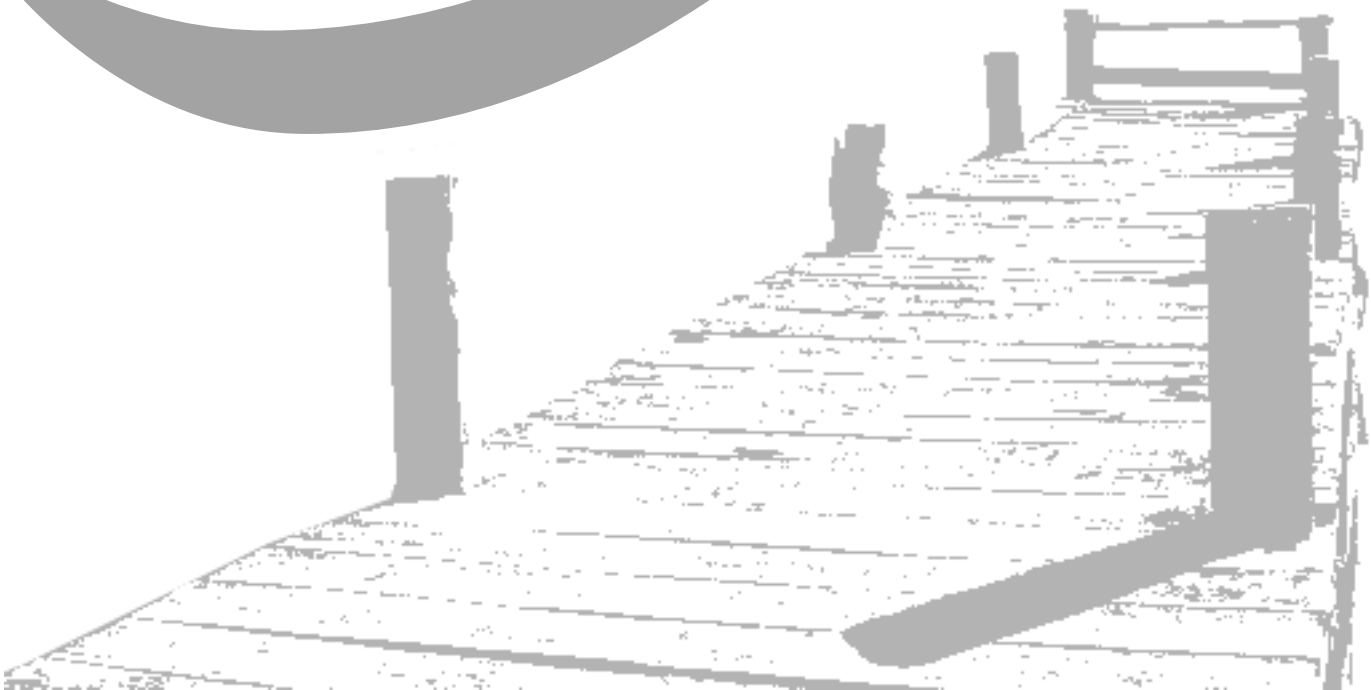
GCE
AS and A Level

Human Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 3T:
Specimen mark scheme

Version 1.1



Version 1.1 0108

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Human Biology 2405

Investigative Skills Assignment (ISA)

HBI3T AS Centre Assessed Unit

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.

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.

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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.

Title given which relates the independent and dependent variables. 1

Column headings correctly identify both the independent and dependent variables with independent variable in first column. 1

Units clearly stated, and only in the heading in the appropriate row or column. 1

Total 3

Teachers are referred to the Institute of Biology publication, *Biological Nomenclature, 3rd edition, 2000.*

The table of raw data collected during implementation will be required at moderation and should be attached to the ISA test.

Assessment of data processing and the graph

Candidates should be assessed on their ability to process raw data and draw a graph according to the following mark scheme (**one mark** for each).

1. *Mean* diameters (before and after treatment) calculated accurately. 1

2. (Mean) percentage changes in diameter calculated accurately. 1

3. Correct choice of graph (line graph, bar chart, histogram or scatter graph) 1

4. Variables plotted with dependent variable on Y (vertical) axis and independent variable on x (horizontal) axis. 1

5. Axes labelled appropriately with IOB unit conventions followed. 1

6. Data plotted accurately. 1

7. Graph is scaled appropriately (including size, proportion of paper that plotted data use and linear) 1

Total 7

The table of processed data and the graph produced will be required at moderation and should be attached to the ISA test.

SECTION A

Question 1

Independent variable identified correctly as the variable manipulated; 1

Question 2

(a) Identification of an investigation controlled variable and description of how variable was controlled; 1

(b) (i) Controlling = keeping variable at a pre-determined/set level; 1

(ii) Monitoring = taking readings of variable during investigation; 1

Question 3

Allow comparison;
Not all the same diameter initially;
Shows proportional change; 2 max

Question 4

(a) Allow between 0.2-0.25 mol dm^{-3} ; 1

(b) Plant cells have the same water potential as (produced by) this solution; 1

(c) (Water) molecules in a state of random motion/continually moving;
Movement into cells at same rate as movement out; 2 max
No net gain or loss of water;

(d) Changes in size are due to loss or gain of water;
By osmosis;
Cells lose water when in solution of lower/more negative water potential;
Cells gain water when in solution of higher/less negative water potential;
Water loss proportional to surrounding solutions of decreasing water potential;
Water gain proportional to surrounding solutions of increasing water potential; 5 max

(e) Student data:
Uses narrower range of independent variable;
May not include repeats;
Is not based on percentage change; 2 max

Total 17

SECTION B

Question 5

Accept argument either way but with reference to:
Need to repeat trials;
Need for appropriate control experiments;
Qualitative data;
One sport only;
Sample size; 3 max

Question 6

(a) (75 x 5/100) 3.75kg; 1

(b) Difference in mass/weight before and after run;
Without clothes / mass of sweat in clothes accounted for;
Less mass of fluid consumed during run; 2 max

Question 7

(a) Difficult to define reduced performance / decline in capacity for muscular work;
Need standard for reference;
Variation between individuals;
Variation between sexes;
Variation with age; 3 max

(b) Loss of water (in sweat) lowers/produces more negative water potential;
Loss of salt/electrolytes (in sweat) raises/produces less negative water potential; 2

Question 8

(a) Different definition/carbohydrate concentration of isotonic drink; 1

(b) Allow comparison between individuals/common unit;
Runners of different sizes/masses; 2

(c) (i) (170.8 – 125/170.8 x 100) 26.8/27%; 1

(ii) Only based on 7 runners/small sample size;
Time between trials not known;
Fluid consumed before exercise might also influence results;
Glycogen utilization at rest not known; 2 max

Total 17