

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
1(a)	Any three from: phloem walls contain <u>only</u> cellulose, whereas xylem vessels also contain lignin ✓ phloem contains sieve plates, whereas xylem vessels have hollow tubes ✓ phloem has no pits, whereas xylem vessels do ✓ phloem has plasmodesmata, whereas xylem vessels do not ✓ phloem has companion cells, whereas xylem vessels do not ✓ phloem has living tissue, whereas xylem tissue is dead ✓		3 max	AO1 3.1.3(b)(i)
1(b)	glycolysis ✓		1	AO1 5.2.2
1(c)	two ✓		1	AO1 5.2.2
1(d)	phosphorylation (of glucose to hexose bisphosphate) ✓ to lower the activation energy ✓	Allow 'to add P _i '	2	AO2 5.2.2
1(e)	Any three from: actively transported to the matrix in the mitochondria ✓ link reaction occurs ✓ CoA becomes acetyl CoA ✓ (In the link reaction) pyruvate becomes oxidised forming reduced NAD and H ⁺ ✓ removal of carbon dioxide ✓	Allow 'via active transport' Allow decarboxylation	3 max	AO2 5.2.2
2(a)	0.5 mm ³ min ⁻¹ ✓ ✓	(5 - 3 = 2) $\frac{2}{4}$ Allow 2 marks for answer without working	2	AO2 3.1.3

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
2(b)	<p>Level 3 (5–6 marks): Full and detailed description of the differences between the structure of the xylem vessels and the phloem tissue. At least one reference to the light micrograph is needed for full credit.</p> <p><i>There is a well-developed description. The information presented is relevant and clearly described.</i></p> <p>Level 2 (3–4 marks): Response is aware of at least two differences between the structure of the xylem vessels and the phloem tissue.</p> <p><i>There is a reasonable description and sequence. The information presented is in the most-part relevant and well-described.</i></p> <p>Level 1 (1–2 marks): Response is aware of one difference between the structure of the xylem vessels and the phloem tissue.</p> <p><i>The information is basic and communicated in an unstructured way. The information is supported by limited structure which may be unclear.</i></p> <p>0 marks No response worthy of credit.</p>	<p>Indicative content:</p> <ul style="list-style-type: none"> • Increased kinetic energy of water molecules • Greater (rate of) evaporation (of water molecules) • Greater volume of water vapour diffuses out of the leaves • Greater diffusion rate (of water molecules) • Diffusion out of stomata • Water potential gradient created between the leaves and xylem vessels (the water potential is lower in the leaves) • Lowering water potential causing movement of water by osmosis through the apoplast, symplast and vacuolar pathways • Lowers h_p / increases tension at the top of xylem vessels Causing transpiration pull 	6	AO2 3.1.3
3(a)	<p>Any two from:</p> <ul style="list-style-type: none"> rolled up leaves ✓ waterproof cuticle exposed on the outside ✓ stomata open inside a humid space ✓ sunken stomata ✓ hairs ✓ thick cuticle ✓ 		2 max	AO1 AO2 3.1.3

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
3(b)(i)	first plant species to colonise (bare ground) ✓ can adapt to a harsh abiotic environment ✓	Allow named conditions	2	AO1 6.3.1
3(b)(ii)	Any three from: ferns / grasses develop ✓ plants with deeper roots develop ✓ shrubs develop ✓ trees develop ✓		3 max	AO1 6.3.1
3(c)	Any one from: mowing / ploughing ✓ removing existing vegetation ✓ deforestation ✓ water drainage ✓		1 max	AO1 6.3.1
4(a)	<p>Level 3 (5–6 marks): Full and detailed description of the differences between the structure of the vessels and the phloem tissue. At least one reference to the light micrograph is needed for full credit. <i>There is a well-developed description. The information presented is relevant and clearly described.</i></p> <p>Level 2 (3–4 marks): Response is aware of at least two differences between the structure of the xylem vessels and the phloem tissue. <i>There is a reasonable description and sequence. The information presented is in the most-part relevant and well-described.</i></p> <p>Level 1 (1–2 marks): Response is aware of one difference between the structure of the xylem vessels and the phloem tissue.</p>	<p>Indicative content:</p> <ul style="list-style-type: none"> • Xylem vessels contain lignin, phloem tissue does not • The xylem vessel element is impermeable, whereas the phloem has some permeability • Xylem vessels have pits, phloem tissue has plasmodesmata • Xylem vessels have no companion cells but phloem tissue does • Xylem vessels' end walls are completely absent, whereas phloem tissue contains sieve plates 	6	AO1 AO2 2.1.1 3.1.3

