

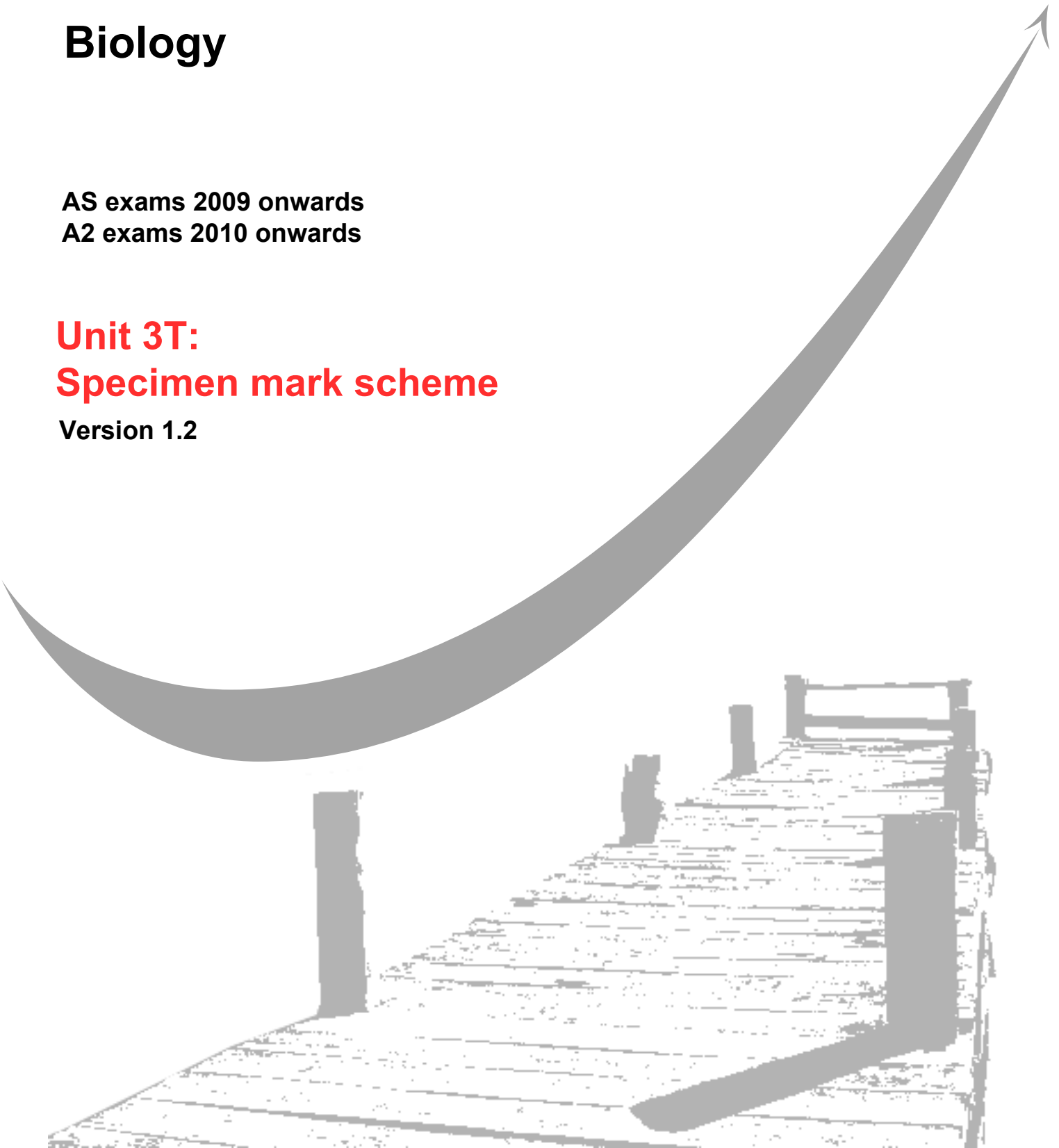
**GCE**  
**AS and A Level**

# **Biology**

**AS exams 2009 onwards**  
**A2 exams 2010 onwards**

## **Unit 3T:** **Specimen mark scheme**

**Version 1.2**





# **General Certificate of Education**

## **Biology**

**BIO3T**

**Investigative Skills Assignment (ISA)**

**AS Centre Assessed Unit**

## **Marking Guidelines**

*Specimen Paper*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: [www.aqa.org.uk](http://www.aqa.org.uk)

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**Stage 1****Assessment of presentation of raw data**

Candidates should be assessed on their ability to present raw data in an appropriate way. The following criteria should be used to mark this skill.

