computer system to perform special functions beyond the basic operation of the computer itself.

→ Application software, such as business application, office, entertainment and learning applications.

② System software → a software that directly operates the computer hardware

* Network

→ A network is a group of two or more computers that intelligently share resource such as, hardware software and data devices with each other.

• Classification

① Local Area Network

→ one building, single administrative system.

A computer network spanned inside a building and operated under single administrative system is generally termed as LAN.

→ offices, schools, universities

→ Resources such as printers, file servers, scanners, and internet are easily shareable among computers.

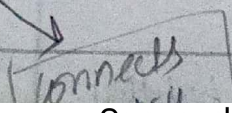
② Metropolitan Area Network

→ large computer network that spans a metropolitan area or campus.

→ scope falls between LANs and WAN.

③ Wide Area Network

→ covers a wide area which may span across provinces and even a whole country.



→ Telecommunication networks are

WAN's.

• → WAN's use very expensive network
equipment.

• Interwork, or internet →

A network of networks.

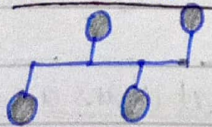
It is largest network in
existence on this planet.

• Network Topology

→ is the arrangement with which
computer systems or network
devices are connected to each
other.

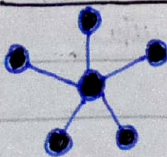
→ Topologies may define both
physical and logical aspect of
the network.

① Bus Network



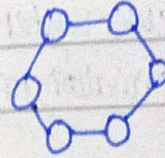
all nodes are connected to
a common medium along
this medium.

② Star Network



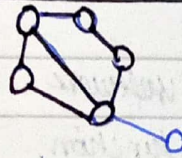
all nodes are connected to a
special central node.

③ Ring Network



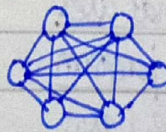
each node is connected to its left
and right neighbour node, such that
all nodes are connected and that
each node can reach each other node
by traversing nodes left- or rightwards.

④ Mesh Network



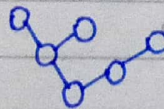
each node is connected to an arbitrary
number of neighbours in such a way that
there is at least one traversal from
any node to other.

⑤ Fully connected network



each node is
connected to every
other node in the
network.

⑥ Tree Network



→ nodes are
arranged hierarchically.



Source of information
 Source of information
 Sources of information.

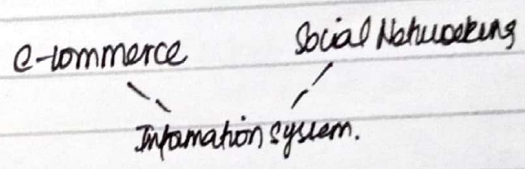
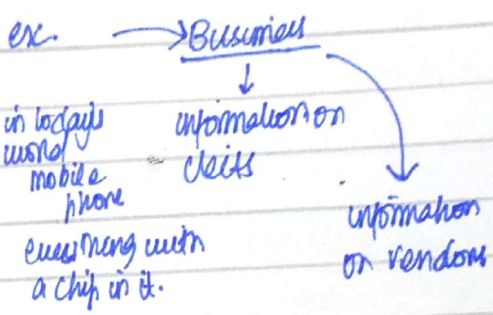
Hainza
 Hainza

Information System

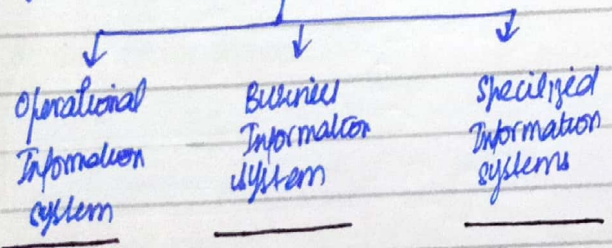
→ as software system to capture, transmit, store, retrieve, manipulate, or display information, thereby supporting people, organization, or other software systems.

