

MENGO SENIOR SCHOOL
END OF TERM I EXAMINATIONS – 2026
SENIOR FIVE BIOLOGY | PAPER 2 | P530/2
MARKING GUIDE

SPECIMEN KEY:

Specimen A = Onion bulb (*Allium cepa*) – inner epidermal layer used

Specimen B = Commelina leaf (*Commelina benghalensis* / *communis*)

PART I – ITEM 1 (Specimen A: Onion Bulb)

Task (a): Procedure for preparing a temporary mount of the inner epidermal layer [5 scores]

Award 1 mark per correctly stated step (any 5 from the points below). Steps must be in logical order.

Expected Answer / Marking Point	Score	Acceptable Alternatives
1. Using forceps / fingernails, peel off a small piece of the inner (concave) epidermis from a fleshy scale leaf of the onion bulb.	1	<i>Must specify inner/concave layer</i>
2. Place / mount the peel flat (epidermis side up) onto a clean glass slide.	1	
3. Add 2–3 drops of methylene blue stain onto the peel and allow to stain for 1–2 minutes.	1	<i>Accept any appropriate time</i>
4. Rinse/blot excess stain with filter paper / tissue / distilled water to remove excess stain.	1	
5. Lower a clean coverslip at an angle (using a mounted needle) to avoid/minimise air bubbles.	1	<i>Must mention angle/needle</i>
6. Remove excess water / stain from the edges using filter paper.	1	
7. Place the prepared slide on the microscope stage and observe under low power first, then increase magnification.	1	<i>Accept 'focus under low power'</i>
TOTAL FOR TASK (a)	5	

Task (b): Measuring the diameter of the field of view under low power [2 marks]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Place a clear ruler / transparent mm ruler directly on the stage (or on the slide) under low power objective.	1	<i>Must state low power</i>
Align the ruler so that a millimetre graduation is at one edge of the field of view; read off the diameter in mm by noting where the far edge of the circle of light falls on the ruler.	1	<i>Must describe alignment and reading</i>

Diameter of the field of view: accept any value stated by student between 1.5 mm – 5 mm for low power. Award 1 mark if a value with correct unit (mm) is given.	1	<i>Mark for stated value + correct unit</i>
TOTAL FOR TASK (b)	3	

Note to marker: the student's stated diameter in (b) must be used consistently in the calculation in (c)(ii) below.

Task (c)(i): Number of cells across the diameter [1 score]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Any reasonable whole number recorded (e.g. 5–15 cells). Award 1 mark for any integer value recorded.	1	<i>Accept; 5 – 15 cells</i>
TOTAL	1	

Task (c)(ii): Calculate average length of one cell in micrometres [2 scores]

Model calculation (using example values – accept student's own consistent values):

Field of view diameter = 1.5 mm → convert: $1.5 \times 1000 = 1500 \mu\text{m}$

Number of cells across diameter = 10

Average cell length = $1500 \div 10 = 150 \mu\text{m}$

Expected Answer / Marking Point	Score	Acceptable Alternatives
Correct conversion of mm → μm ($\times 1000$) OR correct substitution of values into formula.	1	<i>Must show conversion step</i>
Correct final answer in μm , consistent with student's own values from (b) and (c)(i).	1	<i>Unit μm must be stated</i>
TOTAL	2	

Task (d): Two reasons why this method gives only an estimate [2 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
1. Cells are not uniform in size / onion epidermal cells vary in length and width.	1	
2. Cells at the edge of the field of view may not fit completely / the boundary is not a straight line, making counting inaccurate.	1	
Alternative: The field of view is circular but cells are rectangular – not all cells span the full diameter.	0	<i>Accept as alternative</i>
TOTAL FOR TASK (d)	2	

Task (e)(i): Structure of one cell as observed under medium power [2 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Thick cell wall visible	1	
Large central vacuole	1	
Round nucleus visible	0	<i>Award as alternative if cell wall or vacuole not mentioned</i>

Reject; Cytoplasm	0	
TOTAL	2	

Task (e)(ii): Drawing of two adjacent cells of specimen A [3 scores]

Award marks using the biological drawing criteria below:

Expected Answer / Marking Point	Score	Acceptable Alternatives
Title; Drawing showing two adjacent cells of specimen A observed under medium power	1	
Drawing is clear with sharp, continuous lines (no shading / colouring).	1	
Accuracy: Two adjacent cells shown correctly touching/sharing a common cell wall; large vacuole evident.	1	
Magnification	1	X100 - X300
Correct labels present: cell wall, nucleus,	1	Minimum 2 labels required
TOTAL	05	

