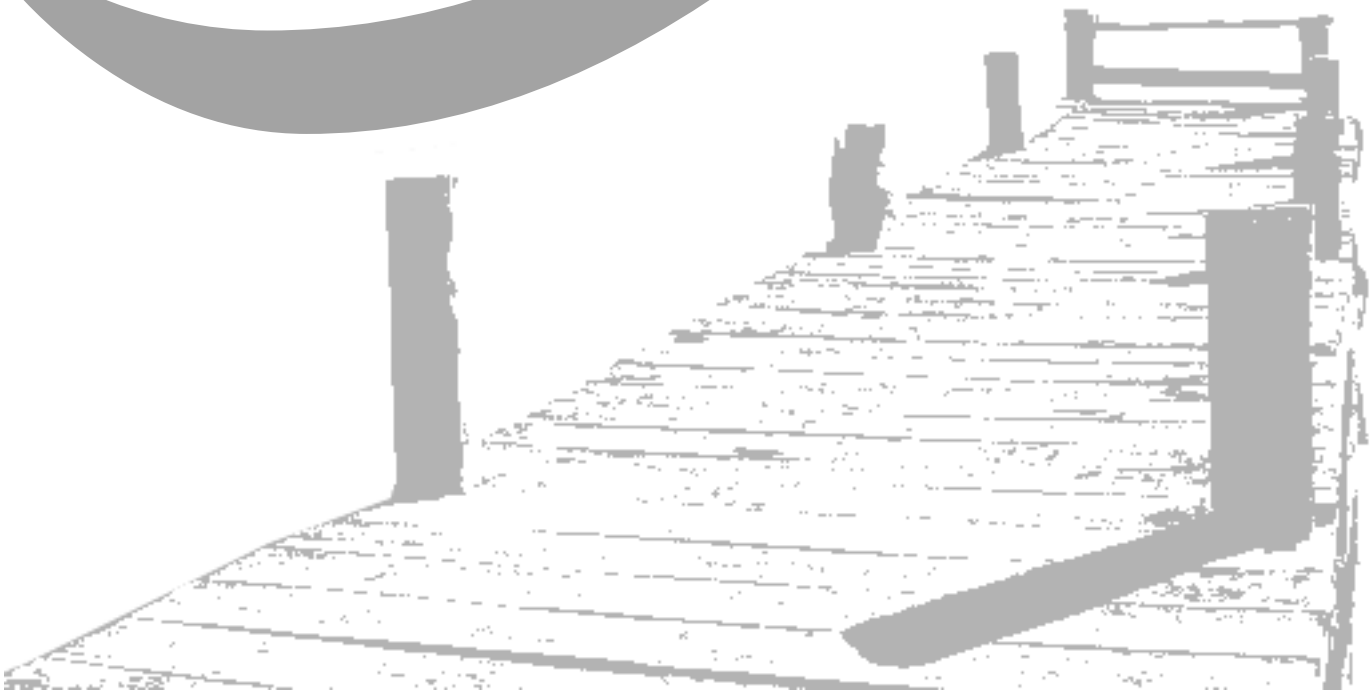
GCE
AS and A Level

Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 6X:
Specimen mark scheme (EMPA)

Version 1.0



Version 1.0: 12/07

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 2411

BIO6X 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.

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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TASK 1

Question 1

Prevent desiccation of maggot / keep smell in the dish / maggot might be using smell; 1

Question 2

Reference to use of random numbers / use of sectors around dish;
E.g., grid drawn on Petri dish / numbered marks around edge of Petri dish;
Grid / lines drawn on bottom of Petri dish (since lid might move); 3

Question 3

Use a fresh maggot for each trial; 1

Question 4

Time;
(Time) from releasing maggot to maggot reaching well of agar plate;
Distance from starting point to well in agar plate; 2 max

Question 5

Repeat experiment under identical conditions;
Water in well/empty well; 2

Question 6

One relevant confounding variable controlled / method of using stopwatch to ensure accuracy of timing; 1

Total for TASK 1 10 marks

TASK 2

Question 1

Table headings contain appropriate descriptors and include units and body of table contains only numbers;
Values in table have same number of significant figures that are justified by method used;
Data in table show consistent values;
Any anomalous result identified; 4

Question 2

Valid statistical test chosen;
Number of repeats valid for use of chosen statistical method;
Outline given of the calculations involved in the test / of formula used;
Calculated value has been clearly stated;
Calculated value has been used to find correct probability value;
Reference made to relationship between calculated probability value and a value of $p \leq 0.05$;
Clear statement of valid null hypothesis; 6 max

Total for Task 2: 10 marks

The EMPA Test

Section A

Question 1

(a) Eliminates a confounding variable; 1

(b) Similar to technique in ecological survey / only numbered grid squares on outside of Petri dish so that all distances were same. 1

Question 2

Maggots do not move in straight lines;
Enables comparison; 2

Question 3

(a) (i) Time was the dependent variable;
Dependent variable always plotted on y-axis; 2

(ii) Maggots move faster when meat present;
Valid reference to time;
Movement of maggots is directional towards meat;
Valid reference to slope of curves;
Great variability in data;
Valid reference to spread of data about line of best fit; 4 max

Question 4

Maggots attracted to other (feeding) maggots;
Time taken always lowest in **Figure 3**; 2

Question 5

Result not due to chance / reject null hypothesis;
$P < 0.05$ / p is less than 5% / p is less than 1 in 20; 2

Total for Section A: 14 marks

Section B

Question 6

(a) (All) eggs had hatched;
(All) larvae had developed beyond 1st instar stage; 2

(b) (i) Lays eggs in fresh carrion/first two days after death;
Little difference in number at 2 days and 5 days/388 after 2 days and 375 after 5 days; 2

(ii) Move into soil (to pupate);
Correct reference to figures in table; 2

(c) Most of larvae are in soil;
Correct reference to figures in table; 2

Question 7

Range of hours very large;
Shows relationship (of dependent and independent variables) better; **2**

Question 8

(a) Three valid reasons;;; **3**
E.g., Temperature affects rate of hatching
Difficulty in identifying species of larvae/pupae
Females lay eggs at different times of day

(b) Three related suggestions;;; **3**
E.g., Determine mean temperature/mean maximum temperature
Use DNA fingerprints of larvae/allow larvae to form adults
Correct identification of females

Total for Section B: 16 marks