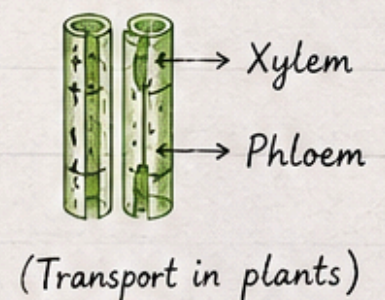
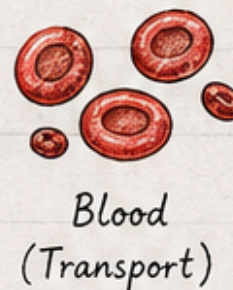
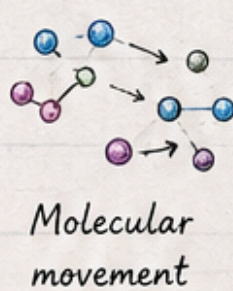
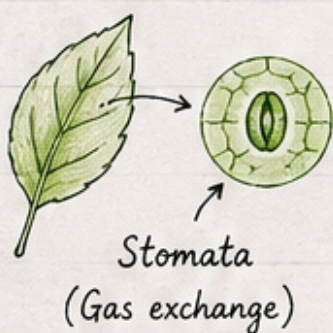
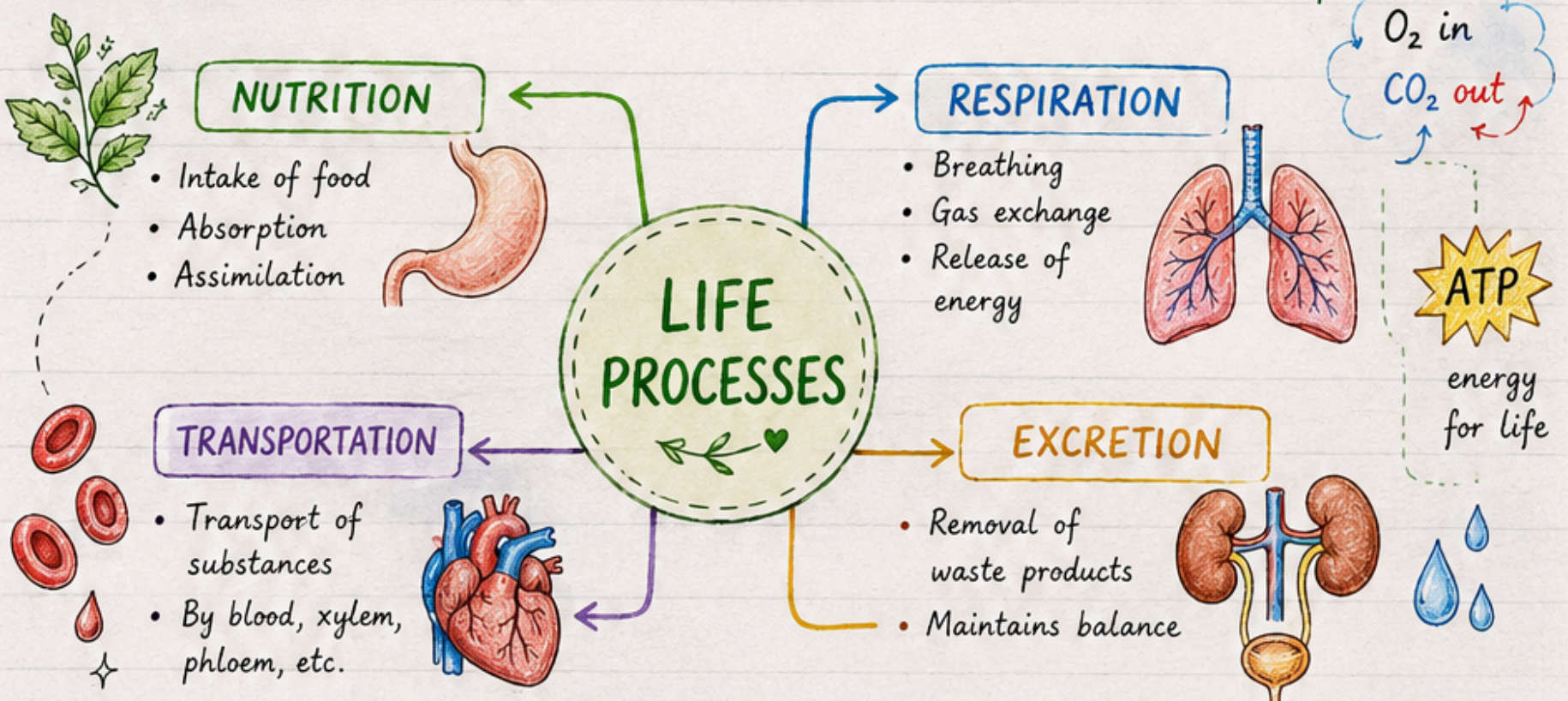


CHAPTER 5 — LIFE PROCESSES

Life survives
through
continuous
maintenance
processes

Nutrition • Respiration • Transportation • Excretion



CHAPTER INDEX

1. Life Processes
2. Nutrition
3. Respiration
4. Transportation
5. Excretion

Understand
the process,
embrace
life.



LIFE PROCESSES

What are Life Processes?

• **Movement** is evidence of life.



• Invisible **molecular movement** is necessary for life.



• Living organisms **repair and maintain** structures continuously.



• Life processes **maintain** living organisms.



Energy is required even when organisms are not doing anything.



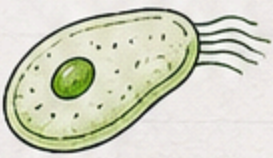
ATP

FLOW OF LIFE PROCESSES



LIFE PROCESSES AT DIFFERENT LEVELS

SINGLE-CELLED ORGANISMS



↓
diffusion
sufficient

vs.