Data presented clearly in a table with both pH and time recorded;	1
pH (independent variable) in first column;	1
Time measured in minutes or seconds. Units clearly stated and only in the heading to the appropriate row or column;	1
	<b>Total 3</b>

The table of raw data collected during implementation is required for moderation and must be attached to the ISA test.

**Stage 2****Assessment of Processing**

The following criteria should be used to assess the processing of the data.

Rate of browning calculated correctly;	1
Mean values of the rate of browning calculated correctly;	1
Graph has independent variable (pH) x axis and dependent variable (rate of browning) on y axis;	1
Appropriate scales selected for the x and y axes these scales should allow for both accurate plotting and reading of the graph;	1
Both axes correctly labelled with appropriate units;	1
All points plotted accurately. If ICT has been used to plot the graph, it should be possible to read the points with appropriate precision;	1
Data presented as a line graph. Points may be joined with a curve of best fit if it is felt that individual values are likely to fall on such a curve. Alternatively, all points should be joined with straight lines if it is felt that the position of intermediate points cannot be predicted reliably;	1
	<b>Total 7</b>

The graph collected during implementation is required for moderation and must be attached to the ISA test.

**ISA test****SECTION A****Question 1**

Temperature maintained/kept constant with a water bath / temperature at which experiment carried out monitored with thermometer; 1

**Question 2**

Answer refers to variation in the data collected for at least one pH value  
e.g. two repeats sufficient if both measurements very similar/three repeats taken if first two measurements are not consistent ; 1

**Question 3**

Variation in surface will not influence rate at which the surface turns brown;  
Since all surface in contact with oxygen/reactants in all exposed cells; 2

**Question 4**

Time in buffer solution/variety of apple/all slices from one apple; 1

**Question 5 (a) and (b)****Either**

Box relating to unreliable data ticked and correct identification of all unreliable data;

Value is markedly different from other values at same pH;

**Or**

Box relating to reliable data ticked;

All values for same pH readings similar;

2 max

**Question 6**

Measurement is subjective / difficult to determine endpoint / brown is unevenly distributed; 1

**Question 7**

- (a) Fastest rate of browning at pH 7.0;  
Rises to a peak and falls; 2
- (b) Change in pH changes charge/shape of active site;  
Substrate does not bind/fit;  
Does not form enzyme-substrate complex; 3
- (c) Two values between pH 6 and pH8;  
Locate optimum pH / maximum rate of reaction more precisely; 2

**Total 15****SECTION B****Question 8**

Angle of probe; 1

**Question 9**

- (a) Use (distilled) water;  
Otherwise treat exactly the same; 2
- (b) Showed the difference in response was due the substance added / not due to  
another factor; 1

**Question 10**

- (a) Combination of all three / last solution;  
Lowest fall in mean; 2
- (b) Cysteine;  
Highest standard deviation; 2
- (c) Ranges overlap; 1
- (d) Accept any reasonable suggestion for example  
Pears vary in colour of flesh / variation in instrument reading so that firmness all  
identical; 1

**Question 11**

- (a) Variation in samples;  
Calculated mean more reliable / minimises effect of anomalies; 2
- (b) Equal number of slices from each pear in each test solution / assigned randomly to each solution; 1

**Question 12**

Reduces enzyme activity;  
As lower kinetic energy of substrate or enzyme molecules/lower probability of enzyme and substrate colliding;  
Reduces rate of browning;  
To lowest level;  
As lower temperature would result in freezing/cell damage; 3 max

**Question 13**

Sample size not known;  
Whether consumer would have bought/liked the taste of pears;  
Explanation of term 'acceptable' to consumer/subjective nature of 'acceptable'; 2

**Question 14**

Whether residues of the substances remain in the fruit;  
Whether substances used are harmful to human health;  
Whether substances accumulate in humans; 1 max

**Total 19**