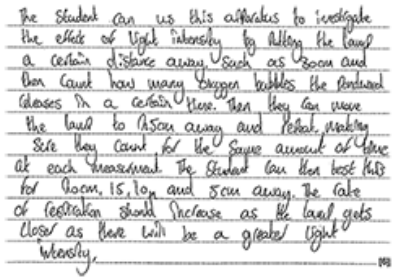
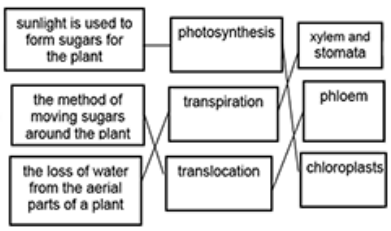
Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			Photosynthesis ✓ Chlorophyll ✓ Sunlight ✓ Phloem ✓	4 (4 x AO 1.1)	**Examiner's Comments** The majority of candidates managed to gain either 1, 2 or 3 marks on this question. Answer line four appeared to be the most challenging, with a lot of candidates incorrectly selecting 'leaf'.
			Total	**4**	
2			C	1 (AO 1.2)	
			Total	**1**	
3			C	1 (AO 2.1)	
			Total	**1**	
4		i	pH (of the pondwater) ✓	1 (AO 2.2)	**Examiner's Comments** This question caused some confusion, with just over half the candidates identifying the independent variable as pH of pondwater. Common incorrect responses were number of plants or number of days.
		ii	4.5 ✓	1 (AO 2.2)	**DO NOT ALLOW** more than 1 tick **Examiner's Comments** The majority of candidates were able to correctly identify the mode.
		iii	Repeat beaker 4 / 14 ✓ The result in jar 4 was an anomalous result/outlier/did not fit the pattern ✓	2 (2 xAO 3.3b)	**Examiner's Comments** This was a challenging question for the majority of candidates. There were many vague references to 'repeat the experiment', rather than identifying which beaker needed to be repeated.
		iv	Acid pollution causes the enzymes (in duckweed) to work slower/stop working ✓	2 (2 xAO 3.2b)	**ALLOW** enzymes denature **/** active site/enzyme changes shape **DO NOT ALLOW** kills

			The rate of photosynthesis/food production is slower ✓		enzymes/enzymes die **Examiner's Comments** Where candidates did not score on this, it was because they said 'the enzymes die', or that there would be 'no photosynthesis', rather than talking about it occurring more slowly.
		v	Include other/greater range/smaller intervals of pH values ✓ Around pH 6.5 ✓	2 (2 xAO 3.3a)	**IGNORE** just repeat readings **ALLOW** values in range of 5-8 **Examiner's Comments** While there were a lot of vague 'repeat the experiment' responses, the majority of candidates identified that you would need to test more pH values. The more successful responses identified a suitable range of pH values.
			Total	**8**	
5			**Level 3 (5–6 marks)** Provides a detailed description of how to change the light intensity **AND** describes variables that need to be controlled **AND** Describes in detail the measurements that should be taken. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Describes how to change the light intensity, states a variable that needs to be controlled and describes a measurement that should be taken. **OR** Provides a detailed description of how to change the light intensity and describes variables that need to be controlled. **OR** Provides a detailed description of how to change the light intensity and describes in detail the measurements that should be taken.	6 (4 ×AO 2.2) (2 ×AO 3.3a)	**AO2.2 Describes how to change the light intensity** • suitable method used to describe how to change the light intensity. e.g. place the lamp at different distances from the pondweed/change light intensity • suggest how many light intensities / range of distances **AO3.3a Describes the variables that need to be kept constant to collect valid data** • same species of plant • same piece/mass/amount of pondweed in each experiment • same volume/concentration of sodium hydrogen carbonate • same volume of water • eliminate all other light sources/only light source is the lamp

			OR Describes variables that need to be controlled and describes in detail the measurements that should be taken *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Describes how to change the light intensity **OR** describe variables that need to be controlled **OR** describes a measurement that should be taken. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 mark** *No response or no response worthy of credit.*		• keep the temperature constant /use a thermostatically controlled water bath • same wavelength of light • pH **AO2.2 Describes the measurements that should be taken** • count the number of bubbles of oxygen given off in a set time • repeat the readings and/or calculate a mean **<u>Examiner's Comments</u>** The Level of Response extended writing question was based on a PAG practical that the candidates should have been familiar with. This was accessible by most candidates who achieved Level 1 and 2 responses on correctly identifying independent and dependent variables. Some candidates were able to reach Level 3 with a detailed description on changing the independent variable, measuring the dependent variable and identifying the control variables. Exemplar 3  The student can use this apparatus to investigate the effect of light intensity by using the lamp a certain distance away. Such as 30cm and then count how many oxygen bubbles the pondweed releases in a certain time. Then they can move the lamp to 25cm away and repeat, making sure they count for the same amount of time at each measurement. The student can then test this for 20cm, 15, 10cm and 5cm away. The rate of respiration should increase as the lamp gets closer as there will be a greater light intensity. [6] Exemplar 3 demonstrates a candidate who provided a detailed description of how to change the light intensity and described in detail the measurements that should be taken. Level 2 – 4 marks as no reference to any control variables identified. We can ignore the

					incorrect use of respiration as not relevant to the question. **OCR support** Our Language of measurement in context resource can be used with candidates to help familiarise them with terms such as control variables, and where to identify them in a practical.
			Total	**6**	
6	a		Water ✓ Oxygen ✓	2 (2 × AO 1.1)	**ALLOW** alternatives H_2O / O_2 but name takes precedence **Examiner's Comments** Roughly half of the candidates could correctly complete the word equation for photosynthesis. The most common incorrect answer was getting the water and oxygen the wrong way round.
	b			4 (4 × AO 1.1)	6 correct lines = 4 5/4 correct lines = 3 3 correct lines = 2 2 correct lines = 1 **DO NOT ALLOW** more than 1 line from each box **Examiner's Comments** The majority of candidates achieved 3 or maximum marks, correctly identifying the description and structures involved in photosynthesis, transpiration and translocation. This tested their AO1 knowledge and understanding.
			Total	**6**	
7			D ✓	1 (AO 2.2)	**ALLOW** 19 **Examiner's Comments**

					This question was the most accessible questions in the multiple choice Section A, with most candidates correctly answering D by correctly identifying the anomalous result.
			Total	**1**	