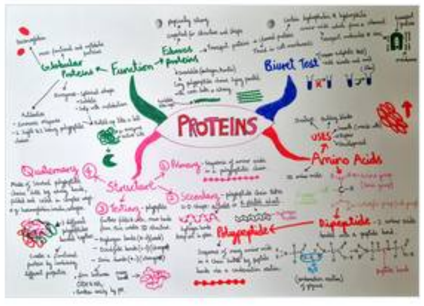
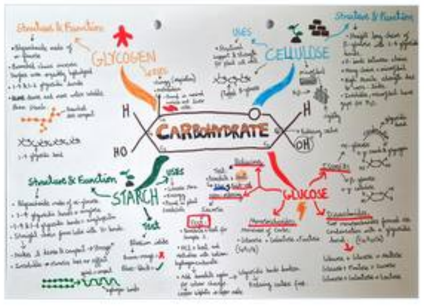
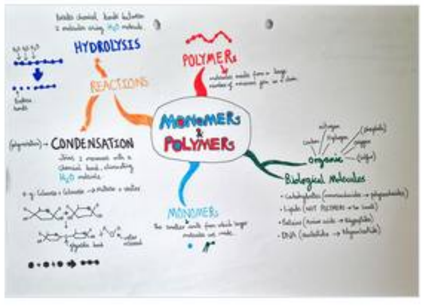
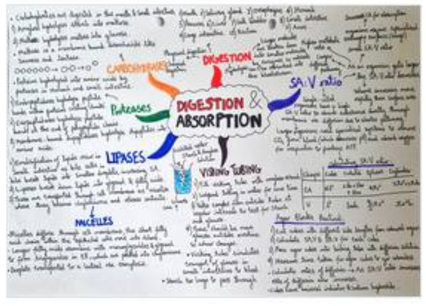
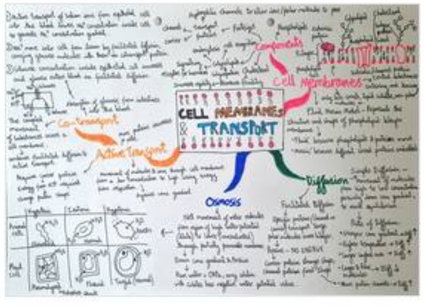
35 mindmaps in this pack

