

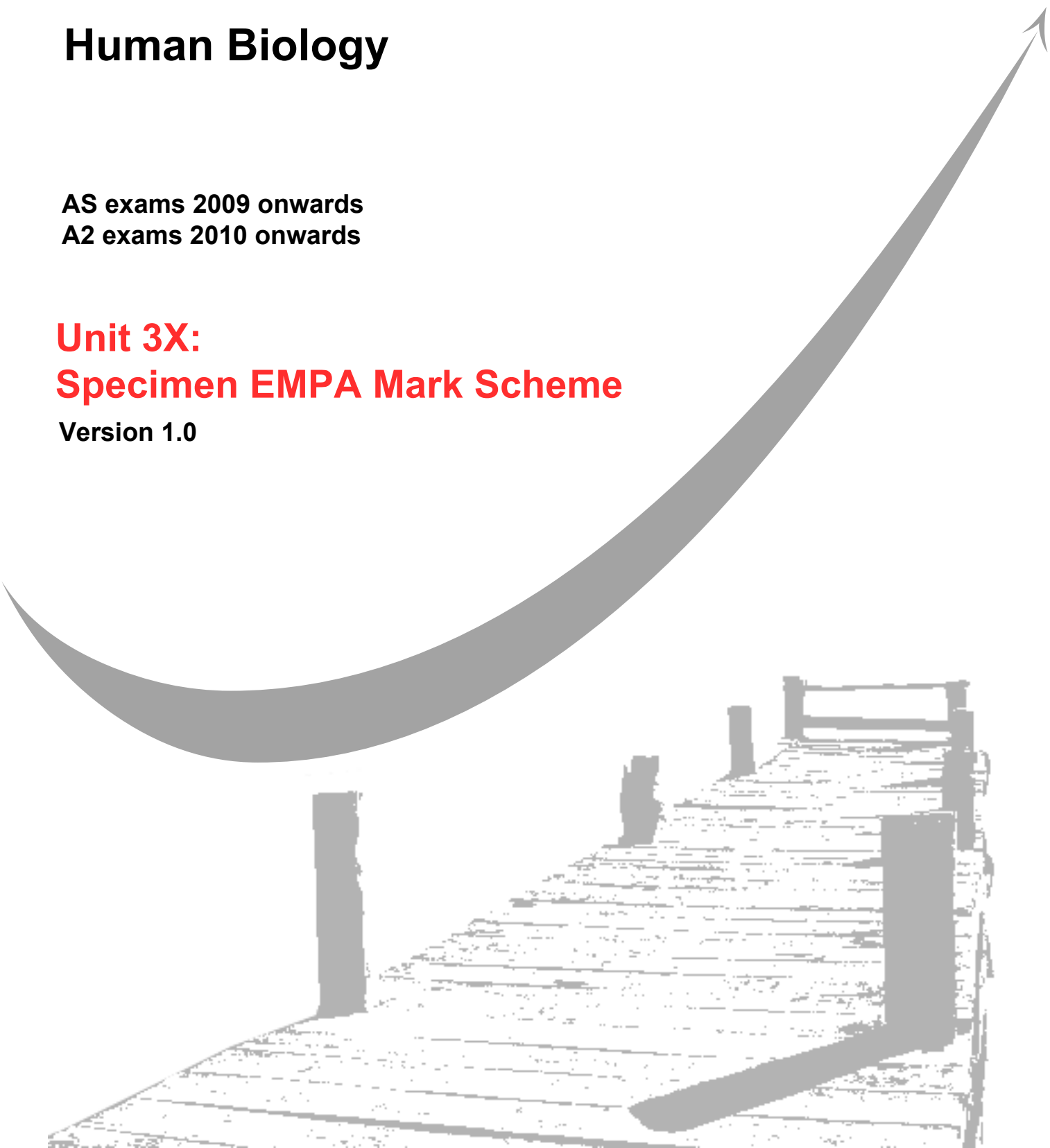
GCE
AS and A Level

Human Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 3X: **Specimen EMPA Mark Scheme**

