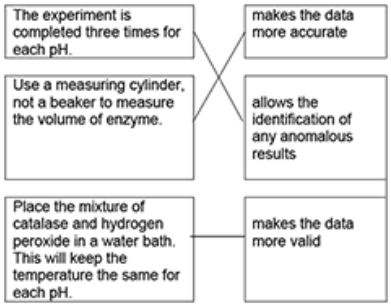
Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1	a	i	Water bath ✓	1 (AO 1.2)	**ALLOW** descriptions of a water bath **ALLOW** incubator **Examiner's Comments** This question proved to be found quite challenging by candidates. Commonly seen incorrect responses were Bunsen burner or thermometer.
		ii	Dependent variable ✓	1 (AO 2.2)	**Examiner's Comments** This was answered correctly by less than half of all candidates. There didn't appear to be a common distractor. Where there was an incorrect response, it was evenly spread between the other options.
	b	i	A line starting at the same point as 15 °C and 35 °C but with a slope in between these two ✓	1 (AO 2.2)	**Examiner's Comments** Over half of all candidates were able to use the data to correctly draw a line on the graph. Where candidates were unsure, they usually left it blank rather than attempting the question.
		ii	Faster ✓ (Kinetic) energy ✓ Collisions ✓ Sugar ✓	4 (AO 3.2b) (AO 2.2) (AO 2.2) (AO 2.2)	**ALLOW** quicker/quickly/rapidly **IGNORE** more **ALLOW** speed / movement **ALLOW** interactions **IGNORE** reactions **ALLOW** substrate **Examiner's Comments** The first response line was generally well answered. The fourth response line was the least well answered, with the majority of candidates selecting milk rather than sugar.

		iii	Repeat at higher temperatures ✓ Identify the temperature where the pH does not decrease ✓	2 (2 x AO 3.3a)	**Examiner's Comments** Approximately half of all candidates were able to identify that you would need to repeat at higher temperatures. The second mark proved more challenging and where an incorrect response was given, it was evenly spread between the other options.
			Total	**9**	
2			A	1 (AO 2.1)	
			Total	**1**	
3		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 ✓ The rate of photosynthesis/food production is slower ✓	2 (2 xAO 3.2b)	**ALLOW** enzymes denature **/** active site/enzyme changes shape **DO NOT ALLOW** kills 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**	
4	a		 ✓✓	2 (2 ×AO 3.3b)	Three lines correct = 2 marks One/two line correct = 1 mark **DO NOT ALLOW** more than 1 line from each box **Examiner's Comments** This question was a good discriminator. The most successful responses gained full marks in correctly identifying how the improvement when collecting data effected accuracy, validly and identifying anomalies. **OCR support** Our Language of measurement in context resource can be used with candidates to help familiarise them with terms such as validity, repeatability and anomalies.
	b		Repeat the experiment using pH 6.5, 7, 7.5, 8 and 8.5. ✓	1 (AO 3.3b)	**DO NOT ALLOW** more than 1 box ticked **Examiner's Comments** This question was challenging for the candidates, with a minority analysing the information to correctly identify how to improve the experiment in finding the correct optimum pH.
			Total	**3**	

<table>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>
<table>
<tr><th>Statement about DNA</th><th>True (T)</th><th>False (F)</th></tr>
<tr><td>DNA is a polymer.</td><td>✓</td><td></td></tr>
<tr><td>DNA is made of 4 strands.</td><td></td><td>✓</td></tr>
<tr><td>The strands in DNA form a double helix.</td><td>✓</td><td></td></tr>
<tr><td>A DNA nucleotide is made of a sugar, a phosphate group and a base.</td><td>✓</td><td></td></tr>
<tr><td>The 4 bases found in DNA are A, C, G and U.</td><td></td><td>✓</td></tr>
</table>
✓✓✓
</td>
<td>3
(3 xAO 1.1)</td>
<td>5 correct ticks = 3 marks

4 correct ticks = 2 marks

2/3 correct ticks = 1 mark

DO NOT ALLOW more than 1 tick for each statement

<u>Examiner’s Comments</u>

This question on DNA was a good discriminator between candidates at different grades. Most candidates were able to correctly identify one true or false statement about DNA, with many candidates gaining maximum marks.</td>
</tr>
<tr>
<td></td><td></td><td></td><td>Total</td><td>3</td><td></td>
</tr>
<tr>
<td>6</td><td>a</td><td>i</td><td>5 correct data plots ✓ ✓</td><td>2
(2 ×AO 2.2)</td><td>3 or 4 correct data plots = 1 mark
ALLOW +/− half a square

<u>Examiner’s Comments</u>

More candidates scored maximum marks than either 0 or 1 mark. The most incorrectly plotted point was for pH 10. Candidates need to make sure they look at the scales and are precise with their plotting as only half a square error margin is allowed.</td>
</tr>
<tr>
<td></td><td></td><td>ii</td><td>Line of best fit through most points increasing and decreasing ✓</td><td>1
(AO 2.2)</td><td>DO NOT ALLOW dot to dot line
ALLOW line of best fit for their plotting
IGNORE any extrapolation of line

<u>Examiner’s Comments</u>

The majority of candidates could plot points on a graph correctly, however the vast number of candidates did not draw a line of best fit increasing and decreasing when pH increases through most points. The majority of candidates only drew a straight line of best fit showing a positive correlation.</td>
</tr>
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					Assessment for learning Knowledge gap identified in the application of a line of best fit. Candidates should be prepared to draw straight and curved lines of best fit where appropriate. This should be reinforced throughout the KS4 curriculum.
	b		**Any two from:** As pH increases amount, oxygen collected increases, then decreases ✓ The optimum pH is between 6-8/pH 8 ✓✓ Above and/or below pH 6-8/pH 8, enzyme starts to denature ✓	2 (2 ×AO 3.2b)	**IGNORE** temperature **Examiner's Comments** This question to analyse information to draw conclusion was challenging for the candidates. The more successful responses identified the trend and a small number of candidates were able to apply this to denaturing of enzymes above and/or below the optimum pH.
			Total	**5**	
7			B ✓	1 (AO 2.1)	
			Total	**1**	
8			D ✓	1 (AO 2.1)	
			Total	**1**	
9			B ✓	1 (AO 1.1)	
			Total	**1**	