MULTI-CELLULAR ORGANISMS



↓
transport system
needed

MEMORY TRICK

N R T E

=

Nutrition, Respiration,
Transport, Excretion



Life processes are essential for survival, growth and maintenance of life.

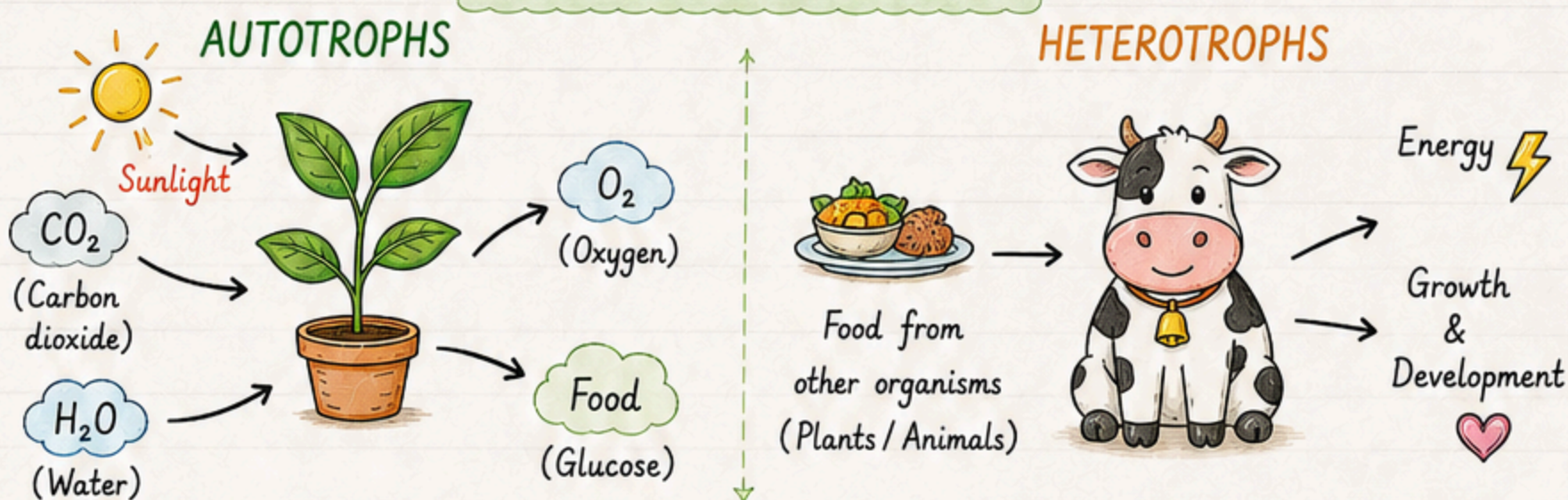
Nutrition

- Organisms need food for energy and growth.
- Protein synthesis and development require nutrients.

TWO MODES OF NUTRITION

	AUTOTROPHS	HETEROTROPHS
Definition	Organisms that can make their own food. (Self-feeders)	Organisms that cannot make their own food. (Depend on others)
Food Source	Use carbon dioxide and water to prepare their own food in the presence of sunlight and chlorophyll.	Use complex food substances obtained from other organisms.
Examples	Green plants Bacteria (e.g., cyanobacteria)	Animals (e.g., human, cow) Fungi (e.g., mushrooms, yeast)

FOOD SOURCE DIFFERENCE



★ IMPORTANT

Bio-catalysts
=
Enzymes

KEY POINTS

- Food provides energy.
- Nutrients are required for growth and repair.
- Cells perform life processes with the help of enzymes.

QUICK REVISION

- ★ Autotroph → Makes food
- ★ Heterotroph → Depends on others

AUTOTROPHIC Nutrition

- Autotrophic nutrition is the mode of nutrition in which organisms make their own food from inorganic substances using light energy and chlorophyll.

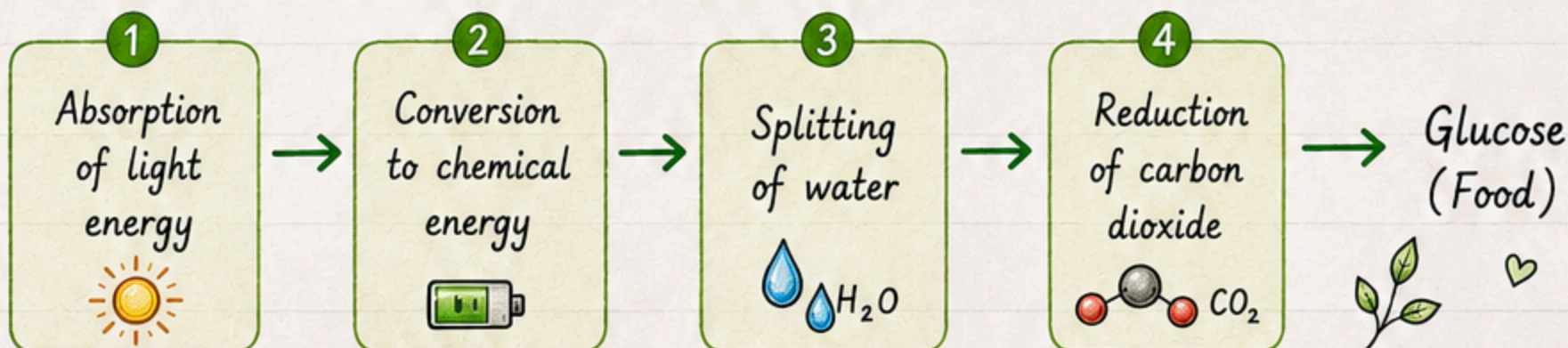


PHOTOSYNTHESIS

Green plants prepare their own food by the process of photosynthesis.