Version 1.0





General Certificate of Education

Human Biology 1406/2406

**HBI3X Externally Marked Practical
Assignment (EMPA)**

Mark Scheme

SPECIMEN PAPER

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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TASK 1

Question 1

Remained orange / brown; (an *accurate* observation is required – reject no change)
 Starch not present because molecules too large to pass through;
 (Note: there may be some escape of starch but the explanation must therefore match the colour given) 2

Question 2

- (a) Given volumes of reducing sugar and starch equal AND total meets determined volume of visking tubing bag; (accuracy is required); 1
- (b) Same volume sample (of surrounding liquid);
 Same volume of Benedict's reagent;
 Heat same length of time;
 Compare colour/mass of precipitate; 4

Question 3

- (a) Five spaced concentrations in range;
Accurate volumes of starch and reducing sugar and water to produce all concentrations identified; 2
- (b) To identify trend / read off intermediate values; 1

TASK 2

Table

- | | | |
|----------|--|---|
| 1 | Title given which relates the independent and dependent variables; | 1 |
| 2 | Column headings correctly identify both the independent and dependent variables with independent variable given in the first column; | 1 |
| 3 | Institute of Biology unit conventions followed; | 1 |
| 4 | Data illustrates trend of shorter reaction time with increasing enzyme concentration; (<i>accuracy</i> of experimental results) | 1 |

TASK 3

Processing of data and graph

- | | | |
|----------|---|---|
| 1 | Mean rate of reaction ($1/t$) calculated <i>accurately</i> ; | 1 |
| 2 | Data presented as line graph; | 1 |
| 3 | Dependent variable plotted against independent variable with axes the correct way; | 1 |
| 4 | Axes labeled correctly with IOB unit conventions followed; | 1 |
| 5 | Data plotted <i>accurately</i> and joined with best-fitting curve or ruled lines as appropriate; | 1 |
| 6 | Graph is scaled appropriately (including size, proportion of paper that plotted data use and linear); | 1 |

The EMPA Written Test
Section A**Question 1**

- | | |
|---|---|
| Value obtained related to/depends on value of independent variable; | 1 |
|---|---|

Question 2

- | | | |
|-----|--|-------|
| (a) | (Yes) water bath used / water outside of tubing acts as water bath; | 1 |
| (b) | Reducing sugar identified quicker at all temperatures;
More kinetic energy;
Faster movement of molecules;
More collisions;
Faster rate of diffusion; | 3 max |
| (c) | Same volume samples / reagent / water OR same length of tubing; | 1 |
| (d) | Monitoring = taking readings of variable during investigation v constant OR variable might change during investigation v does not change; | 1 |

Question 3

- (a) Glucose is a reducing sugar;
(but) Benedict's is non-specific; 2 max
- (b) (Context of visking tubing or converse)
no proteins;
no carriers;
but diffusion / concentration gradient similar; 3

Question 4

Appropriate values chosen (from raw data not mean values) to illustrate;
Suggested reason for variance / all very similar (so no anomalies); 2

Question 5

As concentration of reducing sugar increases so does rate of diffusion / movement through membrane/ appearance in surrounding water; 1

Section B

Question 6

- (a) 90000; 1
- (b) Different medical care in different countries;
Number with diabetes/heart disease changes; 2

Question 7

- (a) Increase surface area / reduce size of machine; 1
- (b) Produce concentration gradient;
For diffusion; 2
- (c) Heparin would enter the body / blood;
Stop / reduces ability of blood to clot; 2

Question 8

- (a) Pores between proteins (in cell membrane);
Ion channels (in cell membrane);
Not through phospholipids / no cellulose present; 3
- (b) Maintain water potential gradient between blood and dialysis fluid;
Prevent loss of water (from blood);
By osmosis; 2 max

Question 9

- | | | |
|-----|--|---|
| (a) | Alters concentration of chlorine in dialysate; | 1 |
| (b) | Concentration in blood varies between individuals; | 1 |