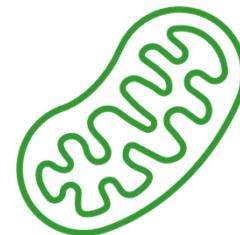
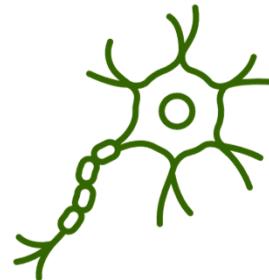


# **G3 Biology**

## **G3 Science (Biology)**

## **G2 Science (Biology)**

Information *for*  
Prospective Students 2024



# Preamble

- **All** sciences are demanding in some way or another
- **Balance** between interest and disposition to cope with subject content
- Think about whether this subject makes you qualified to apply for certain courses in **post-secondary education**
  - It is *your responsibility* to check websites of polytechnics / JC<sup>s</sup> / tertiary education institutions before you make an **informed choice** for your subject combination

# What is Biology?

- What makes organisms “alive” and how life is sustained.
- Knowledge of Biology makes you relevant to the real world – Tackle challenges relating to climate change, energy, food, health and disease.

# Subject Content (I)

Sections	Topics	G3 Pure	G3 Sci (Bio)	G2 Sci (Bio)
Cells and the Chemistry of Life	Cell Structure and Organisation	✓	✓	✓
	Movement of Substances	✓	✓	✓
	Biological Molecules	✓	✓	✓
The Human Body	Nutrition in Humans	✓	✓	✓
	Transport in Humans	✓	✓	✓
	Respiration in Humans	✓	✓	✓
	Excretion in Humans	✓		
	Homeostasis	✓		
	Nervous System and the Eye	✓	✓	
	Infectious Diseases	✓	✓	✓

# Subject Content (II)

Sections	Topics	G3 Pure	G3 Sci (Bio)	G2 Sci (Bio)
Living Together – Plants, Animals and Ecosystems	Nutrition and Transport in Flowering Plants	✓	✓	✓
	Organisms and their Environment	✓	✓	
Continuity of Life	Molecular Genetics	✓	✓	
	Reproduction in Humans	✓	✓	✓
	Reproduction in Plants	✓		
	Inheritance	✓	✓	



# Assessment – G3 Pure Biology

Paper	Type of Paper	Duration	Marks	Weighting
1	Multiple Choice	1 hr	40	30 %
2	Structured and Free-Response	1 hr 45 min	80	50 %
3	Practical Test	1 hr 50 min	40	20 %

# Assessment – G3 Science (Biology)

Paper	Type of Paper	Duration	Marks	Weighting
1	Multiple Choice (Phy and Chem) / (Phy and Bio) / (Chem and Bio)	1 hr	40	20.0 %
2	Structured and Free Response (Physics)	1 hr 15 min	65	32.5 %
3	Structured and Free Response (Chemistry)	1 hr 15 min	65	32.5 %
4	Structured and Free Response (Biology)	1 hr 15 min	65	32.5 %
5	Practical Test (Phy and Chem) / (Phy and Bio) / (Chem and Bio)	1 hr 30 min	30	15.0 %

# **Assessment – G2 Science (Biology)**

<b>Paper</b>	<b>Type of Paper</b>	<b>Duration</b>	<b>Marks</b>	<b>Weighting</b>
3	Multiple Choice (Chemistry)	1 h 15 min	20	20%
4	Structured (Chemistry)		30	30%
5	Multiple Choice (Biology)	1 h 15 min	20	20%
6	Structured (Biology)		30	30%

# Skills

- Application of content to novel situations
  - **Not** merely regurgitation of *memorised* content
- Drawing of biological diagrams
- Plotting different types of graphs
  - Line graph
  - Bar chart
  - Histogram

# Skills

- An excellent grasp of the English Language will place you at an **advantage**
  - Construction of argument in answers
  - Understanding of questions
- Significant amount of memory work needed, as a **baseline**.

