

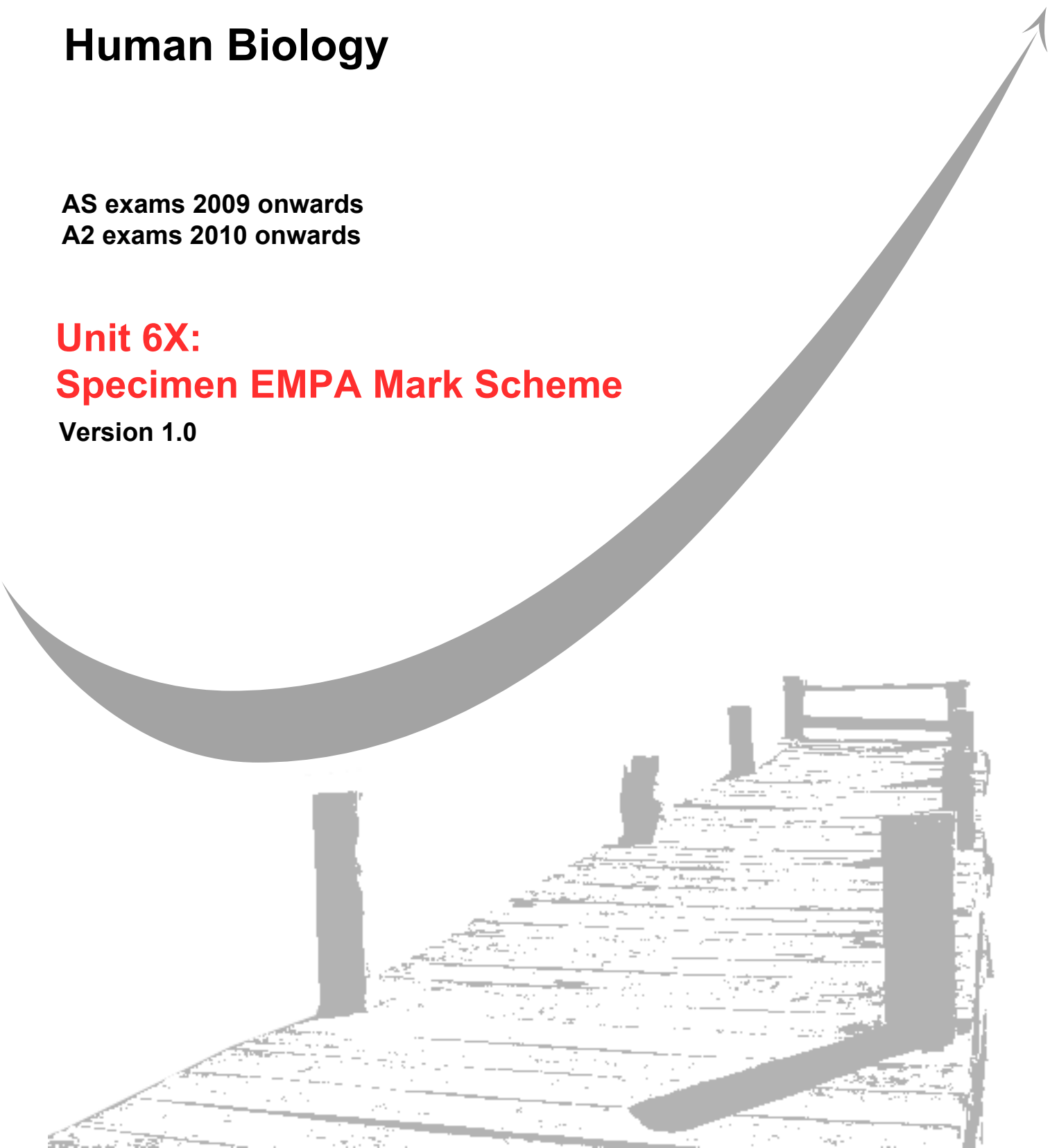
GCE
AS and A Level

Human Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 6X: **Specimen EMPA Mark Scheme**

