

APOLLO

Water potential

HL

Biology

First assessment 2025

6 questions | mark schemes

Mark-scheme answers

Biology HL | Paper 1A | May 2025 TZ1 | Q20 | 1 marks

20. C

Biology HL | Paper 1A | May 2025 TZ3 | Q20 | 1 marks

20. B

2.	a		into the cell/cytoplasm / in / inwards;		1
2.	b	i	a. cells injected with mRNA have (more) aquaporins (in the membrane); b. aquaporins transport water by <u>osmosis</u> OR down the <u>water potential</u> gradient / from high to low <u>water potential</u> OR from hypotonic to hypertonic solution; c. aquaporins (are protein channels) facilitate the uptake of water; d. increased/excess water uptake causes cell size to increase/(ultimately) burst;	a. Allow vice versa.	2 max

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Question			Answers	Notes	Total
2.	b	ii	a. ADH is secreted (by the pituitary gland); b. aquaporins released from intracellular vesicles; c. aquaporins inserted into the <u>plasma</u> membrane; d. more water reabsorbed (into blood) / water content of blood increased; e. more concentrated urine produced;	e. Do not accept smaller volume of urine.	3 max
2.	c		eggs will be of different initial volumes/sizes/shape;	OWTTE Answers should include both the idea of different and initial/starting/beginning volume. Ignore fair test or fair comparison.	1
2.	d		the investigation is reliable as it was repeated 10 times / there were multiple trials/readings OR the investigation is not reliable as there were not enough trials / 10 trials may not be enough OR reliability cannot be assessed as no error bars / standard deviation;		1

Question			Answers	Notes	Total
2.	e		a. (time required for) assembly of ribosomal-mRNA complex; b. mRNA must be translated; c. post-translational modifications are necessary OR valid example of modification; d. protein needs to be transported to (and inserted into) the plasma membrane;	<i>b. Do not award if transcription is mentioned.</i> <i>b. Accept description of translation.</i>	2 max

Question	Answers	Notes	Total
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Mark-scheme answers

Biology HL | Paper 1A | Nov 2025 TZ1 | Q20 | 1 marks

20. D

4.	a	a. (when cell is placed in a hypotonic solution) surrounding/outside (of the root hair cell) is more dilute / has higher water potential OR water will enter the root hair cell OR water moves from high water potential to low water potential; b. (positive) pressure potential will increase / become more positive; c. (negative) solute/osmotic potential will increase / become less negative; d. water potential inside the cell will increase / become less negative; e. $\Psi_w = \Psi_s + \Psi_p$; f. when cell's water potential equals that of the solution, (net) water movement stops;	For e. allow word equation: Ψ_w = water potential Ψ_s = solute potential Ψ_p = pressure potential	3 max							
4.	b	i	a. uptake of mineral ions into root; b. root cells transport mineral ions into the <u>xylem</u>; c. requires active transport/ATP; d. water enters the <u>xylem</u> by osmosis (due to hypertonic/higher solute concentration in xylem sap); e. creates a pressure which pushes water up (the xylem / the stem / against gravity);	Do not accept "capillary action" or answers referring to "transpiration"	2 max						
4.	b	ii	<table><tr><th>Hormone</th><th>Site of production</th></tr><tr><td>Auxin</td><td>Shoot (tip)</td></tr><tr><td>Cytokinin</td><td>Root (tip)</td></tr></table>	Hormone	Site of production	Auxin	Shoot (tip)	Cytokinin	Root (tip)	Award 1 mark per row. If 0 marks awarded, allow 1 mark if both hormones are named.	2
Hormone	Site of production										
Auxin	Shoot (tip)										
Cytokinin	Root (tip)										

Question	Answers	Notes	Total
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1.	a	i	sucrose concentration		1
1.	a	ii	a. surface area; b. varies with size (and shape) OR is a variable that affects osmosis OR would have affected the rate of osmosis/diffusion/movement of water into/out of the tissue OR is a variable that needs to be controlled;		2
1.	b		initial masses/size of beetroot pieces were (slightly) different OR (relative changes in mass allow for a) fair comparison between pieces at different concentrations with (slightly) different initial mass		1
1.	c		a. water enters the pieces of beetroot tissue; b. (water enters) by osmosis; c. pressure potential rises; d. increasing the water potential (of the tissue); e. until an equilibrium is reached / no further net movement of water; f. the cells/tissue is/are turgid;	Accept ψ_s for solute potential, ψ_p for pressure potential and ψ for water potential.	3

Question	Answers	Notes	Total
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