Components

- ① Hardware → Physical computer, in today's world mobile phone
- ② Software → excel, Photoshop
- ③ Database
- ④ Procedures
- ⑤ People



Types of Information system

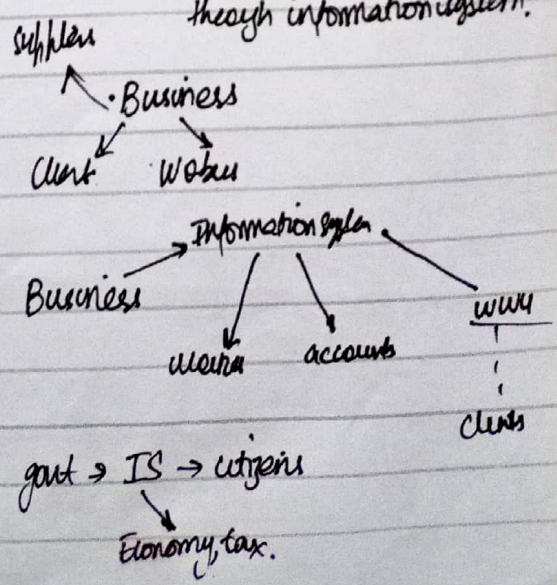


- Information is needed by everyone.
- Today, information data volume is increasing.
- To manage high data and assure smooth accessibility to people, we through information system.

→ Software :: Tells the hardware what to do.
 Database :: info manipulated by software

→ People :: users, programmers, analysts.

Procedure/Process :: steps to accomplish a goal.
 ↳ In Business, processes are a bit big deal.



Naqab

* Internet

- is the computer based global information system.
- Roti, Kaffra, Makan Aur Internet
 - ↳ By Tania Airdus
- many interconnected computer networks.
- The Internet has made it possible for people all over the world to communicate with one another effectively and inexpensively.

→ Internet has small units of data called packets

* Few points in book

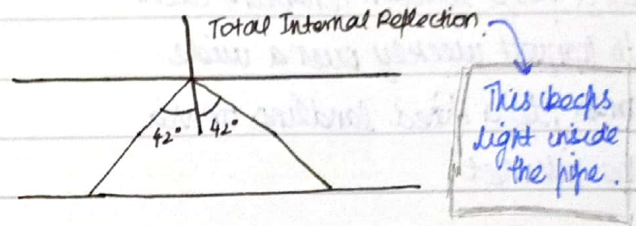
pg 318.

Types of wireless communication

- ① Satellite communication
- ② Infrared communication
- ③ Broadcast Radio
- ④ Microwave communication
- ⑤ Wif
- ⑥ Bluetooth
- ⑦ Mobile communication systems.

* Optical fibre

→ Optical fibre refers to the medium and the technology associated with the transmission of information as light pulses along a hollow glass tube or plastic wire or fibre



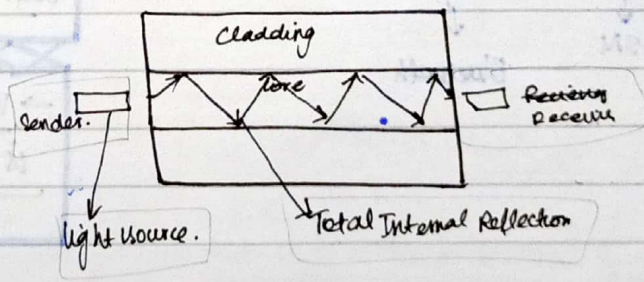
→ consists of four parts.

- ① Core
 - ② Cladding
 - ③ Coating or buffer
 - ④ Jacket
- ↳ ③ Reduces loss of light from the core into the surrounding air.

→ optical fibre are classified into two types.

