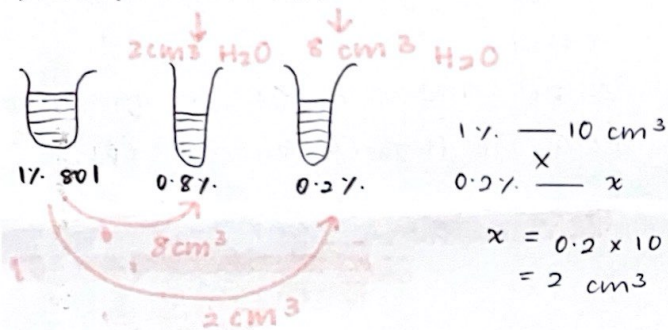


bio P3 NOTES

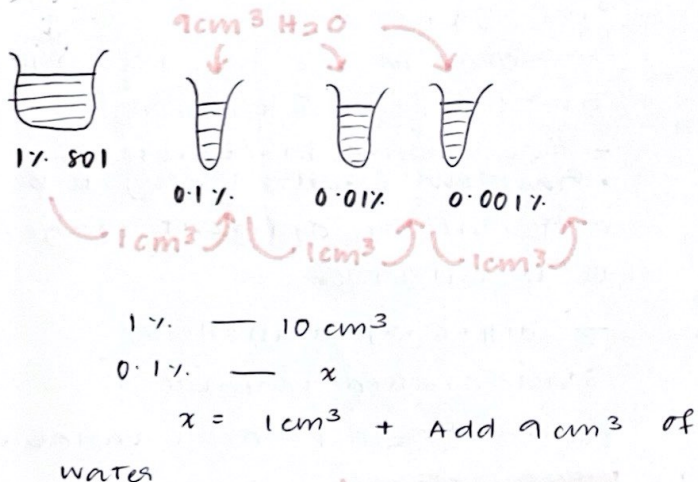
- **INDEPENDENT VARIABLE** - factor whose values you decide on & change
- **DEPENDENT VARIABLE** - variable which is not under your control
- **STANDARDISED / CONTROL VARIABLES** - other variables that might affect the results are kept constant
eg - 1) temp
2) pH

• DILUTIONS

1) simple dilutions



2) Serial dilutions



• CONTROLLING VARIABLES

1) Temperature

- use a water bath
→ thermostatically controlled water bath rather than beakers of water

2) pH

- use buffer solutions

3) light intensity

$$\text{light intensity} \propto \frac{1}{\text{distance}^2}$$

4) windspeed

- use a fan

5) humidity

- INCREASED by covering plant with plastic bag OR placing container of water close to plant
- REDUCED by placing containers of CaCl₂ (absorbs water vapour)

• CONTROLS

→ where the factor we're investigating is ABSENT

- **ACCURACY** - how 'true' it is

- **PRECISION** - of a measurement depends on the ability of the measuring instrument to give the same reading every time the same reading is measured

- **RELIABILITY** - of a measurement is the degree of trust you have in it

- **POOR RELIABILITY** - repeat & take the average

• ERROR STUFF

- thermometer scale marked off 10°C intervals $\rightarrow$ can be read to nearest 0.5°C

$$\text{error} = \frac{\text{Smallest division}}{2}$$

POSSIBLE ERROR $= 0.5^{\circ}\text{C}$

- potential error in a measurement is half of the value of smallest division on the scale

- when measuring change in temp, 2 readings are taken; each reading has an error of 0.5°C so total error is 1°C .

$$\% \text{ error} = \frac{\text{error in measurement}}{\text{measurement}} \times 100$$

• RECORDING RESULTS

- 1 Draw table with ruled columns
- 2 Don't forget headings
- 3 independent variable comes first
- 4 use same no. of decimal places everywhere
- 5 If nothing happened, converted to rate $\rightarrow \frac{1}{\infty} = 0$ (zero rate)

• CONSTRUCTING LINE GRAPH

- 1 independent $\rightarrow$ x-axis
- 2 Dependent $\rightarrow$ y-axis
- 3 Label the axes including units
- 4 Graph should be more than $\frac{1}{2}$ of grid
- 5 use x or y
- 6 Don't extrapolate unless mentioned

• BAR CHART

- when there's a DISCONTINUOUS variable on x-axis

- continuous variable on y-axis

- no relation between stuff so bars are drawn w/ gaps between them.