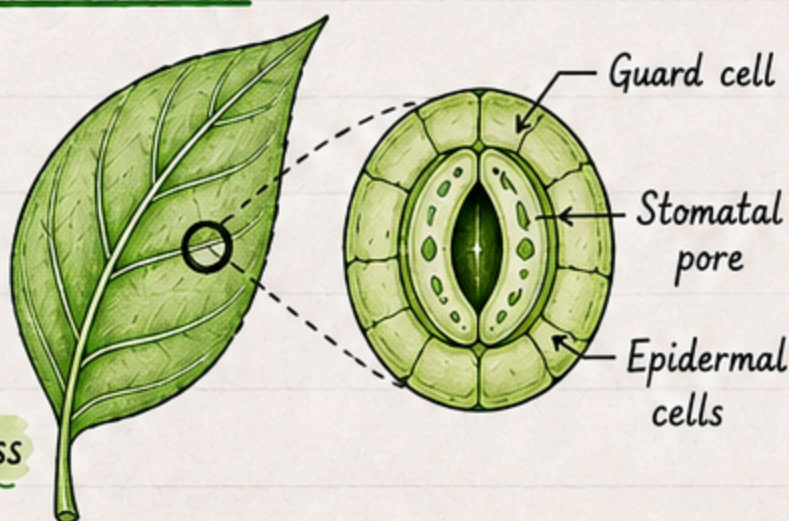


EVENTS DURING PHOTOSYNTHESIS



STOMATA - TINY GATEWAYS

- Tiny pores on leaf surface
- Guard cells open and close stomata
- Prevent water loss



Green plants - Nature's food factories! ♥

QUICK REVISION

★ Starch =
Stored food

Nitrogen helps
protein synthesis



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HETEROTROPHIC Nutrition

- Food broken down into simpler substances.
- Some organisms digest outside body.
- Parasites derive nutrition without killing host.

EXAMPLES



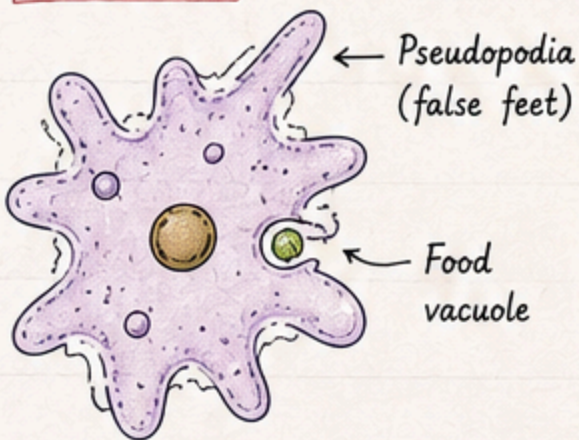
Bread moulds,
yeast, mushrooms



Cuscuta, ticks,
lice, tapeworm

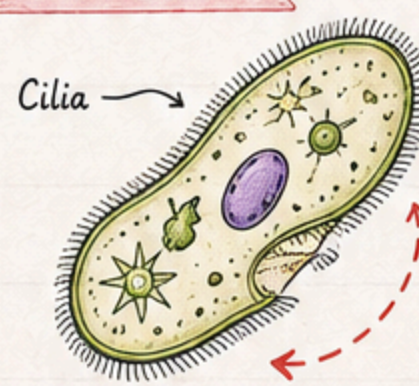
NUTRITION IN SINGLE - CELLED ORGANISMS

AMOEBA



- Food is engulfed by pseudopodia.
- Digested in food vacuole.
- Nutrients absorbed into cytoplasm.

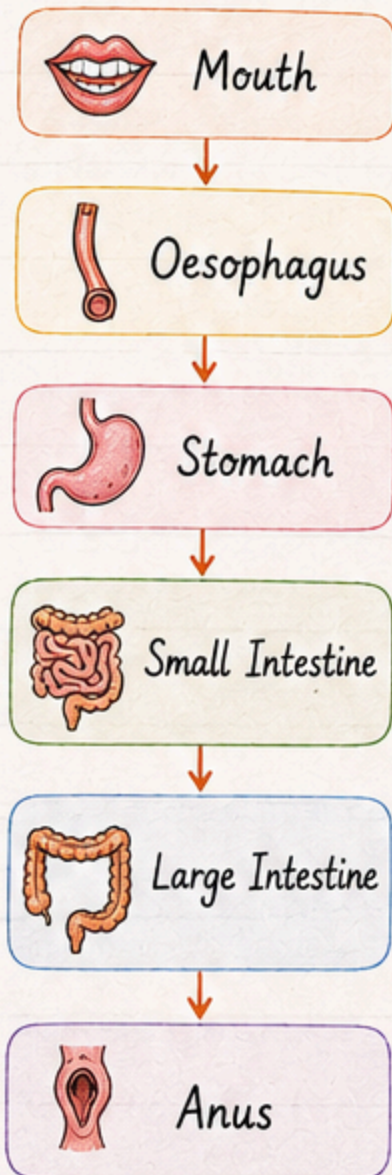
PARAMECIUM



Cilia help in movement and bringing food.

- Food enters through oral groove.
- Digested in food vacuoles.
- Waste expelled at specific spot (anal pore).

NUTRITION IN HUMAN BEINGS



SALIVARY AMYLASE
Begins digestion of starch into simpler sugars.



PERISTALSIS
Rhythmic muscular contractions move food forward.



HYDROCHLORIC ACID (HCl)
Provides acidic medium, kills germs.



PEPSIN
Digests proteins into peptones.



BILE JUICE
Emulsifies fats and provides alkaline medium.



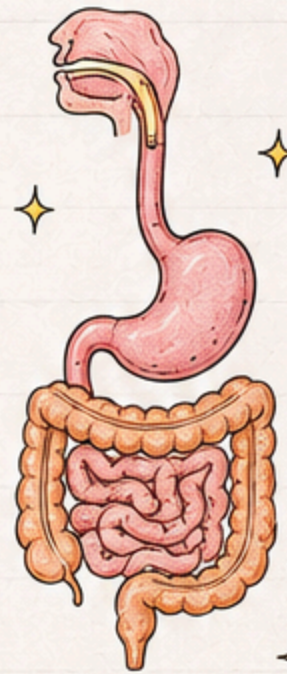
TRYPSIN AND LIPASE
Trypsin digests proteins. Lipase digests fats.