Task (e)(iii): How cell structure helps the plant survive during the dry season [2 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
The large central vacuole stores water, which the plant can use when water is scarce during the dry season.	1	
The thick, cell wall prevents excessive water loss / wilting and maintains cell shape even under low turgor pressure.	1	
Alternative: Cell is elongated to increase surface area for protection	0	Accept as 2nd point
TOTAL	2	

Task (f): Mistake causing air bubbles and correction [2 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Mistake: The student placed the coverslip straight down (flat) onto the slide instead of lowering it at an angle / too quickly.	1	Accept 'dropped the coverslip'

Correction: Lower the coverslip at 45° angle using a mounted needle / cocktail stick, allowing air to escape gradually; or lift and re-mount the coverslip after adding more water.	1	
TOTAL FOR TASK (f)	2	

PART I – ITEM 1 TOTAL: 24 scores

PART II – ITEM 2 (Specimen B: Commelina Leaf)

Task (a): Procedure for obtaining and mounting thin epidermal peels from upper and lower surfaces [6 marks]

Award 1 mark per correctly stated, clearly described step (any 6 from the points below):

Expected Answer / Marking Point	Score	Acceptable Alternatives
1. Place the Commelina leaf on a white tile / flat surface with the surface to be peeled facing upward.	1	
2. Using a sharp scalpel / razor blade, make a small shallow cut / nick along the edge of the leaf (upper surface) without cutting through the whole leaf.	1	<i>Must mention upper and lower separately OR describe doing both</i>
3. Grip the cut edge with forceps and slowly peel off a thin, transparent strip of epidermis from the upper surface.	1	<i>Must be thin/transparent</i>
4. Repeat the peeling process on the lower surface of the same / another leaf.	1	
5. Immediately mount each peel flat on a separate clean glass slide with a drop of water.	1	<i>Must specify water (not stain for initial mount)</i>
6. Lower a coverslip at an angle to avoid air bubbles over each peel.	1	<i>Must mention angle / avoiding bubbles</i>
7. Label the slides clearly as 'upper surface' and 'lower surface' respectively.	1	
8. Observe under medium power; repeat for three different fields of view per surface.	1	
TOTAL FOR TASK (a)	6	

Task (b): Stomata Count Table [2 marks]

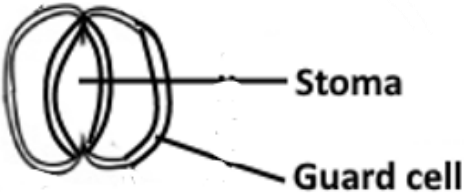
Award marks for a correctly completed table with

Expected Answer / Marking Point	Score	Acceptable Alternatives
Upper surface: any reasonable average number recorded (expected: fewer stomata, (0 – 5).	1	<i>Accept any reasonable value < the lower</i>
Lower surface: higher average than upper surface (expected: more stomata, (8 – 20).	1	<i>Lower surface must be > upper surface for award</i>
TOTAL	2	

Task (b)(i): Likely habitat and explanation [2 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Habitat: Dry/Open/sunny terrestrial habitat	1	Must have "terrestrial"
Explanation: Stomata predominantly on lower surface reduces direct exposure to sunlight and heat, minimising water loss by transpiration.	1	
TOTAL	2	

Task (b)(ii): Drawing of one stoma with adjacent guard cells [3 scores]

Expected Answer / Marking Point	Score	Acceptable Alternatives
Title; Drawing showing one stoma with adjacent guard cells of specimen C observed under medium power	1	<i>Must include; medium power</i>
Drawing is clear with sharp, unbroken lines; no shading.	1	
Accuracy; One stoma (pore) visible between two crescent/bean-shaped guard cells drawn correctly.	1	<i>Guard cells must be correctly shaped</i>
Correct labels: guard cells, stomatal pore / stoma.	1	<i>Minimum 2 labels</i>
Magnification	1	<i>X100 – X300</i>
 <p style="color: red; font-weight: bold;">Reject drawing if epidermal cells included, Only award title and magnification</p>		
TOTAL	5	

Task (c): Two differences between an ordinary epidermal cell (Specimen B / Commelina) and a cell from Specimen A (Onion) [2 scores]

Accept any TWO of the following clearly contrasted differences:

Cell from Specimen A (Onion epidermal cell)	score	Cell from Specimen B (Commelina ordinary epidermal cell)
Elongated / rectangular	1	Irregular
Thicker cell wall	1	Thinner cell wall
Alternative; Larger in size	0	Smaller in size
TOTAL FOR TASK (c)	2	

Award 1 mark per clearly contrasted correct difference. Any 2 from the table above.

PART II – ITEM 2 TOTAL: 16 scores

SECTION	MARKS
Part I – Item 1 (Specimen A: Onion bulb)	24
Part II – Item 2 (Specimen B: Commelina leaf)	17
GRAND TOTAL	41

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