(i) Single mode fibres

(ii) Multimode fibres



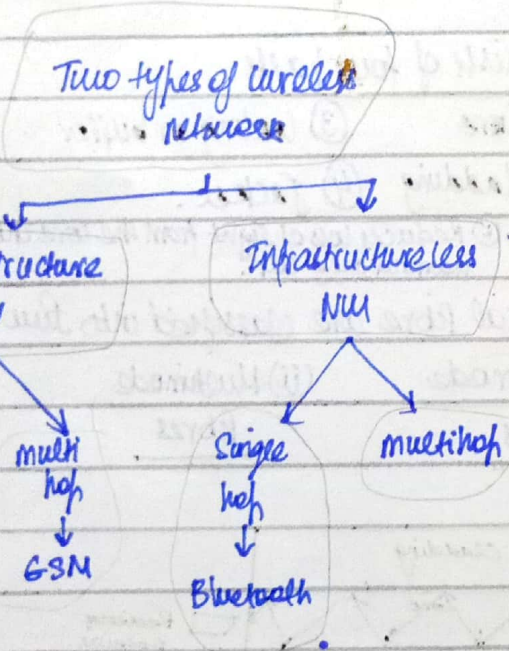
uses of of

- ① Telecommunication
 - ↳ uses fibre optic cables.
 - ↳ transmits energy in the form of light pulses
- ② Medical uses
 - ↳ optical fibres are well suited for medical use.
 - ↳ used in number of instruments that enable doctors to view internal body parts without having to perform surgery.
- ③ General use
 - ↳ Transmission of light to locations otherwise hard to reach

- low power loss
- size
- weight
- safety
- cost
- Reliability
- Security

• cell phone

→ A cellular phone is a telecommunication device that uses radio waves over a networked area (cells) and is served through a cell site or base station at a fixed location, enabling calls to transmit wirelessly over a wide range, to a fixed landline or via the internet.



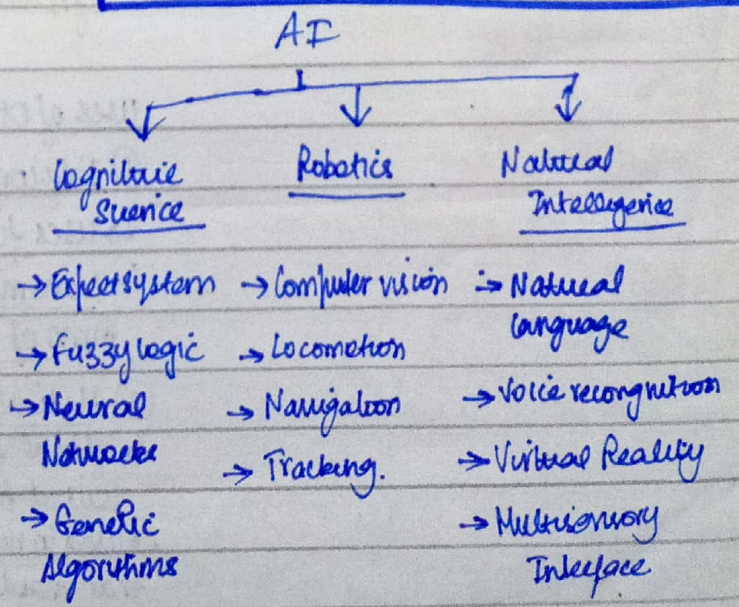
• Artificial Intelligence

→ Every aspect of learning or any feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, from abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves!

→ John McCarthy, 1955 at the Dartmouth Conference: The founding fathers of AI.

→ In simple terms, AI has the ability to solve problems that are usually done by us humans with our natural intelligence

→ Voice recognition, face recognition is phones.



Food Science

→ Food is imp to grow, reproduce and maintain good health.

→ Balanced diet

↳ nutrients and energy requirements of the individual.

→ energy req is measured in terms of calories.

↳ calorie requirement depends on different factors such as age, gender, height, weight, occupation and state of health.

↳ Biomolecules are molecules that occur naturally in living organisms.

↳ includes macromolecules like proteins, carbohydrates, lipids and nucleic acids.