VILLI AND ABSORPTION
Villi increase surface area. Nutrients are absorbed into blood and lymph.



ELIMINATION
Undigested food and waste are egested out.



DENTAL CARIES



- Caused by bacteria.
- Eat away tooth enamel.

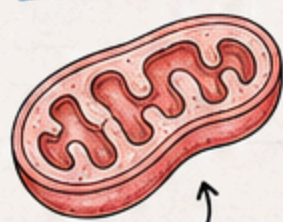
Brush regularly and eat healthy!



Heterotrophic organisms depend on other organisms for food.

5.3

Respiration



Powerhouse
of the cell



Respiration is a biochemical process in which food (glucose) is broken down in cells to release energy.



Glucose

Pyruvate

① Anaerobic
Respiration

Ethanol + CO₂

(e.g., yeast)

② Aerobic
Respiration

CO₂ + Water +
Large Energy

(e.g., human beings)

③ Lack of Oxygen
in Muscles

Lactic Acid

(e.g., human beings
during vigorous activity)

⚡ ATP INFORMATION

ATP = Energy currency

★ 30.5 kJ/mol
energy released



AEROBIC vs ANAEROBIC RESPIRATION

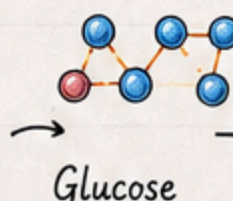
	AEROBIC RESPIRATION	ANAEROBIC RESPIRATION
Oxygen	Requires oxygen	Does not require oxygen
End Products	CO ₂ + Water	Ethanol + CO ₂ (or Lactic acid)
Energy Released	Large amount of energy (30.5 kJ/mol)	Small amount of energy (2 kJ/mol)
Site	Mitochondria	Cytoplasm
Examples	Human beings and other aerobic organisms	Yeast, some bacteria and human muscles during vigorous activity

★ Muscle cramps
due to lactic
acid build-up.

KEY POINTS

- All respiration starts with glucose → pyruvate.
- Oxygen gives more energy.
- Lack of oxygen leads to lactic acid formation in muscles.