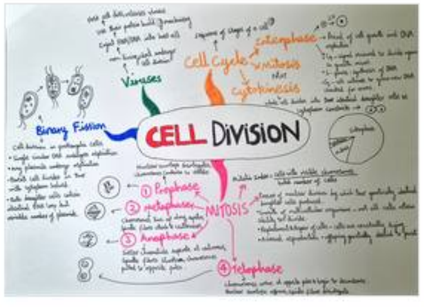


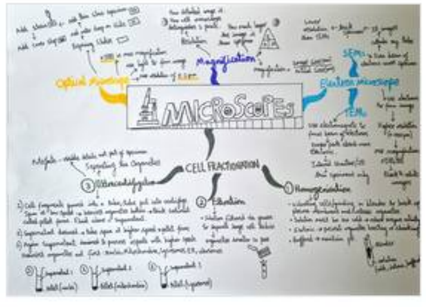


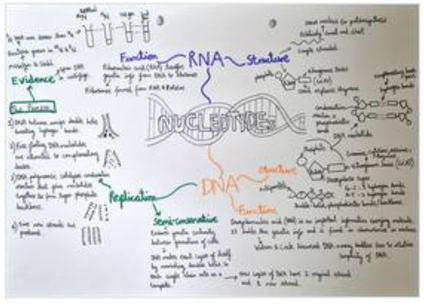


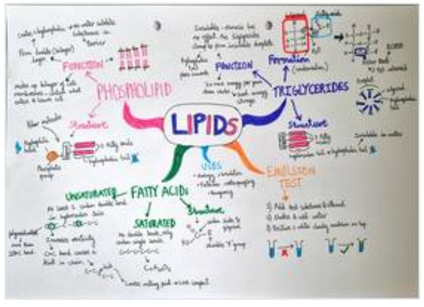


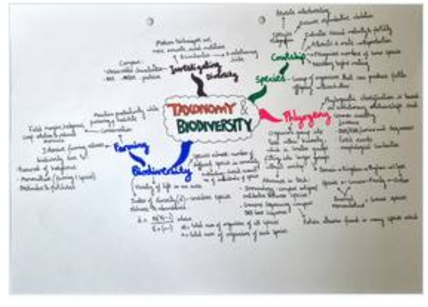


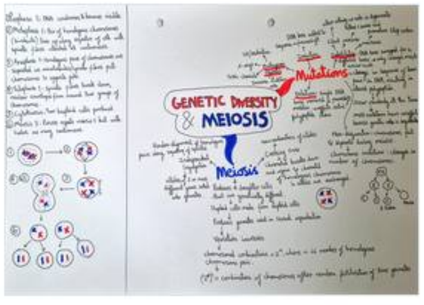


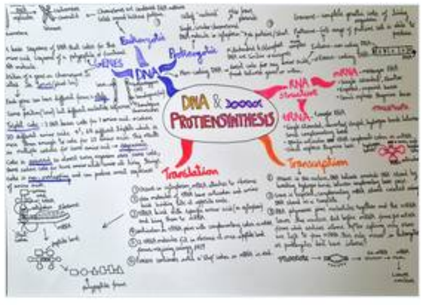


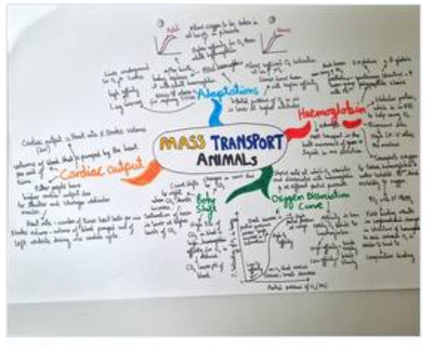


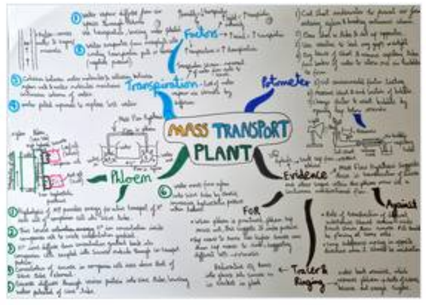


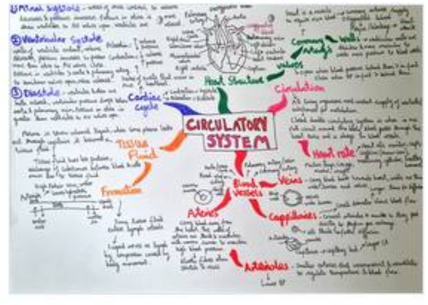


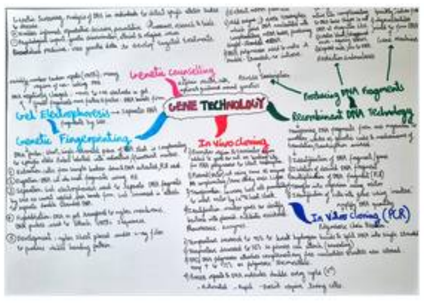


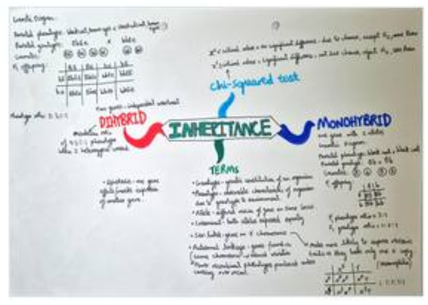


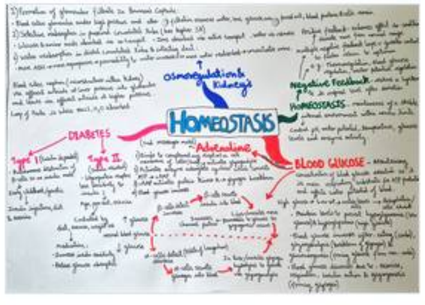


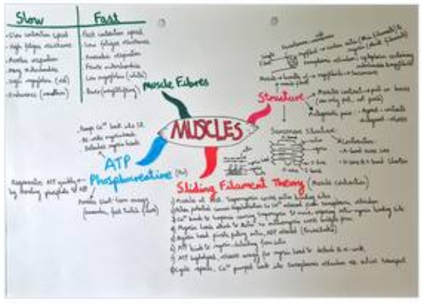


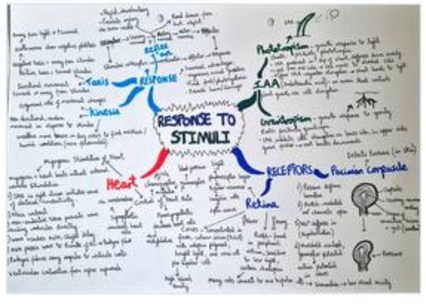




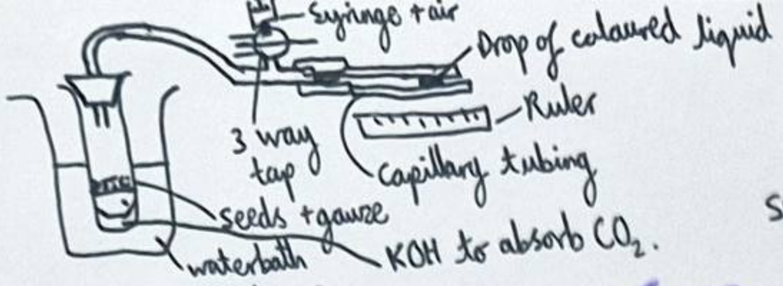








GAS EXCHANGE



3 way Taps
- Used with potometers & respirometers
- Allow repeat readings
- Use scissors, scalpel, tweezers

Dissections
- Lungs
  - Trachea, bronchi should be visible
- Gills
  - Cut off the operculum (gill cover) to reveal gill arch & filaments.
- Insect spiracles
- Ethical concerns:
  - Religious beliefs
  - Worried about how raised/killed

MICROSCOPES
- Cut thin slice of tissue from lungs, alveoli visible.
- Different sizes due to distorted/flattened.
- Cut tissue on leaf
  - optical microscope
  - mount on slide + dye + cover slip
  - stain highlights plant cells.

PVR
- Tidal volume - volume of air inspired per breath at rest.
- Breathing rate - number of breaths per minute.
- Pulmonary ventilation Rate (PVR) - volume of air breathed in or out in 1 minute. PVR = tidal volume x breathing rate.
