

# Transport in Plants

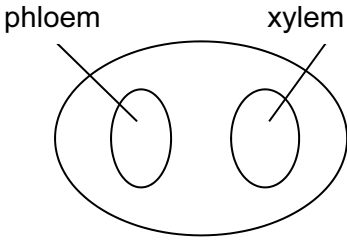
## Mark Scheme 2

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

**Time Allowed:** 64 minutes

**Score:** /53

**Percentage:** /100

<p>1 (a)</p>		<p>[2]</p>	<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>
<p>(b)</p>	<p><u>sucrose</u> ;</p>	<p>[1]</p>	<p><b>ignore</b> sugar / non-reducing sugar <b>A</b> phonetic spellings</p>
<p>(c)</p>	<p>1 during growing season / when photosynthesising / when food is made ; 2 (substances are) transported (down), to the roots <i>or</i> to (named) 3 transported (up) to the, growing points / flowers / fruits / seeds / new leaves / AW ; 4 (time of year) when no photosynthesis / when food is not made ; 5 (substances are transported upwards) from, roots / storage organ / seed ; 6 (substances transported) from <u>source</u> to <u>sink</u> ;</p>	<p>[max 4]</p>	<p><b>A</b> when there is plenty of light</p> <p><b>A</b> move for are transported <b>MP3 A</b> 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>
<p>(d)</p>	<p>1 <u>evaporation of water</u>, from (surfaces of) mesophyll ; 2 movement / diffusion / loss of, water vapour ; 3 from, leaves ; <b>A</b> (named) aerial / upper, parts ; 4 through / from, stomata / cuticle ;</p>	<p>[max 3]</p>	
<p>(e)</p>	<p>1 evaporation / transpiration, causes movement of water ; 2 in xylem ; 3 reduces pressure at the top of the plant / ref to a water potential 4 transpiration pull ; 5 maintained by <u>cohesion</u> between water molecules ; 6 maintains a continuous column of water / AW ; 7 adhesion of water / AW, to walls of xylem ;</p>	<p>[max 4]</p>	<p><b>ignore</b> 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 border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">pea plant</td> <td style="width: 25%;"><b>D</b></td> <td style="width: 25%;"><b>E</b></td> <td style="width: 25%;"></td> </tr> <tr> <td>substance transported</td> <td>sucrose</td> <td>phloem</td> <td>ions</td> </tr> <tr> <td>transport tissue</td> <td>phloem ;</td> <td>xylem ;</td> <td></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> <td></td> </tr> </table>	pea plant	<b>D</b>	<b>E</b>		substance transported	sucrose	phloem	ions	transport tissue	phloem ;	xylem ;		sink	growing tip / flower / fruit / seed / stem / root ;	growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;		[4]	<p><b>ignore</b> any vessels / tubes / etc</p> <p><b>A</b> growing point / meristems / areas where growth occurs</p>
pea plant	<b>D</b>	<b>E</b>																	
substance transported	sucrose	phloem	ions																
transport tissue	phloem ;	xylem ;																	
sink	growing tip / flower / fruit / seed / stem / root ;	growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;																	
(b)	amino acids ; <b>R</b> proteins	[1]	<b>A</b> (named) plant hormones																
(c) 1 2 3 4 5	<p>1 photosynthesis ;</p> <p>2 light (energy) is, absorbed / trapped, by chlorophyll ;</p> <p>3 carbon dioxide reacts with water in the presence of light (energy) ;</p> <p>4 to make glucose (and oxygen) ;</p> <p>5 glucose used to make sucrose ; <b>ignore</b> fructose</p>	[max 3]	<p><b>A</b> word equation / balanced equation if <b>MP3</b> not written out do not award <b>MP3</b> if 'broken down' <b>A</b> formula for glucose in an equation</p> <p><b>MP5</b> do not award if glucose is broken down unless already penalised in <b>MP3</b></p>																
(d) 1 2 3 4 5	<p>1 respired / oxidised to provide energy / used to provide energy / energy for a suitable process ; <b>R</b> 'produce energy' <b>A</b> respiration unqualified</p> <p>2 converted to starch for (energy) storage ;</p> <p>3 converted to cellulose to make cell walls ;</p> <p>4 used to make nectar to attract, pollinators / AW ;</p> <p>5 stored in fruits to attract animals (for seed dispersal) ;</p>	[max 2]	<p>e.g. energy for, growth / active transpo</p> <p><b>R</b> to make fruit / seed unqualified</p>																

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

Question	E	Answers	Marks	Additional Guidance
<sup>3</sup> (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, <b>F</b> / with tip <u>and</u> light ; no response, <b>E</b> / whole seedling in darkness / <b>G</b> / when tip was covered / <b>H</b> / without the tip ;	[max 3]	
(d)	1 2 3	expose a larger surface area of leaves ; so absorbs <b>more</b> light ; so <b>more</b> photosynthesis ;	[max 2]	
(e)	1 2 3 4	auxins stimulate cell <b>elongation</b> ; 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]	
			<b>[Total: 17]</b>	

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