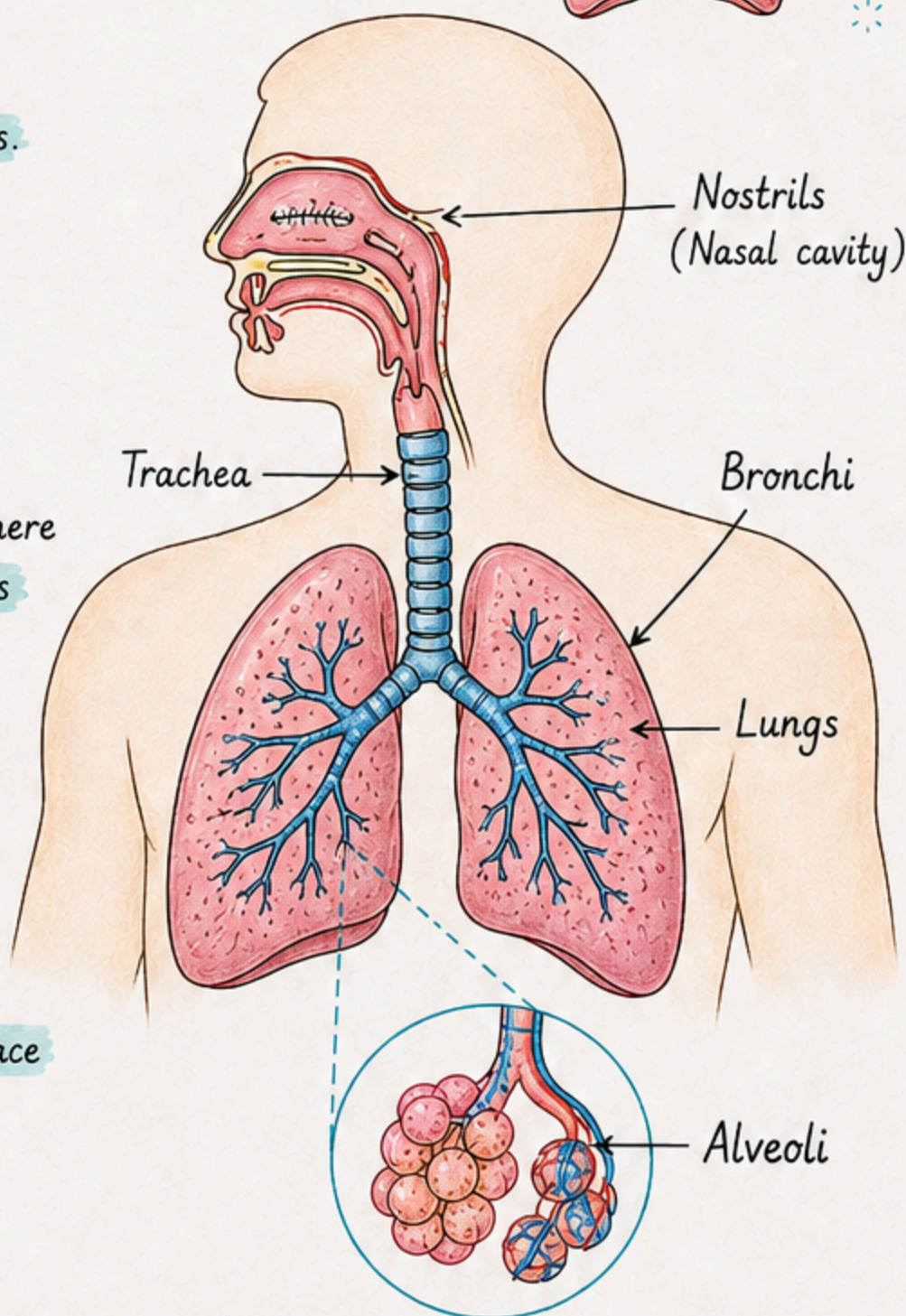
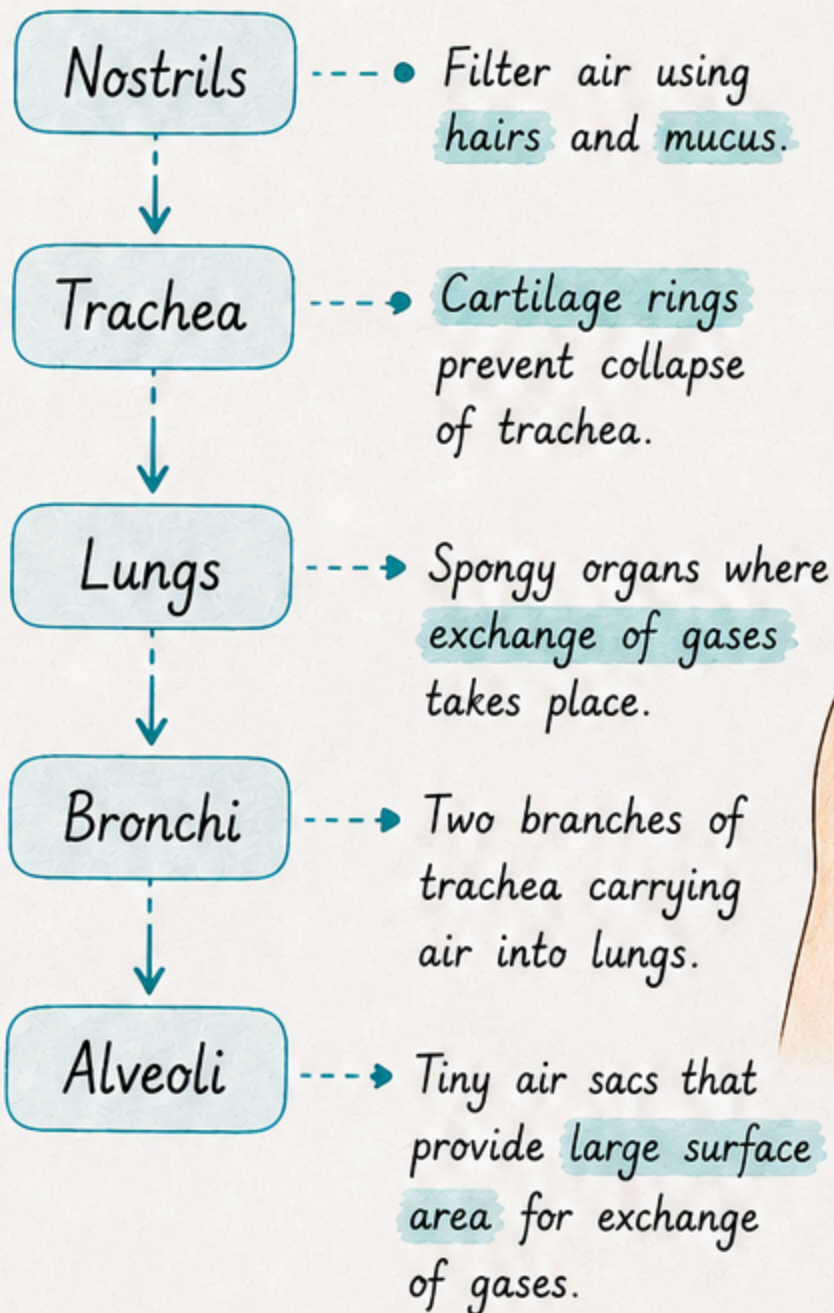
ENERGY



ENERGY
RELEASED



RESPIRATORY SYSTEM



KEY POINTS



- Nostrils filter air using hairs and mucus.
- Cartilage rings prevent collapse of trachea.
- Alveoli provide large surface area.
- Haemoglobin carries oxygen in the blood.
- Carbon dioxide is mostly dissolved in blood plasma.



IMPORTANT NOTE



Smoking destroys cilia and causes lung damage.



COMPARISON NOTE



Aquatic animals breathe faster due to less dissolved oxygen in water as compared to air.



QUICK REVISION



- ★ Alveoli = Exchange surface
- ★ Haemoglobin = Oxygen carrier



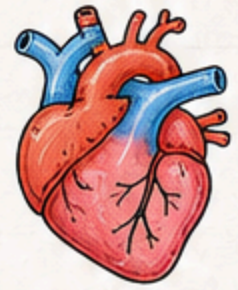
BREATHE IN LIFE, BREATHE OUT STRESS.



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in Human Beings



BLOOD

- Red, thick fluid connective tissue.
- Transports gases, nutrients, hormones and wastes.



PLASMA

- Straw coloured liquid part of blood.
- 90-92% water.
- Contains proteins, salts, hormones, nutrients and wastes.



RBCs (Red Blood Cells)

- Biconcave, disc shaped, no nucleus.
- Contain haemoglobin.
- Carry oxygen from lungs to body parts.



PLATELETS

- Small cell fragments.
- Help in clotting of blood and prevent blood loss.