- Spirometers measure breathing.
- Residual volume - air left over in lungs that can't be removed.

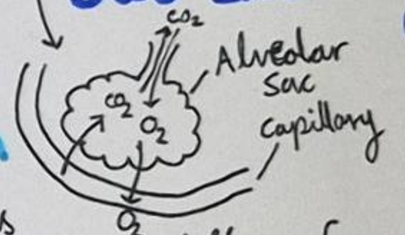
LUNG DISEASE
- Causation ≠ correlation
- Tar in cigarettes increases lung cancer risk.
- Lung cancer caused by alcohol, smoking, pollution
- Emphysema, Asthma, miner's lung
  - muscle contracts, goblet cells make mucus that blocks airways.
  - Elastin breaks down, less recoil so less air in/out.
  - Reduce SA for gas exchange & increase membrane thickness so gas exchange is less efficient.

Ventilation

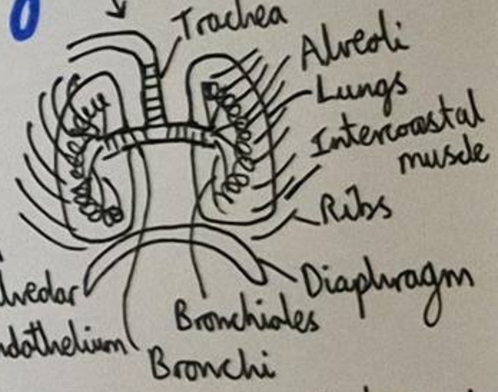
Exhalation
1) Diaphragm relaxes & domes.
2) External intercostal muscles relax, moving ribcage down & in
3) Thoracic cavity volume ↓
4) Pressure in lungs ↑
5) Air forced out

Inhalation
1) Diaphragm contracts & flattens
2) External intercostal muscles contract moving ribcage up & out.
3) Thoracic cavity increases in volume.
4) Pressure in lungs decreases, air drawn in.

Alveoli & Human Gas Exchange



- Oxygen diffuses from alveolar space through alveolar epithelium and capillary endothelium into bloodstream.
- Short diffusion pathway.



- Rich blood supply / network of capillaries maintains steep concentration gradient.
- Many alveoli = large SA.
- 1 cell thin membrane
- Cartilage holds trachea & bronchi open.

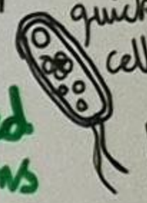
FISH

Counter-current system means blood flow & water flow are opposite so steep conc grad maintained.