# Skills

- Many scientific terms involved. Some examples:

allele	phenotype	genotype	heterozygous	homozygous
continuous variation	discontinuous variation	haploid	diploid	spongy mesophyll
palisade mesophyll	vasodilation	transgenic organism	translocation	transpiration
vena cava	aorta	osmoregulation	arteries	arterioles
glucose	glycogen	glucagon	deamination	homeostasis
proximal convoluted tubule	glomerulus	Bowman's capsule	bronchi	bronchiole

# Biological Drawing

Fig. 2.1 shows a section through a lime fruit.

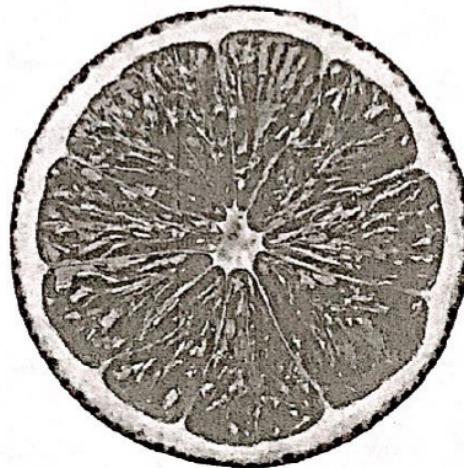


Fig. 2.1

You are provided with a whole lime fruit. Use the knife provided to cut the lime fruit approximately in half so that the cut section appears as in Fig. 2.1. **Take care when using the knife.**

- (a) (i) Make a large drawing of the cut section of your lime fruit, including seeds, if any, in the space below.

