

6103/02

Edexcel GCE

Biology Biology (Human)

Unit Test 3 Paper 02 W1

Advanced Subsidiary / Advanced
Specimen Paper

Time: 1 hour 20 minutes

Materials required for the examination

Nil

Items included with these question papers

Nil

Instructions to Candidates

In the boxes on the Answer Book provided, write the name of the Examining Body (Edexcel), your Centre Number, Candidate Number, the Subject Title, the Paper Reference, your surname, other names and signature.

The Paper Reference is shown towards the top left-hand corner of the page.

Answer BOTH questions in the Answer Book.

Show all the steps in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Additional Answer Sheets may be used.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

You must answer 2 questions in this question paper. There are no blank pages.

The total mark for this paper is 32.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly numbered.

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.

Answer BOTH questions

1. An experiment was carried out to investigate the effect of temperature on the activity of bacterial amylase.

1 cm³ of 1% amylase solution and 2 cm³ of 2% starch solution were placed in test tubes in a water bath at 30 °C for 5 minutes. The amylase was then added to the starch solution. After one minute a small drop of the mixture was withdrawn with a pipette and placed on a drop of iodine solution on a white tile. This was continued at intervals of one minute until the iodine test showed that there was no starch remaining in the mixture. The time taken for all the starch to be removed was recorded. The whole experiment was repeated at this temperature.

This procedure was repeated using water baths at 40 °C, 50 °C, 60 °C, 70 °C and 80 °C.

A copy of a students' laboratory notebook showing the results of this investigation is shown below.

Temp	Iodine stays brown
30	12 mins 11 mins
40	7 mins 9 mins
50	3 mins 3 mins
60	2 mins 1 min
70	1 min 1 min
80	didn't change after 20 mins

- (a) Prepare a table and organise the results in a suitable way so that the effect of temperature on the *rate* of the enzyme reaction can be displayed. (4)
- (b) Use the data in your table to present the information in a suitable graphical form. (4)
- (c) Describe the trends and patterns shown by these data. (2)
- (d) Describe *two* limitations of this method that could give rise to inaccurate results. (2)
- (e) What conclusions can be drawn from this investigation? (2)

(Total 14 marks)

2. Acid rain can cause a change in pH of freshwater streams. This is thought to have a damaging effect on amphibians, such as the common toad, by reducing the number of fertilised eggs which hatch into tadpoles.

Plan an investigation, which you could personally carry out, to test this hypothesis. Your answer should give details under the following headings.

- (a) Plan of the investigation to be carried out. **(9)**
- (b) Recording of raw data measurements, presentation of results and methods of data analysis. **(3)**
- (c) Limitations of your method, and an indication of further work which could be undertaken. **(6)**

(Total 18 marks)

TOTAL FOR PAPER 32 MARKS

6103 UNIT 3 Paper 02 W1 MARK SCHEME

	Marks
1 (a)	Correct table of data ; Minutes converted to SI units of seconds ; Mean times calculated for each temperature ; Rates calculated as 1/time ; Correct treatment of rate for 80 °C ; (4 marks)
(b)	Axes correct orientation: temperature horizontal, rate vertical ; Suitable scale (more than half graph paper) labelled with units ; All points plotted correctly ; Points joined with straight lines no extrapolation ; (4 marks)
(c)	Rate increases exponentially or similar between 30 and 70 °C ; Maximum rate approximately 70 °C ; Rate falls rapidly above 70°C ; Correct reference to Q10 effect (rate approximately doubles between 50 and 60) ; (2 marks)
(d)	End point / colour change difficult to judge ; Drops of iodine / sample drops can be different volume ; Temperature effect make take longer than the 5 minutes treatment ; Time intervals of 1 minute are too wide ; (2 marks)
(e)	Correct application of enzyme theory to suggest an explanation for increase in rate with increase in temperature ; Correct application of enzyme theory to suggest an explanation for rapid decrease in rate at higher temperatures ; (2 marks)
(TOTAL 14 MARKS)	

- 2 (a) Stated number of eggs to be used (minimum 20) ;
From same species of toad / same batch of eggs ;
Correct reference to same time of fertilisation ;
Place in measured volume of water ;
In suitable named container ;
Use of dilute nitric or sulphuric acid to adjust pH ;
Repeat for a different pH ;
Suitable range of pH (allow 7 –4) ;
Two named external conditions kept constant: e.g. temperature, light ;
Reference to need for constant oxygenation ;
Suitable method of measuring hatching described (e.g. % hatching
in a fixed time) ;
At least 2 repeats at each pH ;
- (9 marks)**
- (b) Suitable table with rows and columns matching method suggested ;
Suitable graphical format ;
Correct orientation and choice of axes to compare results for each pH ;
- (3 marks)**
- (c) Difficult to judge / count hatching point ;
Addition of dilute acids may not match acid rain effect in streams ;
Very difficult to control exact time of fertilisation ;
Tap or distilled water (if used) may affect hatching ;
Correct reference to other variation from natural conditions (e.g. Still
water in tank compared to flow in stream) ;
- Measure actual pH / composition of streams affected by acid rain ;
Investigate effects on adult toads / mating behaviour ;
Survey actual numbers of toads in affected and unaffected streams ;
Investigate the effects of acid rain on other species in the same food chain ;
- (6 marks)**

(TOTAL 18 MARKS)

The GCE awarding bodies have prepared new specifications to incorporate the range of features required by the new GCE and subject criteria. The specimen assessment material accompanying the new specifications is provided to give centres a reasonable idea of the general shape and character of the new planned question papers in advance of the first operational examination.