Lamella increase SA, many capillaires in lamella.

INSECTS
- Tracheal system - O_2 enters holes (spiracles), flows through trachaea directly to muscle cells.
- Spiracles open & close / have hairs to limit waterloss. Rigid exoskeleton is waterproof, lactate ↓ WP.

Single-celled organisms



- Gases & nutrients diffuse quickly in & out through cell wall & membrane
- High SA:V ratio

LEAVES

- waterproof cuticle
  - reduces waterloss

xerophytic Plants
- Curled leaves
  - Reduce water loss
- Sunken stomata
- Few stomata
- Hairs → Trap moisture
- waxy cuticle

When guard cells are turgid the stoma open so air enters leaf. Air spaces allow gases to diffuse. Palisade cells photosynthesise.

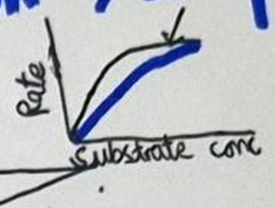
ADAPTATIONS

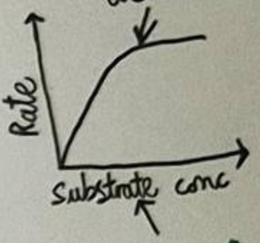
ENZYMES

Enzyme Inhibition

Non-competitive
- Bind elsewhere from active site
- Active site changes shape
- Increasing substrate concentration won't help.

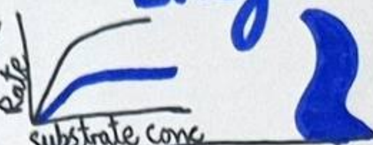
Competitive
- Similar shape to substrate → compete directly for active site
- High inhibitor concentration reduces rate.
- High substrate conc floods out inhibitor.

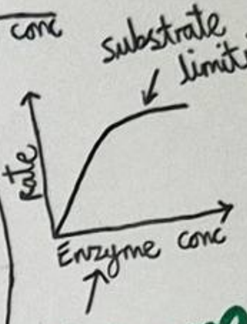




Enzyme's active site is specific to the substrate's shape.

Enzyme-substrate Complex
- Lowers activation energy

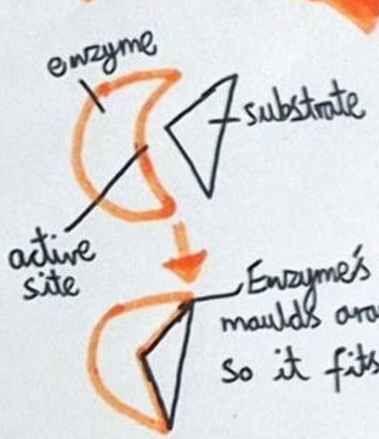




Lock & Key
- new evidence → x

Induced Fit

MODELS



- Enzyme's active site moulds around substrate, so it fits better.

ENZYME ACTION

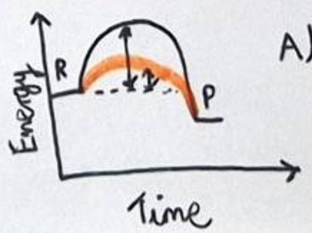
Tertiary Structure
- pH & temperature alter structure. (denatured)
- Enzyme structure determined by primary structure.
- Any change to primary structure affects bonds so enzyme's active site changes.
- Substrate no longer complementary to active site.

Holds substrate close = bonding ← Formation

Strains bonds = breaks substrate ← Breakdown

Enzymes are biological catalysts made of proteins that catalyse metabolic reactions.

Lower ACTIVATION ENERGY
- Alternative energy pathway.



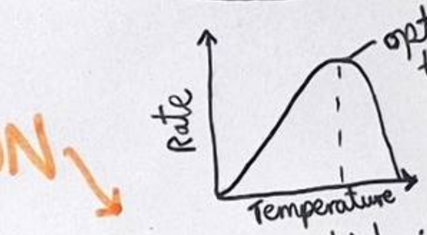
Concentration

Enzyme
- High → More collisions → More E-S complexes → Higher rate

Substrate
- High → More collisions → Higher rate
- Active sites Saturated

FACTORS

Temperature
- Increasing temperature → Molecules + Kinetic energy → More faster → More collisions → More E-S complexes → Increased rate of reaction
- too high → enzyme's bonds break → denaturation.



pH
- too low or high pH → ionic/H-bonds break → Tertiary structure broken → denaturation.