

Key Area 3 Photosynthesis

Mark Scheme

1. A
2. C
3. B
4. B
5. C
6. D
7. C
8. A
9. D
10. C
11. B
12. A
- 13.

(a)	X-axis scale and label including units. Plotting and joining points accurately.	(1) (1)	2	Scale - any three values to establish a linear scale. If a bar chart is drawn, only the second mark can be accessed. Any extrapolation beyond 50°C in the graph should be ignored.
(b)	Any value less than 0.4 (including 0).		1	Not acceptable: values below zero.
(c)	Light intensity/carbon dioxide concentration.		1	
(d)	Substance X - carbon dioxide /CO ₂ Substance Y - starch	(1) (1)	2	

14.	(a)	(i)	Hydrogen	1
		(ii)	Light energy is trapped by chlorophyll	1
			Light energy/it is converted into chemical energy in ATP (Energy stored in sugar can be used for) respiration/converted into cellulose or starch or any other correctly named substance/protein synthesis or cell division or any other named plant process	1
	(b)		Light intensity Carbon dioxide concentration	1 1
				3 2

15.	(a)	Name of the first stage: light reactions (1) Diffuses out of the leaf: oxygen (1) Two products used in second stage: hydrogen and ATP (1)	3	both answers required.
	(b)	Forms sugar/glucose/starch (1) ATP provides energy/hydrogen combines/reacts/joins with CO ₂ (1)	2	Any additional wrong biology negates this mark. Any additional wrong biology negates this mark. Indicate correct and incorrect points and give overall mark by annotating with ticks/crosses.

16.

(a)	<table border="1"> <thead> <tr> <th>Statement</th> <th>Stage 1</th> <th>Stage 2</th> </tr> </thead> <tbody> <tr> <td>Carbon dioxide required</td> <td></td> <td>✓</td> </tr> <tr> <td>Light energy required</td> <td>✓</td> <td></td> </tr> <tr> <td>Water required</td> <td>✓</td> <td></td> </tr> <tr> <td>Sugar produced</td> <td></td> <td>✓</td> </tr> <tr> <td>ATP + Hydrogen required</td> <td></td> <td>✓</td> </tr> <tr> <td>Oxygen produced</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Statement	Stage 1	Stage 2	Carbon dioxide required		✓	Light energy required	✓		Water required	✓		Sugar produced		✓	ATP + Hydrogen required		✓	Oxygen produced	✓		2	<p>1 mark for each correct column</p> <p>Any additional ticks in a column negate the marks for that column.</p>
Statement	Stage 1	Stage 2																						
Carbon dioxide required		✓																						
Light energy required	✓																							
Water required	✓																							
Sugar produced		✓																						
ATP + Hydrogen required		✓																						
Oxygen produced	✓																							
(b)	<p>Photosynthesis is controlled by enzymes / enzymes are needed 1</p> <p>(At high temperatures) enzymes are denatured/do not work. 1</p>	2																						
(c)	<p>Light Intensity } either order</p> <p>Temperature }</p>	1	<p>Both required</p> <p>Not Acceptable - Heat or light</p>																					