① Carbohydrate when carbohydrates are broken down, glucose is produced.

↳ nutrition category for sugars and molecules your body breaks down to make sugars.

↳ broken down by the body, glucose is produced.

① Simple carbohydrate

② Complex carbohydrate

Formula = $C_m(H_2O)_n$ empirical formulae

Carbohydrates are also known as saccharides

① Monosaccharides

↳ Glucose, Fructose and Galactose are all simple sugars.

cellular respiration and blood sugar

honey

milk and yoghurt

↳ leave two of them together, you get

→ Disaccharides ~~(from)~~

(i) Lactose (ii) Maltose (iii) Sucrose

→ Complex Carbohydrates have three or more simple sugars stuck together.

→ Polysaccharides are compound sugars and yield more than 10 molecules of monosaccharides.

(+) are chief energy source, in many animals; they are instant source of energy.

(+) stored as glycogen in animals and starch in plants.

(+) stored carbs acts as energy source instead of proteins.

(+) carbs are rich in fibre content help to prevent constipation.

→ source:- cereals, fruits, honey, milk, sugar beet, potato, pasta and sugarcane.

Glucose | Galactose | Fructose

Maltose | Sucrose | Lactose

Proteins are polymers, made of monomers called the amino acids.

Proteins are polymers made up of monomers called the amino acids.

Proteins

- ↳ Chief builders of the body.
- ↳ complex molecules made up of carbon, hydrogen, oxygen and nitrogen
- ↳ Proteins are used to synthesize enzymes.
- ↳ Some protein transport nutrients through out the body.
- ↳ some help chemical reactions to happen at faster rates.
- ↳ other make up the structure of living things.
- ↳ Despite this, all proteins are made up of 21 building blocks called amino acids.

↳ Amino acids are made up of carbon, oxygen, nitrogen, hydrogen and some contain sulphur.
(CONH₂)

Functions of Protein

- 1) Build new tissues of the body and maintain and replace damaged tissues.
- 2) Proteins carry out regulating activities as enzymes and hormones.
- 3) Keratin protein forms hair, nails, feather, horns and beaks.
- 4) Carrier proteins move molecules from one place to another around the body. e.g. haemoglobin.
e.g. haemoglobin

Sources

- groundnuts, beans, pulses, fish, egg, meat and cheese among animal products.

Classification

- 1) Enzymatic proteins → catalytic
- 2) Structural proteins → protecting
- 3) Transport or carrier proteins
- 4) Nutrient and storage proteins

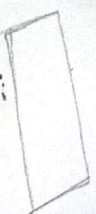
Provide nutrition to growing embryos and store some

help in transport of ions or molecules in the body.

Haimza
Haimza

stored food
LIPIDS
Biological Process
Cell structure

cholesterol can lead to coronary heart diseases



* Lipids (FATS and OIL)

→ Lipids are naturally occurring organic compounds, commonly known as oils and fats.

→ Lipids contribute to cell structure, provide stored fuel and also take part in many biological processes.

There are two types of cholesterol, good or bad. Too much of one type can put your heart at risk for coronary heart disease.

* Cell structure, stored fuel and many biological processes.

→ Fats can be classified into

① Saturated → solid at room temperature

② Trans fats → this has been changed by a process called hydrogenation.

③ Unsaturated → is liquid at room temperature.

milk, cheese and meat

mostly in oil from plants.
→ olive oil

It may increase your cholesterol level.
If you eat it instead of saturated.

Processed foods, cookies, snack foods, such as chips and crackers.

Raise your cholesterol level.

Properties

- ① Insoluble in water
- ② have high energy content and are metabolized to release calories.
- ③ also act as electrical insulators

Functions

- ① are storage compounds, triglycerides serve as reserve energy of the body.
- ② They may protect vital organs like heart and kidney.
- ③ are components of some enzyme system.
- ④ layers of fat in the subcutaneous layer, provides insulation and protection from cold.