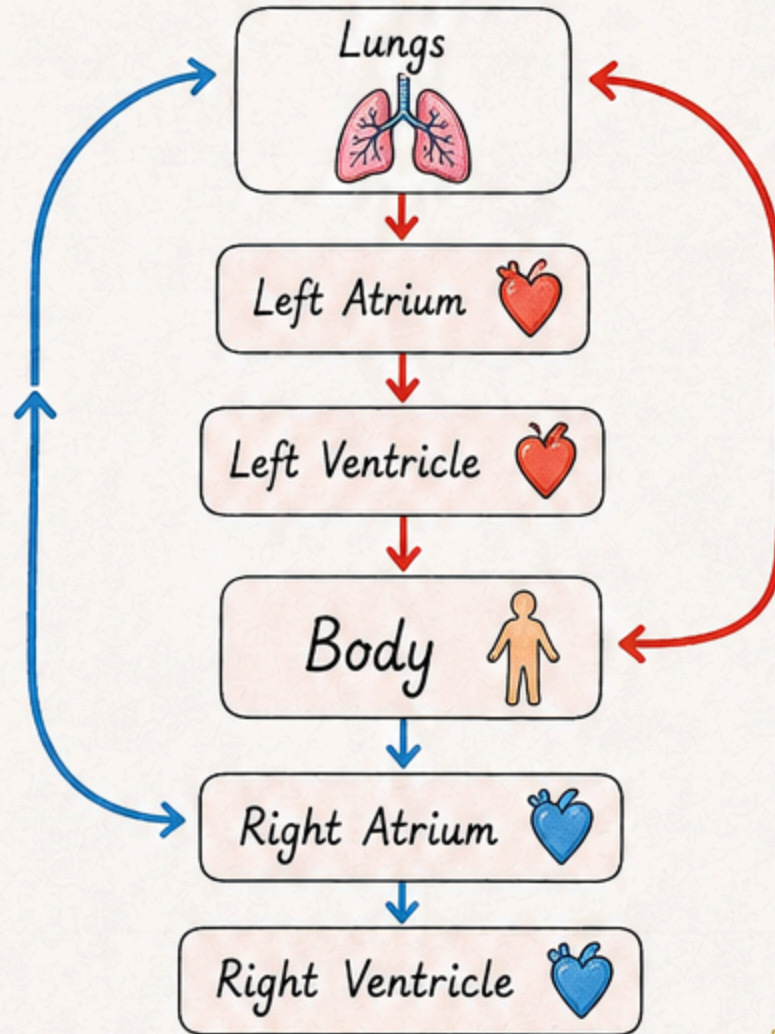
LYMPH

- Colourless fluid.
- Returns tissue fluid to blood.
- Contains lymphocytes (infection fighters).



DOUBLE CIRCULATION

Blood passes through the heart twice in one complete cycle.



→ Oxygenated blood
→ Deoxygenated blood

Oxygen and nutrients to all body parts

BLOOD PRESSURE

- The pressure exerted by blood on the walls of blood vessels.
- It is maximum in arteries and minimum in veins.

Normal
BP = 120/80
mm Hg

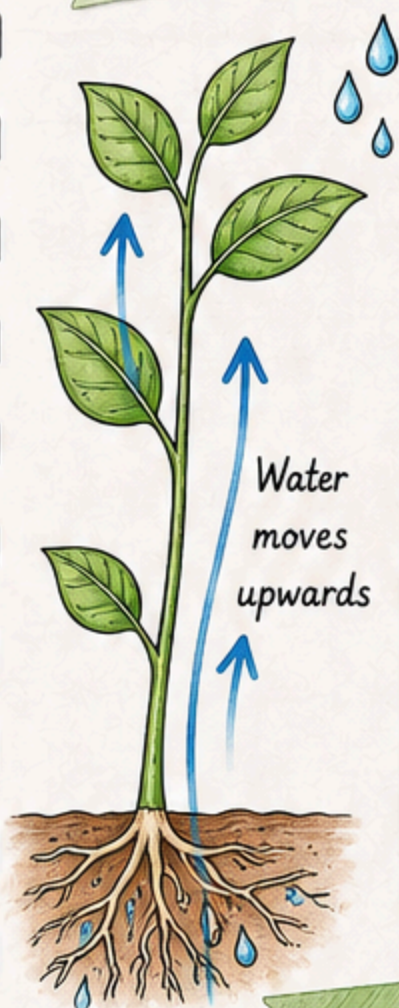


FEATURE	ARTERIES	VEINS	CAPILLARIES
Direction of flow	Carry blood away from heart. 	Carry blood towards heart. 	Connect arterioles and venules.
Wall thickness	Thick, elastic and muscular. 	Thin and less elastic. 	Very thin (one cell thick).
Pressure	High ↑↑↑	Low ↓↓	Very low ↓
Valves	No	Yes (to prevent backflow). 	No

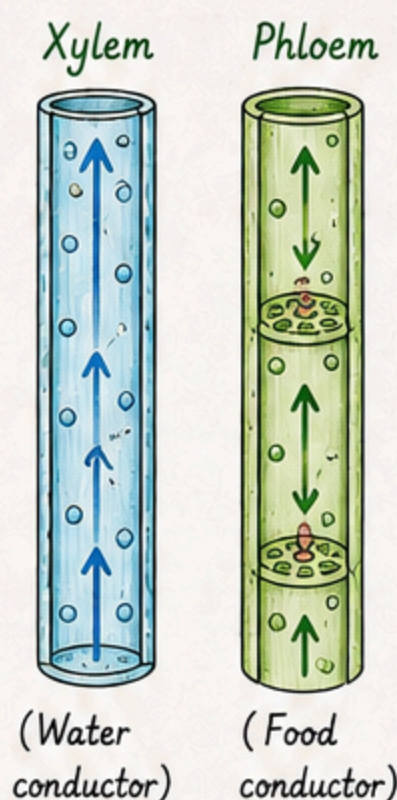


Transportation is essential for survival – it delivers life and removes waste!

