

Transport in Plants

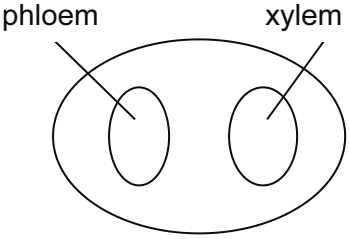
Mark Scheme 2

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Transport in Plants
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 2

Time Allowed: 64 minutes

Score: /53

Percentage: /100

1 (a)			<p>1 mark for drawing and 1 mark for labelling <i>drawing must represent correct position of xylem and phloem as shown in Fig. 4.1</i></p> <p><i>if cells are drawn, these must be in the correct positions for xylem and phloem as in the photograph</i></p>
(b)	<u>sucrose</u> ;	[1]	<p>ignore sugar / non-reducing sugar A phonetic spellings</p>
(c)	<p>1 during growing season / when photosynthesising / when food is made ;</p> <p>2 (substances are) transported (down), to the roots <i>or</i> to (named)</p> <p>3 transported (up) to the, growing points / flowers / fruits / seeds / new leaves / AW ;</p> <p>4 (time of year) when no photosynthesis / when food is not made ;</p> <p>5 (substances are transported upwards) from, roots / storage organ / seed ;</p> <p>6 (substances transported) from <u>source</u> to <u>sink</u> ;</p>	[max 4]	<p>A when there is plenty of light</p> <p>A move for are transported MP3 A transported up for either time of year once only</p> <p><i>source may be a storage organ or a leaf depending on the time of year</i></p>
(d)	<p>1 <u>evaporation of water</u>, from (surfaces of) mesophyll ;</p> <p>2 movement / diffusion / loss of, water vapour ;</p> <p>3 from, leaves ; A (named) aerial / upper, parts ;</p> <p>4 through / from, stomata / cuticle ;</p>	[max 3]	
(e)	<p>1 evaporation / transpiration, causes movement of water ;</p> <p>2 in xylem ;</p> <p>3 reduces pressure at the top of the plant / ref to a water potential</p> <p>4 transpiration pull ;</p> <p>5 maintained by <u>cohesion</u> between water molecules ;</p> <p>6 maintains a continuous column of water / AW ;</p> <p>7 adhesion of water / AW, to walls of xylem ;</p>	[max 4]	<p>ignore capillarity (except if discussing events at interface between water and air in mesophyll in leaf)</p>

Question	E	answers	Mark	Additional Guidance												
2 (a)		<table><tr><td>pea plant</td><td>D</td><td>E</td></tr><tr><td>substance transported</td><td>sucrose</td><td>pho ions</td></tr><tr><td>transport tissue</td><td>phloem ;</td><td>xylem ;</td></tr><tr><td>sink</td><td>growing tip / flower / fruit / seed / stem / root ;</td><td>growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;</td></tr></table>	pea plant	D	E	substance transported	sucrose	pho ions	transport tissue	phloem ;	xylem ;	sink	growing tip / flower / fruit / seed / stem / root ;	growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;	[4]	<p>ignore any vessels / tubes / etc</p> <p>A growing point / meristems / areas where growth occurs</p>
pea plant	D	E														
substance transported	sucrose	pho ions														
transport tissue	phloem ;	xylem ;														
sink	growing tip / flower / fruit / seed / stem / root ;	growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;														
(b)		amino acids ; R proteins	[1]	A (named) plant hormones												
(c) 1 2 3 4 5		photosynthesis ; light (energy) is, absorbed / trapped, by chlorophyll ; carbon dioxide reacts with water in the presence of light (energy) ; to make glucose (and oxygen) ; glucose used to make sucrose ; ignore fructose	[max 3]	<p>A word equation / balanced equation if MP3 not written out do not award MP3 if 'broken down' A formula for glucose in an equation</p> <p>MP5 do not award if glucose is broken down unless already penalised in MP3</p>												
(d) 1 2 3 4 5		respired / oxidised to provide energy / used to provide energy / energy for a suitable process ; R 'produce energy' A respiration unqualified converted to starch for (energy) storage ; converted to cellulose to make cell walls ; used to make nectar to attract, pollinators / AW ; stored in fruits to attract animals (for seed dispersal) ;	[max 2]	<p>e.g. energy for, growth / active transpo</p> <p>R to make fruit / seed unqualified</p>												

Question	Answers	Mark	Additional Guidance
² (e) 1 2 3 4 5 6	root hairs / root hair cells ; active transport ; against, concentration / diffusion, gradient A from low to high concentration ; using, energy / ATP ; R energy produced / production of energy from respiration ; ref to, proteins / carrier molecules (in membranes) ;	[max 3]	ignore diffusion / movement down a concentration gradient / osmosis ignore gradient in 'from low concentration gradient to high concentration gradient'

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Question	E	Answers	Marks	Additional Guidance
³ (a)	1 2 3	increase in size ; (permanent) increase in dry mass ; increase in <u>cell</u> number ;	[max 2]	
(b)		positive ; phototropism ;	[max 2]	
(c)	1 2 3 4	tip of shoot is area where stimulus is detected ; response to light is a growth response ; response occurs, F / with tip <u>and</u> light ; no response, E / whole seedling in darkness / G / when tip was covered / H / without the tip ;	[max 3]	
(d)	1 2 3	expose a larger surface area of leaves ; so absorbs more light ; so more photosynthesis ;	[max 2]	
(e)	1 2 3 4	auxins stimulate cell elongation ; cells have turgor pressure causes cells to lengthen ; more auxins on shaded side ; more, lengthening / growth, on shaded side causes bending ;	[max 2]	
(f) (i)	1 2 3 4 5	up to 30 minutes no response ; control group showed more, bending / response ; no pigment group, bending increases slowly ; control group, initial lag, increase, levels off, with time ; maximum bending is 73° for control OR maximum bending is 8° for variety with no pigment ;	[max 4]	Units must be stated at least once.
(ii)	1 2 3	variety without pigment is not able to <u>absorb</u> blue light ; does not detect, (direction of) light ; shows, no / less, bending / response ;	[max 2]	
			[Total: 17]	

4	(a)	1 carbon dioxide is required for photosynthesis ; 2 (more carbon dioxide) more, glucose is produced ; 3 carbon dioxide <u>concentration</u> is a <u>limiting</u> factor ; 4 more carbon dioxide = faster rate of photosynthesis ; 5 prevents concentration falling below that of atmosphere / AW ; 6 ref to more, growth / yield ;	[max 2]	
	(b)	carbon dioxide will diffuse out of the glasshouse ; carbon dioxide is wasted ; <i>idea that</i> extra, growth / yield, does not cover the cost of the carbon dioxide ;	[max 2]	
	(c) (i)	plants respire at night and do not photosynthesise ;	[1]	<i>both ideas are needed for the mark</i>
	(ii)	1 decrease temperature on hot days / AW / avoid plants overheating ; 2 denaturing of enzymes ; 3 avoids plants wilting ; 4 <i>idea that</i> open to allow carbon dioxide to enter <u>during the day</u> / ref to F ; 5 <i>idea that</i> open to allow oxygen to enter <u>at night</u> ; 6 to allow plants to respire ; 7 allow water vapour to escape / avoids air becoming too humid ; 8 reduces chances of (fungal) disease ;	[max 4]	
			[Total: 9]	