* Cholesterol

* Cholesterol

→ is a waxy substance that comes from two sources: human body and food.

→ Liver makes all the cholesterol needed and circulates it through the body.

→ Cholesterol is also found in foods from animal sources, such as meat etc.

→ when we eat a diet high in saturated and trans fat → liver produces

Excess cholesterol can form plaque between layers of artery walls, making it harder for your heart to circulate blood. It can then cause stroke.

* Vitamins and Minerals

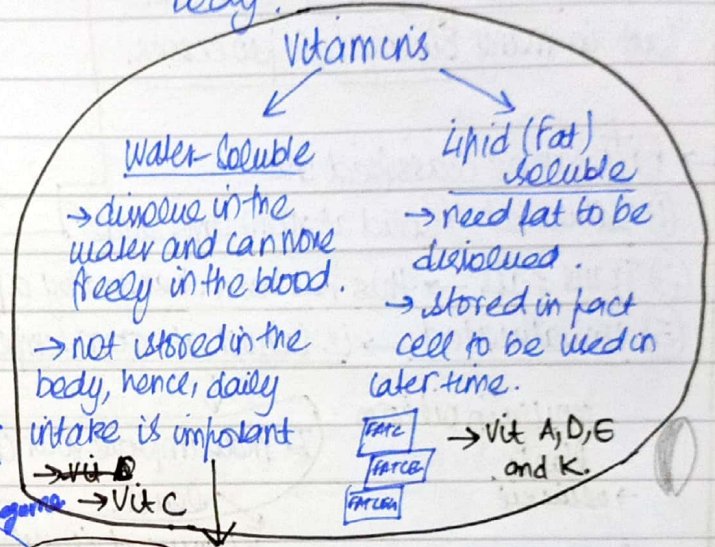
→ Both V and M are needed by the body in very small amounts to trigger the thousand of chemical reactions necessary to maintain good health.

→ Vitamins are needed by the body in small amounts .to allow it for growth, development and function properly.

→ 13 vitamins are needed by the body.

→ Functions

- ① They act as cofactor.
- ② They enhance the body's use of carbohydrates, proteins and fats.
- ③ They are critical in the formation of blood cells, hormones, nervous system chemicals known as neurotransmitters.



egg, milk, liver

They also help the body to connect food into energy (metabolism) create new blood cells, and maintain healthy skin cells, brain cells and other body tissues.

are important for making sure the body's cells are functioning properly.

→ Anemia can be caused by deficiency of Vitamin B.

Red Blood Cells

*** Vitamin B** → There are 8 types of vitamin B and most them come from our diet.

Releases → make energy from the injected food.

to make Red Blood Cells.

→ Deficiency in Vit B 6 and 12 can cause Anemia → which is insufficient RBC.

→ Deficiency in Vit B 1 and 3 can lead to mental confusion

boosts the immune system

also acts as anti-histamine, treatment of allergies.

Infections

*** Vitamin C** → to protect the body from infection, it also contributes to the growth and repair of tissues

→ Fruits and vegetables.

Best source is Guava, Papaya and kiwis.

→ can lead to a disease called Scurvy.

• Pilots and sailors used to have.

Vitamin C is necessary to produce collagen. It is the main protein component in the body, 35% of body protein.

Spongy gums
bleeding
loss of teeth

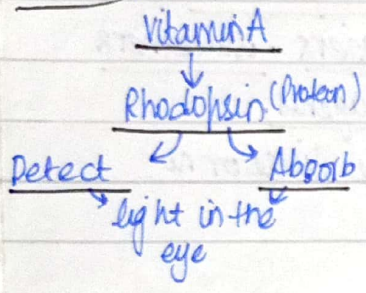
Vitamin A and Vitamin D

flamga
flamga
flamga

* Fat-Soluble Vitamins

Vitamin A and Vitamin D

→ The main role of Vitamin A is maintaining and protecting vision (eye vision)