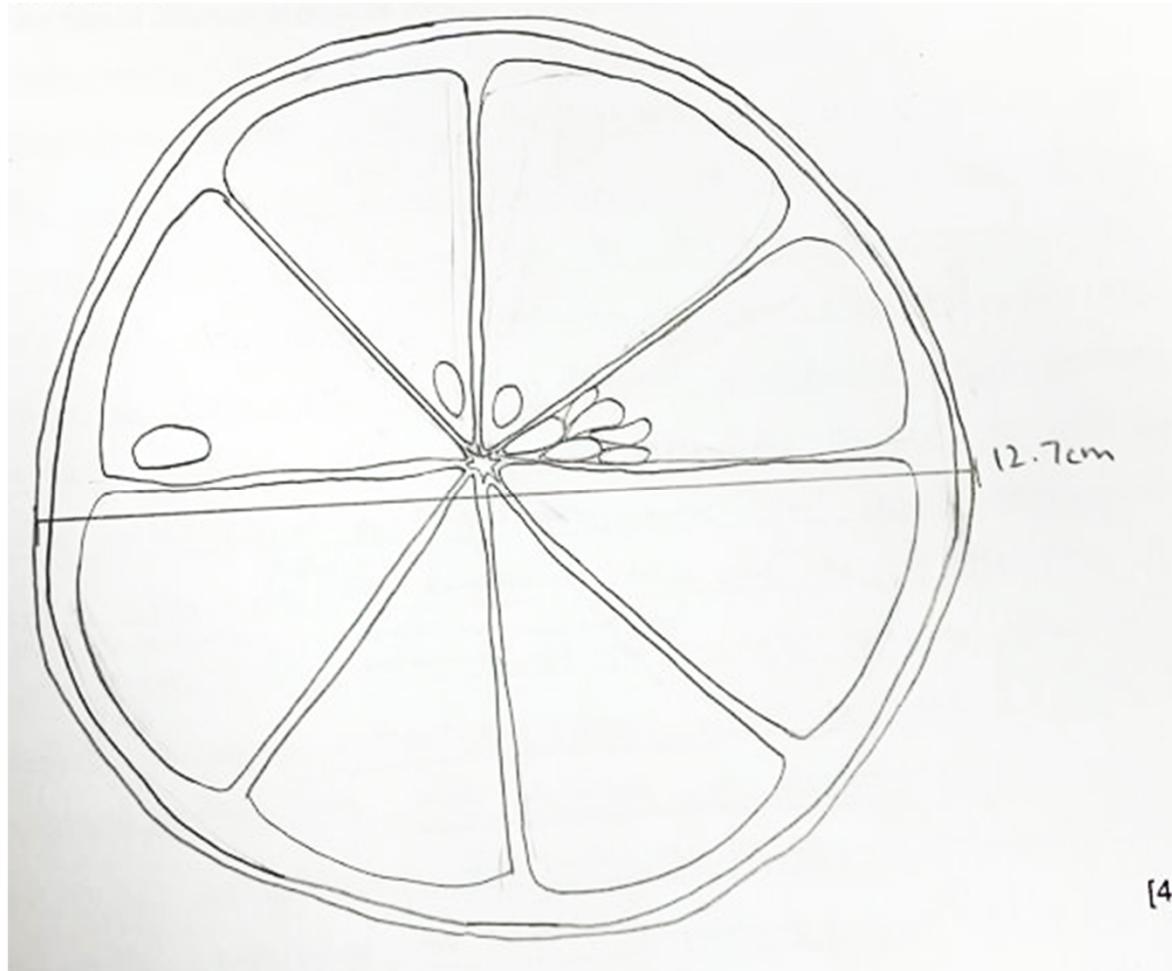
## Distribution of marks

**Size** – at least 50% of given space

**Line** – Clear and unbroken lines in pencil

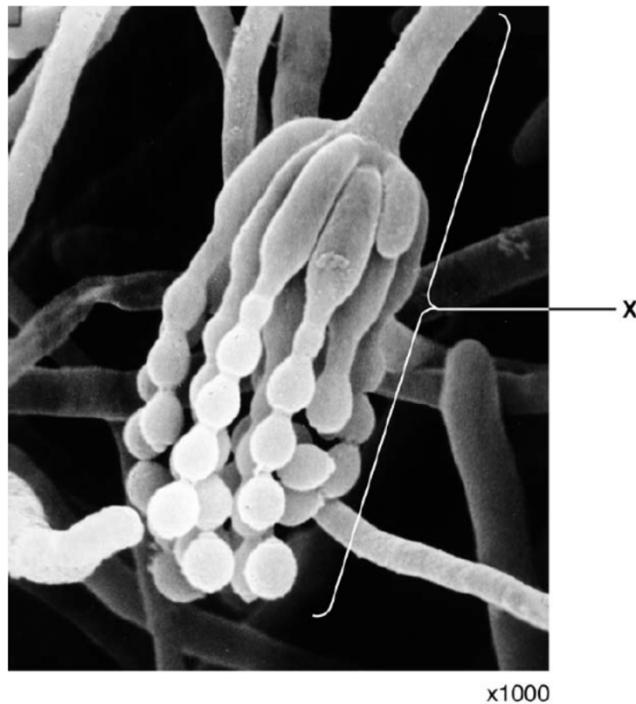
**Anatomy** – 3 layers of tissue drawn, with seeds and juice vesicles drawn

**Proportionality** – All parts drawn in good proportion to each other



# Are you able to draw this?

2 Fig. 2.1 is a photomicrograph of part of the fungus *Penicillium* that is reproducing asexually.



x1000

Fig. 2.1

- (a) (i) Make a large drawing of the structure labelled 'X'.  
Labels are not required.

# Graphing

surface area to volume ratio	time taken for whole cube to change colour / s
3.00	25
1.50	130
1.00	255
0.75	390
0.60	720