• HISTOGRAMS

- continuous range of categories on x-axis
- frequency with which each thing occurs $\rightarrow$ y-axis
- Bars touch each other

• DESCRIBING DATA

- 1 Begin by describing overall trend
- 2 describe changes in gradient
- 3 quote figures from graph

$$\% \text{ change} = \frac{\text{change in mass}}{\text{original mass}} \times 100$$

- systematic errors - lack of accuracy, precision
 $\rightarrow$ same in size, act in same direction on all readings
 $\rightarrow$ uncertainty in measurement
- random errors - likely to be different for different stages of investigation

- $\rightarrow$ difficulty controlling standardised variable + measuring dependent variable

• Reliability

- 1 inc. no. of samples
- 2 Repeat & take average
- 3 Exclude anomalous results
- 4 wide range of temp + pH

• IMPROVEMENTS

① measure volumes using BURETTE, GRADUATED PIPETTE

② colorimeter to measure colour changes

③ repeat & take average

• DRAWINGS

① unbroken lines

② make drawing large

• low power plane - only outlines of tissues

* NO individual cells

• high power ~~plane~~ detail - more detailed, contains individual cells

① label line drawn w/ ruler & pencil

② no arrowheads

③ labels written horizontally

• SYLLABUS CONTENT

2.1 TESTING FOR BIOLOGICAL MOLECULES

1) Non-reducing sugars

① Add 2 cm³ sample to test tube

② Add 1 cm³ HCl

③ Boil for 1 minute

④ Allow tube to cool

⑤ Add alkali to neutralise

⑥ Add Benedict's reagent

3) REDUCING SUGARS

① Add equal volumes of sample + Benedict's reagent

② Heat to 80°C in a water bath

3) EMULSION TEST

① equal vol. of sample + ethanol

② Add TOTAL VOL. eq. of water

4) BIURET TEST

① 1 cm³ of sample + KOH

② Few drops of CuSO₄

4.2 MOVEMENT OF SUBSTANCES INTO & OUT OF CELLS

• osmosis precaution

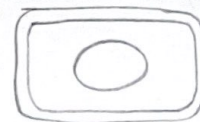
① cover petri dish to prevent evaporation