→ Sources → two

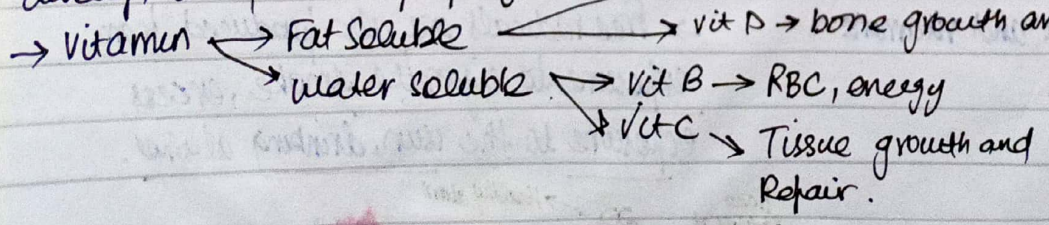
- ① Animal sources → eggs, fish, meat
- ② Plant sources → leafy, vegetables, fruits

- Best sources
- ① Squash
 - ② Carrots
 - ③ Spanish

→ Deficiency → very rare because mainly all food contain Vit A in small quantity
 → Blindness, inability to see in darkness.

Summary

→ Vitamins are essential nutrients needed by the body to grow, develop and function properly.



Vitamin D → bone growth and strength.

→ also known as "Sunshine Vitamin"
 → works to promote bone growth and bone strength.

→ Vit D regulates the absorption of calcium and phosphorus, which are two imp components in developing the strength and structure of your bones.

↳ muscles, heart, brain work well and your body is able to fight infections.

↳ Deficiency results in the softening of the bones known as Rickets in children and Osteomalacia in adults.

* Fibre → indigestible parts of the plant foods, such as vegetables, fruits, grains and beans.
 → Type of carbohydrates that keeps our digestive system healthy.
 → lack of fibre leads to constipation problem.
 → Black lentil, kidney beans, chickpeas, oats, whole wheat pasta.
 → men should take around 36 grams a day. women can take 25 grams a day.
 → fibre flushes the waste outside
 → Food Drug Association → eat 25 grams of fibre a day.

Food Drug Association → fibre a day

+ Nutrient Bioavailability

→ human body does not absorb 100% of all nutrients.

→ Bioavailability is the degree to which food nutrients are available for absorption and utilization in the body.

- ① food must be digested
 - ② Then assimilated
 - ③ Utilized
- absorption of nutrients involves at least three steps.

→ Many factors which affect Nutrient Bioavailability.

- ① Food digestibility and nutrient's absorbability
- ② Age, sex, psychological health, consumption of drugs.

in the form of pollution, smoke and gas

→ How to increase bioavailability

- ① Optimize your gastrointestinal system for better nutrient absorption.

② De-stress

③ Add spice

④ Add oil

↳ remove the bio-availability of fat soluble nutrients such as carotenoids and vitamins A, D, E and K.

+ Food Additives

→ Food additives are substances that are intentionally added to food or animal feed during processing or storage.

→ include antioxidants, preservatives, colouring and flavouring agents, emulsifiers, stabilizers, sweeteners and anti-infective agents.

→ most additives have little or no nutritional value.

+ Antioxidants

Free radicals hurt our cells

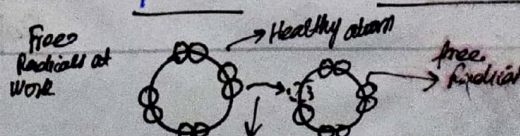
→ The cells are neutral. When the cells are exposed to oxygen, they break down through a process known as oxidation.

→ A substance is oxidized if it gains oxygen, loses hydrogen, or loses electrons.

→ The charged particles are left without pairs, i.e. they are free. This is why these cells are known as free radicals.

→ The problem arises when these free radicals try to achieve their old state of stability by converting other stable cells to free radicals.

→ Free radicals are also produced from exposure to cigarette smoke, excess exposure to the sun, drinking alcohol.