## Distribution of marks

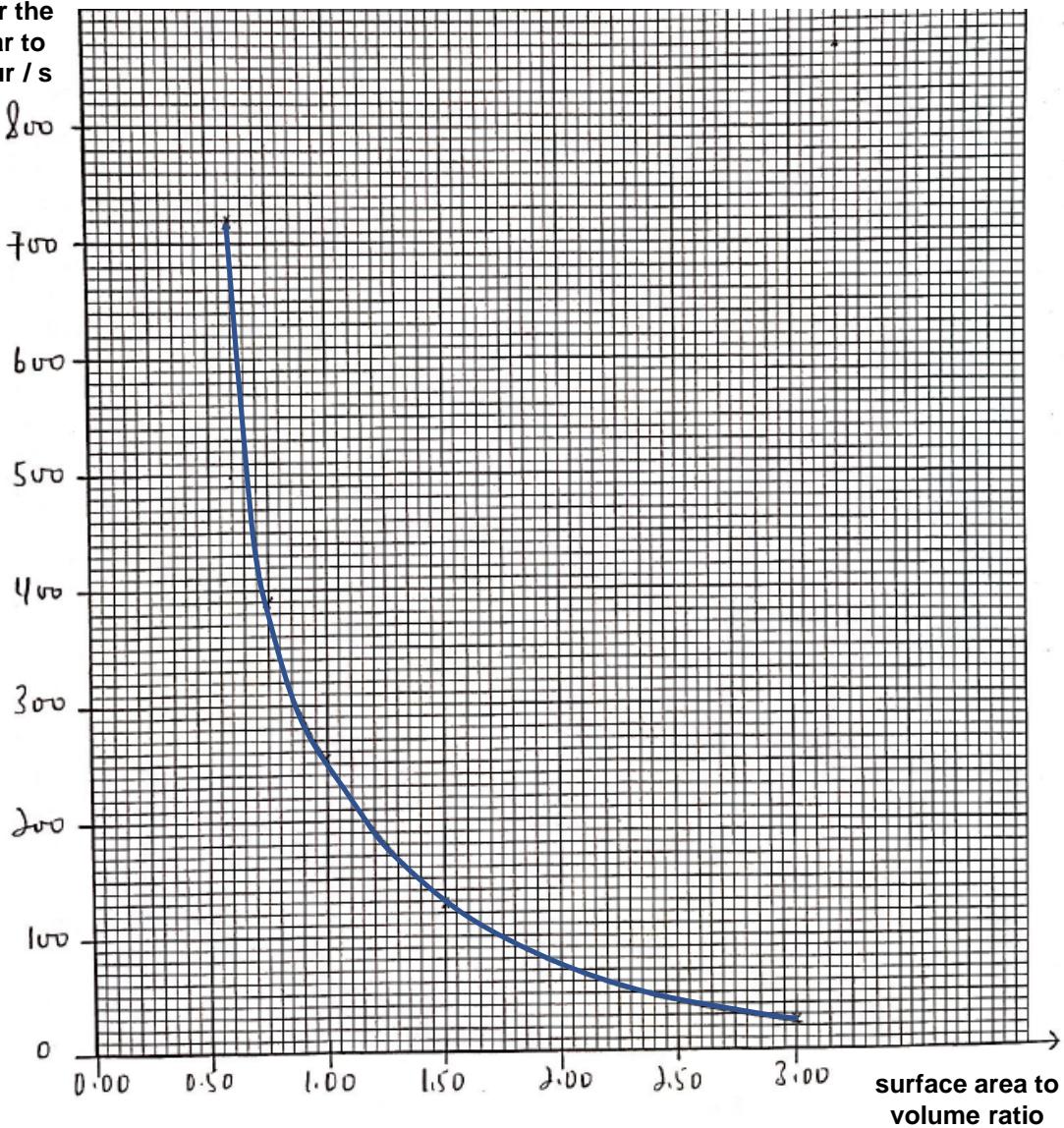
**Size and scale** – at least 50% of given grid and appropriate scale

**Line** – smooth and best fit

**Axes** – both axes labelled and drawn correctly

**Plot** – All data plotted correctly

time taken for the cubes of agar to change colour / s



# **Sample O-Level Questions**

- 3 Enzymes are adapted to their environment. Enzymes are most active at their optimum pH. The optimum pH of an enzyme often matches the pH of the environment it functions in.

The graph in Fig. 3.1 shows three enzymes that function in the human digestive system, each with a different optimum pH.