TRANSPORTATION in Plants



	XYLEM	PHLOEM
Function	• Water and minerals transport	• Food transport (sugars)
Energy	• Does not require energy	• ATP energy used
Mechanism	• Root pressure • Transpiration pull	• Translocation
Direction	• Unidirectional (upwards) ↑	• Bidirectional (up and down) ↑↓



★ Transpiration pull
= major force

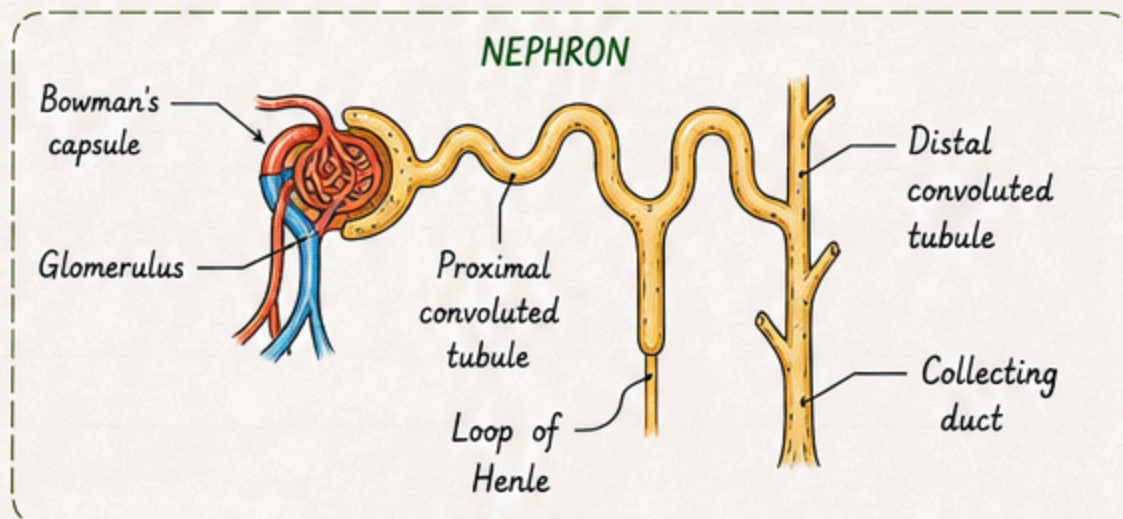
HOW WATER REACHES THE LEAVES?

Root pressure → Transpiration pull → Cohesion between water molecules → Water reaches leaves

EXCRETION

EXCRETION IN HUMAN BEINGS

- Kidneys, ureters, bladder, urethra form the excretory system.
- **Nephrons** are the filtration units of kidneys.
- **Bowman's capsule** collects the filtrate from blood.
- Useful substances are reabsorbed back into blood (selective reabsorption).
- Wastes are passed out as urine.



HEMODIALYSIS

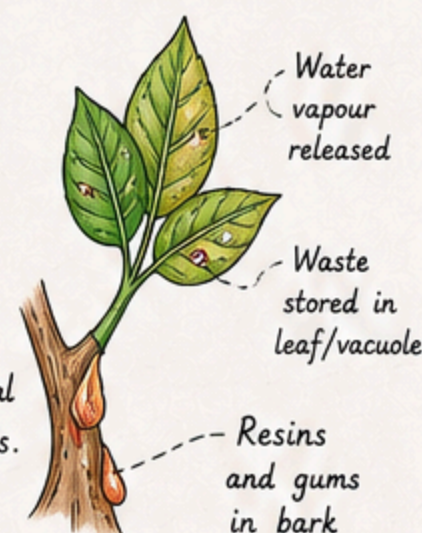
= Artificial kidney

Used when kidneys fail to work.



EXCRETION IN PLANTS

- Transpiration helps in removal of excess water.
- Wastes are stored in leaves, vacuoles or old parts.
- Resins, gums, latex and essential oils are some excretory products.



SUMMARY - KEY POINTS

- Plants transport water and minerals via **xylem** and food via **phloem**.
- **Transpiration pull** is the major force for upward movement of water.
- Excretion removes metabolic wastes and maintains **internal balance**.



Practice



1. Kidneys are part of:

☐ Nutrition

☐ Respiration

☐ Excretion

☐ Transportation

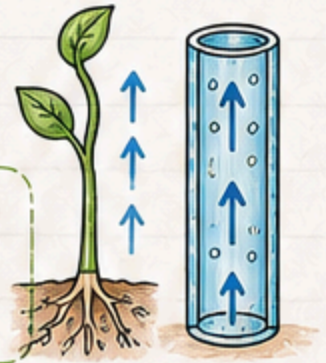
2. Xylem is responsible for:

☐ Food transport

☐ Water transport

☐ Oxygen transport

☐ Amino acid transport



3. Autotrophic nutrition requires:

☐ CO_2 and water

☐ Chlorophyll

☐ Sunlight

☐ All of these



4. Breakdown of pyruvate occurs in:

☐ Cytoplasm

☐ Mitochondria

☐ Chloroplast

☐ Nucleus



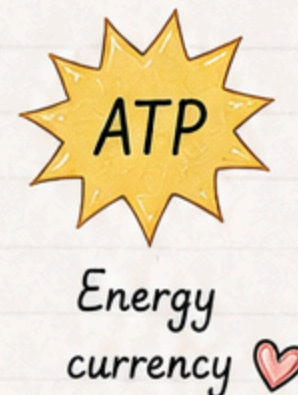
5. ATP stands for:

☐ Adenosine Triphosphate

☐ Amino Triphosphate

☐ Aerobic Transport Process

☐ Active Tissue Protein



ANSWER KEY

1-c , 2-a , 3-d , 4-b , 5-a



IMPORTANT QUESTIONS



SECTION 1 – PYQ QUESTIONS

ANSWER HINTS

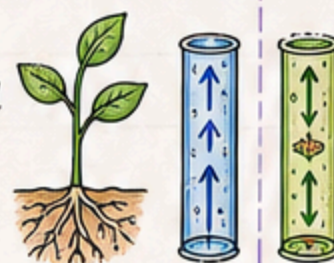
- Describe double circulation in human beings. →
 - Heart → twice in one complete cycle
 - Lungs → Left atrium → Left ventricle → Body
 - Right atrium → Right ventricle → Lungs
- How are fats digested in our bodies? →
 - Bile juice → emulsify fats
 - Lipase → fatty acids + glycerol
 - Small intestine → absorption
- Explain the role of saliva. →
 - Salivary amylase → starch → sugars
 - Moistens food, starts digestion
- Compare aerobic and anaerobic respiration. →
 - Aerobic → O_2 , CO_2 + H_2O , large energy
 - Anaerobic → no O_2 , ethanol + CO_2 / lactic acid, small energy
- Describe structure and function of nephron. →
 - Nephron → filtration unit
 - Bowman's capsule → collects filtrate
 - Selective reabsorption → useful substances