At work

Healthy
atom



→ Oxidative stress has been linked to critical diseases.

- ① Deterioration of the eye lens, which contribute to blindness.
- ② Inflammation of the joints.
- ③ Certain cancers.

→ Antioxidant compounds are one of the chief defence mechanisms used by the body to prevent free radical formation.

→ They prevent or slow down cell damage by donating electron to these free radicals, in effect neutralising the harmful chain reaction that free radicals can set off.

→ The best way to stay healthy is to eat a wide variety of vitamin-rich foods.

* Food Preservation

is any of a number of methods by which food is kept from spoilage after harvest or slaughter.

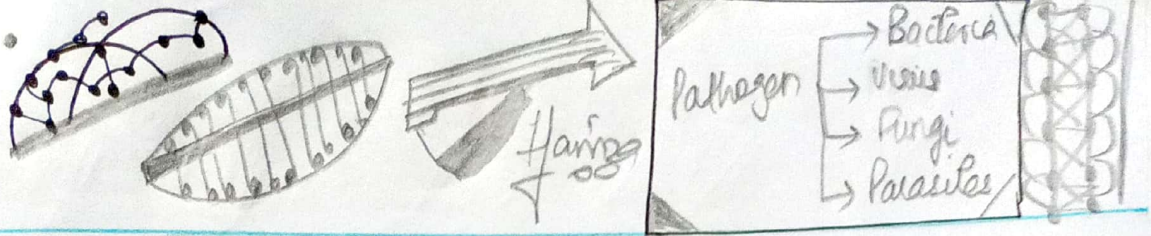
→ (Read points from book)

* Food Adulteration

→ Food Adulteration is an act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient.



Hanna



Human Health and Diseases

Infectious diseases

↳ caused by Pathogens
 ↳ Passed from infected to uninfected people.
 a bacterium, virus, or other microorganism that can cause disease

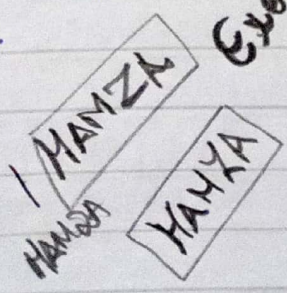
↳ A disease is an illness or disorder of the body or mind that leads to poor health; each disease is associated with a set of signs and symptoms.

→ Immunity is the protection against disease provided by the body's internal defence or immune system.

External defense system

- Epithelia that cover the airways are an effective barrier to the entry of pathogens.
- Hydrochloric acid kills many bacteria that we ingest with our food and drink.

External Defense System



→ Internal Defense System

↳ If WBC enter pathogens enter the body, WBC's recognize them as something foreign and destroy them.
 ↳ Foreign molecule is known as antigen.

- ↳ Two types of white blood cells.
 ① Phagocytes ② Lymphocytes

The response of lymphocytes to the presence of a foreign antigen is known as the immune response.

Respond by producing antibodies, and killing cells that have been infected by pathogens.

Phagocytes are produced throughout life in the bone marrow.

↳ Neutrophils are a kind of phagocyte and form about 60% of the white cells in the blood.

lymphocytes are second type of white blood cells. They play an important role in the immune response.

→ Antibody are also known as immunoglobulins and these proteins are created by the body. They work to fight against the antigen.

• Vaccine

↳ is a biological preparation that improves immunity to a particular disease.

↳ contains an agent that resembles a disease-causing micro-organism, and is often made from weakened or killed form of microbe, its toxins or one of its surface proteins.

↳ The agent stimulates the body's immune system to recognize the agent as foreign, destroy it, and "remember" it, so that the immune system can more easily recognize and destroy any of these microorganisms that it later encounters.

↳ some vaccines may cause mild reactions. Immunization are one of the best means of protection against contagious diseases.

↳ Childhood vaccines produce immunity about 90-100% of the time.

• Antibiotics

↳ are chemical compounds used to kill or inhibit the growth of infectious organisms.

