Transport in Plants

Mark Scheme 4

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Transport in Plants
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 4

Time Allowed: **51 minutes**

Score: **/42**

Percentage: **/100**

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>E – cortex ;
F – medulla ;
G – ureter ;</td><td>[3]</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>
<table>
<tr><td>process</td><td>letter</td><td></td></tr>
<tr><td>diffusion of oxygen</td><td>H ;</td><td>idea that (oxygen) diffuses, from high concentration/to low concentration/down concentration gradient (into the cell) ;</td></tr>
<tr><td>active uptake of sodium ions</td><td>L ;</td><td>idea that (sodium ions) are moved against their concentration gradient/from low to high concentration ;</td></tr>
</table>
</td><td>[4]</td><td>mark the columns independently</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>glomerulus ;</td><td>[1]</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>1 (glucose is reabsorbed) by active uptake/active transport (from filtrate) ;
2 against concentration gradient/from low to high concentration ;
3 using energy ;
4 as in L ;</td><td>[max 2]</td><td>ignore diffusion of glucose

R energy ‘produced’</td></tr>
<tr><td></td><td>(c)</td><td>1
2
3
4
5
6</td><td>active uptake/active transport, of ions against the concentration gradient (into the root) ;
energy is needed for, active uptake/active transport ;
comes from respiration ;
water is absorbed, by osmosis/down water potential gradient ;
(osmosis/diffusion is a) passive process/does not need energy ;
diffusion of ions will occur until equilibrium ;</td><td>[max 3]</td><td>R energy ‘produced’</td></tr>
<tr><td></td><td colspan="4">[Total: 13]</td><td></td></tr>
</table>

2 (a)		[5]	

stage	Process
P	nitrogen fixation ;
Q	protein synthesis ;
R	feeding / digestion ;
S	deamination
T	nitrification ;
U	denitrification ;

Question	Answers	Marks	Additional Guidance
2 (b) 1 2 3 4	plants from irradiated seeds had more nodules ; plants from irradiated seeds had nodules with more mass ; comparative data quote for number ; comparative data quote for dry mass of nodules ;	[max 3]	Units are required at least once.
(c)	mutation ; change in, gene(s) / DNA ;	[2]	
(d) 1 2 3 4 5 6 7	choose plants with desired feature(s) ; cross / breed plants ; any detail ; e.g. bagging flowers, transfer of pollen with paintbrush collect seeds ; grow seeds and check plants for features ; cross plants showing features with original variety ; keep crossing and selecting ;	[max 4]	
(e) 1 2 3 4	genetic engineering / genetic modification ; introduced a gene from a **different** species ; results, after one generation ; any detail of method involved e.g. use of vector / plasmid ;	[max 2]	
(f) 1 2 3 4	fix nitrogen ; products of fixation / nitrates provide a source of protein ; increases nitrogen in soil when beans decay ; maintain / higher, yields (of maize) ;	[max 2]	
		[Total: 18]	

Question		Answers		Marks	Additional Guidance
3	(a)	1	root hairs ;		
		2	water moves from high(er) <u>water potential</u> to low(er) <u>water potential</u> ;		**A** down a water potential gradient ***ignore*** water concentration **R** dilute and concentrated
		3	osmosis ;		
		4	through partially permeable <u>membrane</u> ;		**A** semi-permeable / selectively permeable
		5	ref. to protein pores ;	[max 3]	
	(b)	1	large surface area ;		**A** minerals for ions
		2	thin (cell) walls ;		**A** thin wall as 'cell' is in the question
		3	(many) mitochondria ;		
		4	ref. respiration ;		
		5	provide / release, energy, for active transport ;		**A** active, uptake / transport, uses energy **A** active uptake **R** if water also taken up by active uptake
		6	proteins / carriers / channels, for, diffusion / active transport (of ions) ;	[max 3]	**A** 'moving against concentration gradient' for active transport
	(c)	*in appropriate boxes*			
		adult and zygote = 90 ; ovum = 45 ;		[2]	**A** ***ecf*** if half incorrect diploid number *only allow ecf if **both** diploid numbers are the same*

Question		Answers	Marks	Additional Guidance
3	(d)	*advantages **for plants***		**R** refs to number of plants produced
		only one, parent / plant ;		**R** 'does not require male and female gametes'
		fast / new plants establish themselves quickly ;		**A** 'more likely to leave offspring' idea
		(potential) rapid spread close to parent / AW ;		
		less energy required ;		***ignore*** refs to avoiding mutations unqualified
		no wastage of gametes ;		
		(if parent well adapted) offspring will be adapted to surroundings ;		**A** 'good' traits / e.g., passed on **R** 'good' genes
		plants grow in a suitable place / no wastage ;		
		AVP ; e.g. greater chance of reproduction	[max 2]	*do not accept advantages for humans*
		disadvantage for plants		
		plants too crowded / overcrowding ;		
		(lots of) competition for resources ;		
		little / no, (genetic) variation ;		
		disease transmitted directly to offspring ;		*genetic or infectious disease*
		less evolution / less able to adapt ;		
		(all identical so) can be wiped out by the same disease ;		**A** 'disease can spread easily'
		no / little, dispersal ;		
		AVP ;	[max 1]	
		[Total: 11]		