Version 1.0





General Certificate of Education

Human Biology 2406

**HBI6X 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**

Principle: look for **accuracy** in how measurements were made

Reference to longest part of foot such as heel to tip of great toe;
(because) Variation in length depending on site chosen on foot; 2

Question 2

- (a) Principle: reward **accuracy** of measurements and recording of measurements;
Measurements in mm;
Units with appropriate headings AND not in body of table; 2
- (b) Length is better since more variation in results;
Increase reliability of data/analysis; 2
- (c) Chance;
Genetic reason;
Dietary reason;
Health / disease;
Preference for use e.g. right handed/footed; 2 max

Question 3

- (a) **Two** from: age (range) / sex / race / handedness / no deformity; 1
- (b) Answer in the context of not appropriate (and **accurate** use of data):
Investigation includes all foot sizes not the average foot size;
Cannot find correlation with an average of all results / one foot length and different heights; 2
- (c) Can be used with all age ranges/babies
OR removes effect of gravity/compression on height; 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 conventions followed; | 1 |

Total 3

Assessment of use of statistical test

1	Null hypothesis stated and accurate;	1
2	Choice of statistical test appropriate;	1
3	Valid reason for stated choice of statistical test;	1
4	Calculation of test statistic accurate;	1

Total 4

EMPA Written Test**SECTION A****Question 1**

Height – investigation to see whether height can be predicted from foot size; 1

Question 2

Two from: age (range) / sex / race / handedness / no deformity; 1

Question 3

Can be used with all age ranges/babies

OR

removes effect of gravity/compression on height; 1

Question 4

(a) Two from:
Sample size adequate / same measuring technique / variation within data / accurate recording of data; 1

(b) Explanation must support no or yes answer e.g. could only use other group members/names drawn out of a hat/no bias/all had equal chance of selection; 1

Question 5

No marks for null hypothesis or test statistic but marks awarded in the context of candidate's test statistic in relation to accept or reject:

Appropriate degrees of freedom / use of critical value;

Reference probability level / $p = 0.05$ / use of critical value;

(Reward critical value once only)

Significant or not;

Role of chance; 3 max

Question 6

Reference to positive or negative correlation;

Surface area can / cannot be used to determine height;

Use of comparative data to show that people with larger feet have greater height /
/ no clear relationship; 3

Question 7

- (a) Scatter graph/plot/diagram; 1
- (b) (Statistical analysis) assesses the probability that results are due to chance / reduces effect of outliers / extreme values / removes personal opinion / is not subjective;
(Conclusion) invalid because weak positive correlation / invalid because most points show that shoe size increases with increasing height;
Invalid because sample size sufficient for conclusion;
Valid because make up of sample not known / lack of tall people with small feet / ora / example;
Valid if related to ages where growth is incomplete; 3 max

Total 15

SECTION B**Question 8**

190 / 191 cm; 1

Question 9

- (a) Overall sample size is large enough for conclusion;
Disparity if smaller baby than predicted e.g. premature / smoker mother;
Shoe size and medical assistance inversely proportional;
Although only 3 (size) categories;
Evidence = 294 women with feet 4 ½ and above;
Evidence = 1% must be at least 100 / large number;
Trend less clear with height;
No indication of group size;
(So) percentage could be a small or large number; 5 max
- (b) Data only relates to young children;
Cannot translate to adults;
Growth of body parts different in children than adults;
Small sample size;
No definition of overweight / obese;
Data for mean height of arch overlaps between 2 groups; 4 max

Question 10

- (a) Body mass varies between individuals;
Allows comparisons to be made; 2
- (b) Identifies standard deviation of data;
Shows spread of data about mean;
1 SD = 0.5 / 68% of results found between 15.2 and 16.2; 2 max
- (c) Multiply 15.7 by $(1.05)^2$ / mean BMI by mean height squared; 1

Total 15