↳ although they are used in wide variety of infections, it is important to realize that antibiotics only treat bacterial infections.

↳ used against common cold or fungal infections.

↳ oral antibiotics, Topical antibiotics, injections of antibiotics

↳ side effects → being sick, feeling sick.

↳ Antibiotics work in one of two ways

- ① They kill bacteria by disrupting one of the processes they need to survive, such as turning glucose into energy.
- ② They prevent bacteria reproducing and spreading.

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Polio

↳ highly infectious viral disease, which mainly affects young children.

↳ Global effort to eradicate Polio. The two countries left are Afghanistan and Pakistan.

↳ As long as one child remains infected, children in all countries are at risk of contracting Polio.

↳ It invades the nervous system and cause total paralysis in a matter of hours.

↳ Polio mainly affects children under 5 years of age.

↳ Polio virus spreads in human faeces.

- Polio virus usually enters the body through mouth.
- Contaminated food and water.

↳ There is no cure for Polio, it can only be prevented.

↳ Two vaccines

- ① Inactivated Polio Vaccine (IPV)
- ② Oral Polio Vaccine (OPV)

↳ Children should be vaccinated dose at 2 months, 4m, 6-18m, and

Diarrhoea

↳ is defined as the passage of three or more loose or liquid stools per day.

↳ symptom of an infection in intestinal tract.

↳ Infection is spread through contaminated food or drinking-water.

- ① Acute watery diarrhoea
- ② Acute bloody diarrhoea
- ③ Persistent diarrhoea.

↳ This disease is leading cause of child mortality and morbidity in the world.

↳ causes: Infection, Malnutrition and Source.

↳ Prevention

- Clean food and water
- hand washing
- health education
- zinc supplements.

Malaria

→ spread to people through the bites of infected female Anopheles mosquitoes, called malaria vectors.

↳ According to the latest WHO estimates, Dec 2015, there were 214 million cases of malaria in 2015 and 438,000 deaths.

↳ Symptoms → Headach, Fever, vomiting.

↳ Malaria is caused by Plasmodium parasites.

↳ spread through the bite of female Anopheles mosquitoes.

↳ Vector-control is the main way to prevent and reduce malaria transmissions.

Two form of vector control

① Insecticide-treated mosquito nets.

② Indoor Residual spraying

↳ early diagnosis and treatment of malaria reduces disease and prevents death.

Hepatitis

↳ refers to an inflammatory condition of the liver.

↳ commonly caused by a viral infection

① Autoimmune Hepatitis → is a disease that occurs when body makes antibodies against liver tissue.

② Hepatitis that occurs as a secondary result of medications, drugs, toxins, and alcohol.

Hepatitis A → viral liver disease that can cause mild to severe illness.

Hepatitis B - is a viral infection that attacks the liver and can cause both acute and chronic disease.

Hepatitis C - is a liver disease caused by Hepatitis C virus

• Globally, between 130 - 150 million people have chronic hepatitis C infection.

borne

Dengue

→ mosquito-borne viral disease that has rapidly spread in all regions in recent years.

↳ Dengue virus is transmitted by female mosquitos mainly of the species *Aedes Aegypti* and to a lesser extent, *Ae. albopictus*.

↳ was first recognized in 1950's during dengue epidemics in the Philippines and Thailand.

↳ Dengue should be suspected when a high fever ($40^{\circ}\text{C}/104^{\circ}\text{F}$) is accompanied by 2 of the following symptoms: severe headache, pain behind the eyes, muscle and joint pain, nausea, vomiting, swollen glands or rash.

↳ spread through *Aedes aegypti* mosquito, primary vector of dengue.

↳ urban settlements, clean water, bites early in the morning and before dusk.

↳ In late 2015 and early 2016, the first dengue vaccine, Dengvaxia (CYD-TDV) by Sanofi Pasteur.

↳ Prevention and control.

- main thing is to combat vector mosquito.