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
	<p><i>The information is basic and communicated in an unstructured way. The information is supported by limited structure which may be unclear.</i></p> <p>0 marks No response worthy of credit.</p>	<ul style="list-style-type: none"> Xylem vessels are bigger than phloem tissue Xylem vessels lead into the phloem tissue 		
4(b)	<p>$200 \times 8 = 1600$ 1.6×10^3 ✓ μm ✓</p>		2	AO2 2.1.1
4(c)	<p>magnification is the number of times the image is bigger than the object size ✓ resolution is the ability to distinguish between two small objects that are close together ✓</p>		2	AO1 2.1.1
5(a)	73% ✓ ✓	<p>$26 - 15 = 11$ $\left(\frac{11}{15}\right) \times 100$</p>	2	AO2 5.2.1
5(b)	<p>Any three from: pondweed cut at the same length ✓ same carbon dioxide concentration ✓ change the distance from the lamp by the same amount ✓ method of collecting the oxygen gas described, such as through an inverted measuring cylinder or a gas syringe ✓ method of measuring timing how long it takes for algal balls to change from red/orange to purple ✓</p>	Allow named pondweed	3 max	AO2 5.2.1
5(c)	<p>Any two from: electrons from photophosphorylation 1 are excited into the electron transport chain ✓ electrons pass back to photophosphorylation 1 ✓ ATP synthesis due to chemiosmosis ✓</p>		2 max	AO1 5.2.1

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
5(d)	Any three from: hydrogen ions pumped out of companion cells ✓ using ATP ✓ H ⁺ concentration gradient created ✓ H ⁺ diffuse back into companion cell with sucrose ✓ through cotransporter / facilitated diffusion / sucrose diffuses into sieve tube element through plasmodesmata ✓		3 max	AO1 5.2.1
6(a)	Kingdom = plantae ✓ Genus = <i>Pistia</i> ✓ Species = <i>stratiotes</i> ✓		3	AO2 4.2.2
6(b)	intraspecific ✓		1	AO1 4.2.2
6(c)	<p>Level 3 (5–6 marks): Full and detailed description of the adaptations of <i>Pistia Stratiotes</i>. <i>There is a well-developed description. The information presented is relevant and clearly described.</i></p> <p>Level 2 (3–4 marks): Response is aware of at least two adaptations of <i>Pistia Stratiotes</i> and these are described. <i>There is a reasonable description and sequence. The information presented is in the most-part relevant and well-described.</i></p> <p>Level 1 (1–2 marks): Response is aware of at least one adaptation of <i>Pistia Stratiotes</i>. <i>The information is basic and communicated in an unstructured way. The information is supported by limited structure which may be unclear.</i></p>	<p>Indicative content:</p> <ul style="list-style-type: none"> • aerenchyma to provide buoyancy and a pathway for oxygen to efficiently enter tissues • air sacs to enable floating leaves, enabling maximum light absorption for (light-dependent) photosynthesis • no waxy cuticle enables maximum water loss to prevent over-saturation • flat leaves to increase surface area to volume ratio, enabling maximum light absorption • pneumatophores/aerial roots to allow efficient entry of oxygen 	6	

A Level OCR Biology

10 Transport in Plants – answers

Question	Answers	Extra information	Marks	AO Spec reference
	<p>0 marks No response worthy of credit.</p>	<ul style="list-style-type: none"> small roots to enable water to osmose directly through to the stem abundant supply of stomata on the upper surface, allowing water vapour to leave efficiently and for gas exchange to be maximised 		

Skills box answers

Question	Answer
1	$\frac{67}{300} = 0.22 \text{ mm s}^{-1}$
2(a)	$\frac{36}{1500} = 0.0244 \text{ mm s}^{-1}$
2(b)	$\frac{0}{1080} = 0 \text{ mm s}^{-1}$
2(c)	windy conditions; change of 0.04 mm s^{-1}