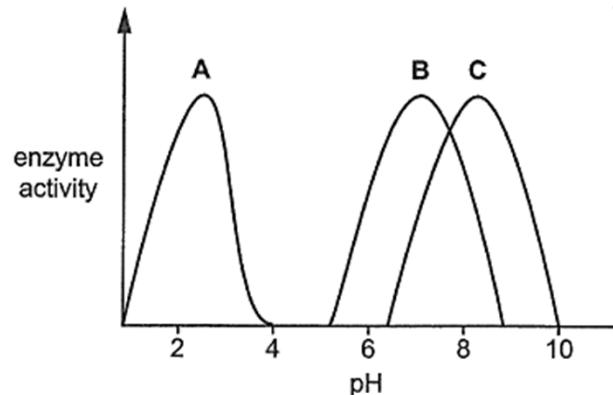


Fig. 3.1

- (a) Complete the answer lines in the table with the enzyme label A, B or C from Fig. 3.1 and an enzyme name.

enzyme label on Fig. 3.1	enzyme name	site of enzyme action	average pH at site of enzyme action
.....	.....	mouth	7
.....	.....	small intestine	8
.....	.....	stomach	2

[6]

- (b) Explain the mode of action of enzymes in human digestion.

Fig. 5.1 shows a kidney nephron.

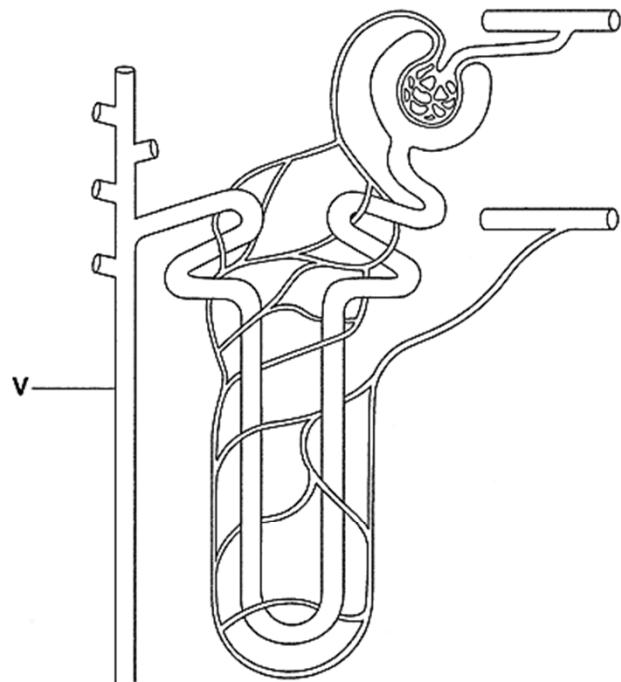


Fig. 5.1

- (b) (i) Draw an arrow, labelled **T**, on the diagram to show the location and direction of ultra-filtration. [1]
- (ii) Draw an arrow, labelled **U**, on the diagram to show the location and direction of selective reabsorption. [1]
- (c) Describe the effect of anti-diuretic hormone (ADH) on the structure labelled **V**.

.....  
.....

2 Fig. 2.1 is a diagram of a section through a plant cell from a dicotyledonous leaf.

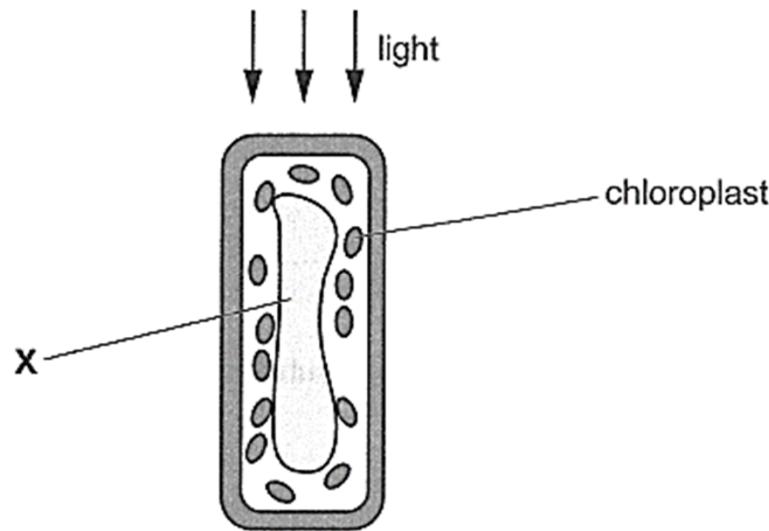


Fig. 2.1

Chloroplasts can move within individual cells.