★ Revise diagrams carefully

SECTION 2 – EXPECTED QUESTIONS

ANSWER HINTS

- Why is diffusion insufficient in humans? →
 - Large body size → small SA:V ratio
 - Lower diffusion rate
 - Transport systems needed
- Explain transport in xylem and phloem. →
 - Xylem → water & minerals → upward
 - Root pressure + Transpiration pull
 - Phloem → food transport (sugars)
 - ATP used → Translocation
- Why are alveoli important? →
 - Tiny air sacs
 - Large surface area
 - Site of gas exchange
- Explain transpiration pull. →
 - Transpiration → water vapour loss
 - Pulls water upward
 - Cohesion + Adhesion
- What are life processes? →
 - Essential for survival
 - Maintain living organisms
 - Nutrition, Respiration, Transportation, Excretion



★ Focus on functions and comparisons

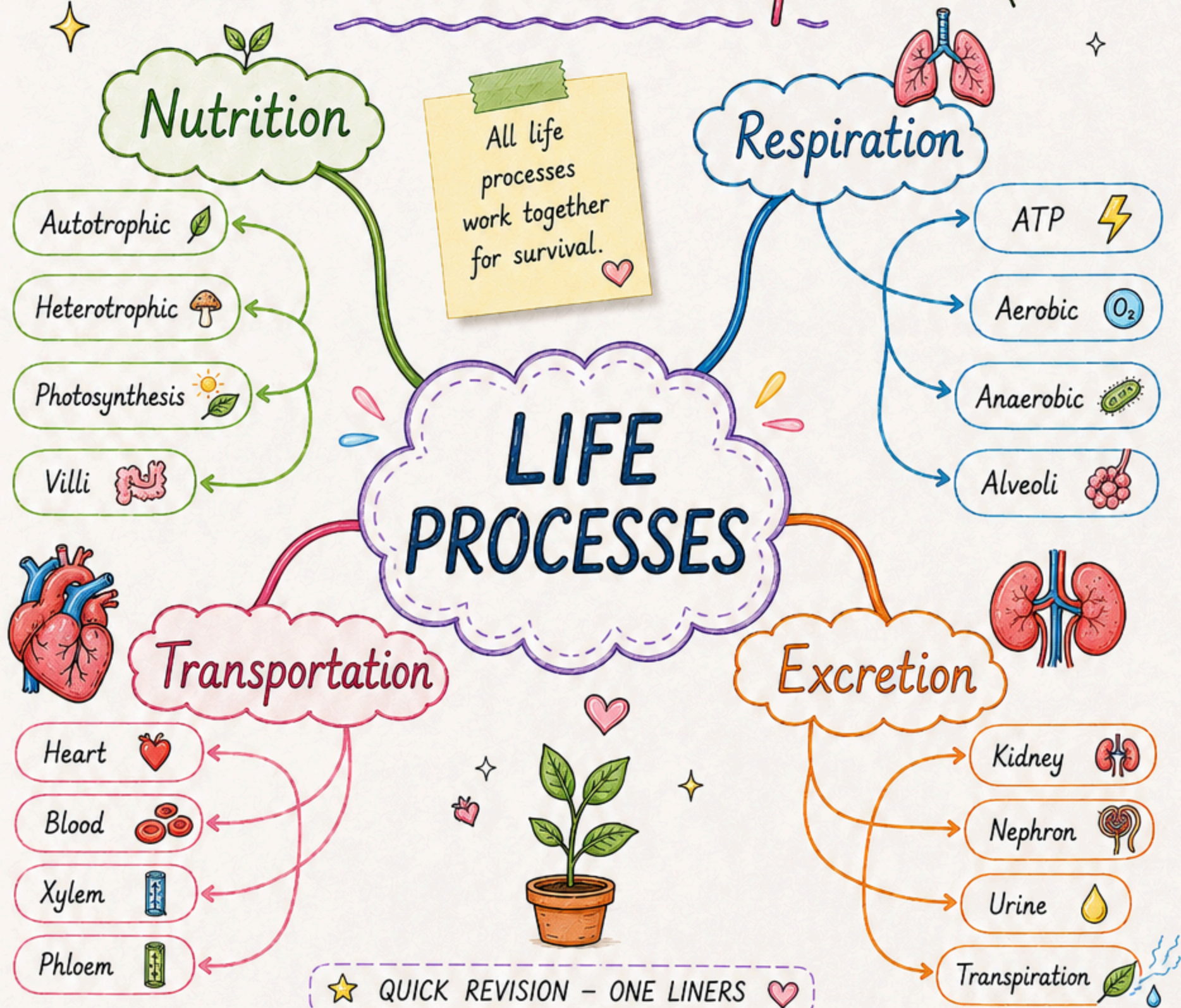


Think → Write → Revise



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Final Revision Mind Map



★ QUICK REVISION – ONE LINERS ★

ATP

= Energy
currency

Villi

increase
absorption

Xylem

transports
water

Nephrons

filter
blood

★ LAST MINUTE REVISION ★

- Nutrition:** Food, Autotrophic, Heterotrophic, Photosynthesis, Villi, Absorption
- Respiration:** ATP, Aerobic, Anaerobic, Pyruvate, Alveoli, Gas exchange
- Transportation:** Heart, Blood, Blood vessels, Xylem, Phloem, Translocation
- Excretion:** Kidneys, Nephron, Urine, Urea, Transpiration

Draw diagrams
neatly and
label correctly.

Understand → Revise → Recall
Practice → Score High!

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