② separate dropper

③ avoid air bubbles

④ completely immerse in solution

5.2 CHROMOSOME BEHAVIOUR IN MITOSIS



INTERPHASE



PROPHASE



METAPHASE



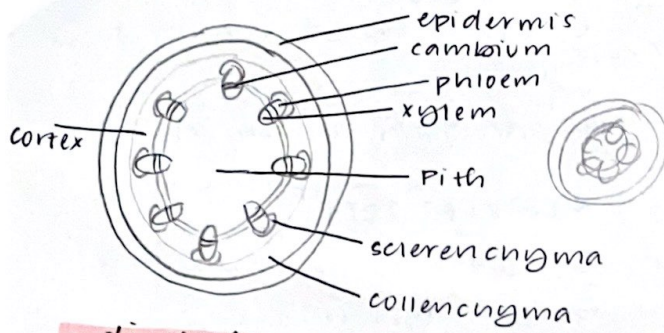
ANAPHASE



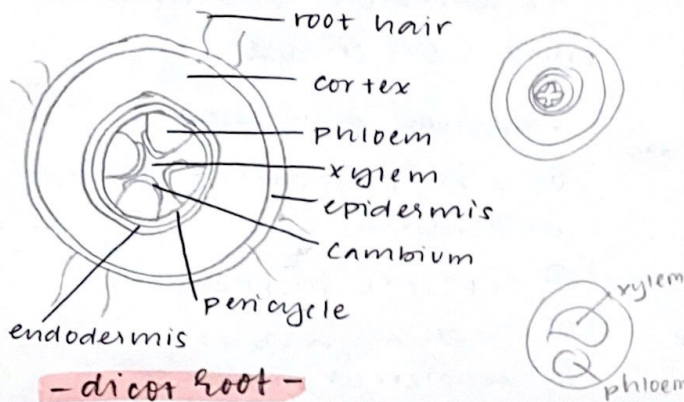
TELOPHASE

PMAT

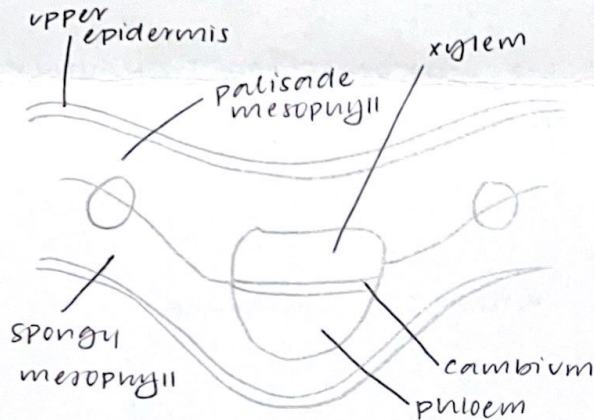
7.1 STRUCTURE OF TRANSPORT TISSUES



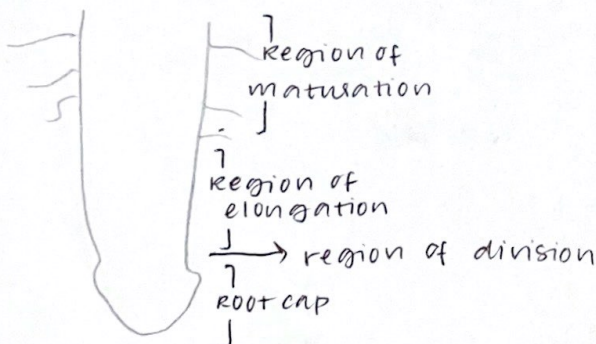
- dicot stem -



- dicot root -

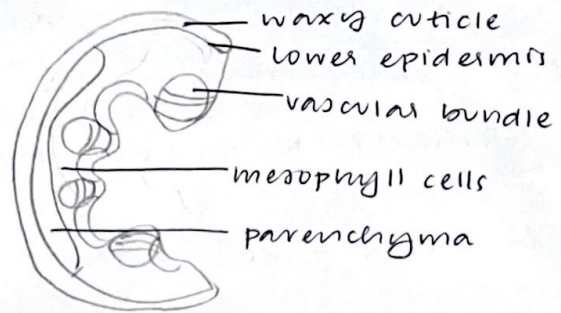


- transverse section of a leaf -



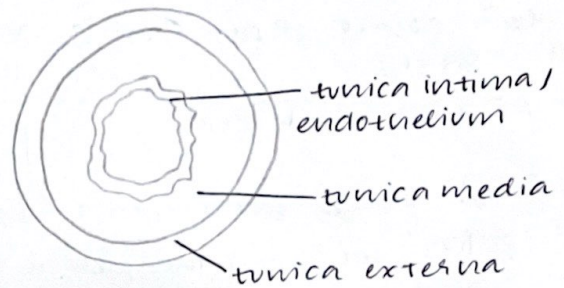
- longitudinal section -

- xerophytic leaf -

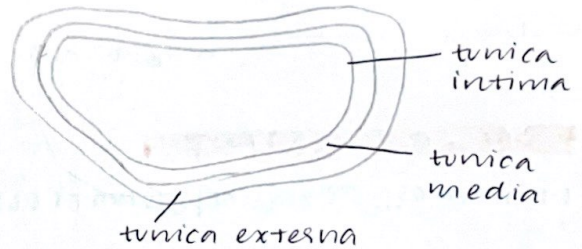


8.1 THE CIRCULATORY SYSTEM

- arteries -



- veins -



- capillary -