A plant is placed in low light intensity. **Suggest** what will happen to the distribution of chloroplasts in its leaf cells.

**Explain** your answer. [3]

Either

- 9 Fig. 9.1 shows the rate of photosynthesis and the rate of respiration in a plant over a 24-hour period.

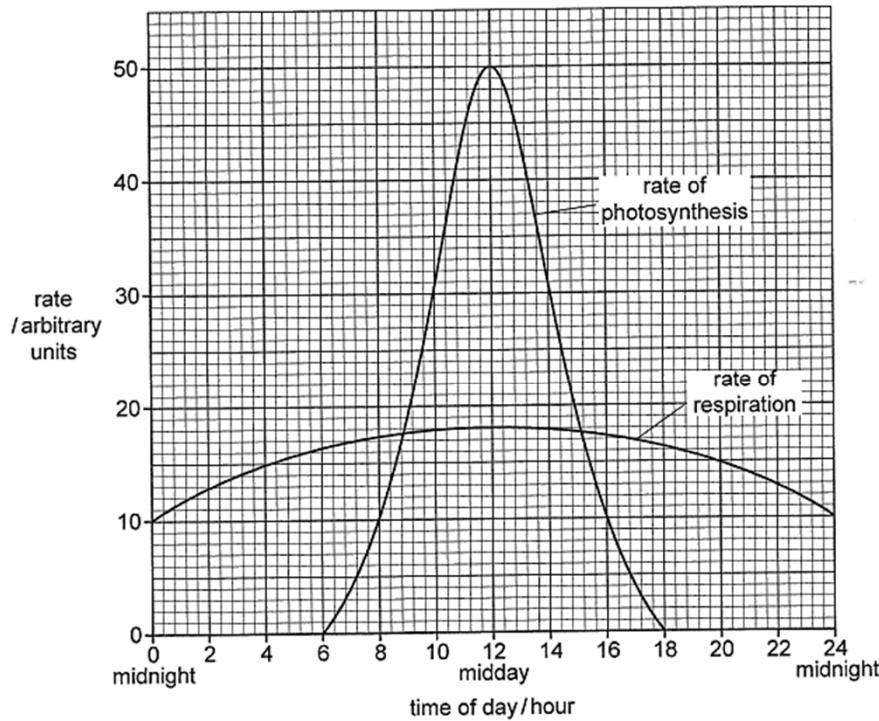


Fig. 9.1

- (a) Draw an arrow, labelled R, on the graph to show one time of the day when the rate of photosynthesis and the rate of respiration are the same.

[1]

- (b) Describe and explain the shape of the curve on the rate of photosynthesis. [5]

- 1 Rate of respiration **increases** from 10 units at midnight to 18 units at midday and then decreases to 10 units at midnight.
- 2 Rate of photosynthesis remains at 0 units from 1800 to 0600, then increases sharply to 50 units at midday and decreases drastically to 0 unit at 1800.
- 3 As light intensity is a **limiting factor of photosynthesis**, rate of photosynthesis increases with increasing light intensity from 0600 to midday, peaked at midday when there is maximum light intensity and decreases with decreasing light intensity from midday to 1800.
- 4 **Photosynthesis is an enzyme-catalysed process.** As air temperature increases from midnight to midday, rate of photosynthesis increases.
- 5 **As air temperature increases from midnight to midday, more stomata open.** Rate of diffusion of carbon dioxide into the leaves through stomata increases, hence concentration of carbon dioxide increases in the leaves and the rate of photosynthesis increases.

# **Questions?**