Answers to Further Questions
in GCSE Biology for You (5th Edition)

On the following pages we show the detailed Answers and Mark Schemes for the Further Questions on Practical work.

The answers have been prepared by an Examiner using the mark schemes published by each Examination Board. They are laid out in the same way as the pages of Further Questions in the Students’ Book.

For the Student:

- It is very important that you are able to answer the questions on your own, using your own knowledge of Biology.
  So it is important that you have a go at the questions first, and then afterwards you can check your answers using these pages.
  If you get a question wrong, try to work out where you have made an error. Discuss it with your teacher if you are not sure.

- Be aware that in some answers the mark is for the idea in your own words (not necessarily the exact words shown), whereas in other answers the number and unit must be exactly correct.

For the Teacher:

- You will find these sheets useful when marking the students’ homework, or when going over the Further Questions in class.
  The Answer Sheet will also enable you to assess how much work is involved in answering the questions when planning how much homework to set.

- The PDFs are available for you to hand out to the students if you wish (perhaps as part of a Revision Programme).
  As with all mark schemes there may be alternative credit-worthy statements for qualitative answers (for the idea) and this may need to be explained to your students. Quantitative answers, however, are generally more prescriptive and your students may need to be encouraged to show the exact numerical value and the appropriate unit.

Gareth Williams
For answers marked by levels of response:
Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content indicates the expected parameters for candidates’ answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a ‘best-fit’ approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer. Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.

The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.

In summary:
The skills and science content determines the level.
The communication statement determines the mark within a level.

1 (a) (i) 1 mark for a suitable scale and label for x-axis;
1 mark for a suitable scale and label with units for y-axis;
2 marks for correct plotting of results and for student 2 +/- ½ a square;
1 mark for straight lines drawn through the points.
(ii) 1 mark for each of three of the following ideas:
the enzyme was most active at pH 8;
pH 8 is the optimum pH for this enzyme;
(allow for optimum pH between 6 and 8 or 8 and 10)
activity of the enzyme increased from pH 2 to pH 8;
activity of the enzyme decreased suddenly above pH 8 or at pH 10.
1 mark for each of the following ideas:
the enzyme is denatured by acidic pH or pH 10;
(so) the substrate / protein cannot fit the active site.
(b) (i) 1 mark for each of five of the following ideas:
carried the investigation out at a higher temperature;
used a more concentrated enzyme solution;
had a thinner layer of protein;
started the timer only when all the enzyme solution had been poured over the film;
stopped the timer as soon as a clear area started to form (rather than when all of it was clear).
(ii) 1 mark for each of five of the following ideas:
use the same type / thickness of photographic film;
use the same sized pieces of photographic film;
use the same concentration of enzyme solution;
use the same volume of enzyme solution in each test;
ensure the pH of the enzyme solution was exactly correct;
do each test at the same temperature;
use the same start point to start the timer;
use the same end point to stop the timer.

Total 18 marks

2 (a) (i) 1 mark for each correct row:

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(ii) 2 marks for 192 (mm³)
(allow 1 mark for 8 x 4 x 6)

(b) 1 mark for each of three of the following ideas:
volume of each bubble may be smaller;
mass of plant used may be greater;
light intensity may be greater;
temperature of water may be higher;
concentration of carbon dioxide in water may be higher.

Total 7 marks

3 (a) (i) 1 mark for smooth = 14
1 mark for wrinkled = 11
(ii) 1 mark for each of the following ideas:
y-axis labelled Number of seeds with suitable scale
x-axis labelled Plant with numbers 1, 2 and 3
suitable key or smooth and wrinkled clearly indicated
2 marks for all bars correctly plotted
(allow 1 mark for 3 or more bars correctly plotted)

(b) 1 mark for each of the following ideas:
parent plants were heterozygous;
allele for smooth seed dominant or allele for wrinkled seed recessive;
wrinkled seed produced with two recessive alleles
(this can be shown in a suitable genetic cross diagram).

Total 10 marks

4 (a) 1 mark for balance
(b) 1 mark for one of the following:
to identify anomalies;
to improve reliability.
(c) 1 mark for each of two correct variables
1 mark for each of two correctly linked suggestions:
mass / size of leaves – difficult to get them exactly the same, but fairly close;
humidity – easy to control;
air movement – easy to control.
(d) 1 mark for change in mass would be less when temperature is lower.
1 mark for idea that evaporation/ transpiration takes place more slowly at a lower temperature as the water particles have less energy.
(e) 1 mark for each of three of the following:
put Vaseline on the upper surface of some leaves;
put Vaseline in the lower surface of some leaves;
cover both surfaces of some leaves with Vaseline;
have some leaves without Vaseline on either surface.

Total 11 marks

5 (a) 1 mark for each of the following:
sample more quadrats and calculate a mean;
place the quadrats randomly.
(b) Please refer to marking guidance at the beginning of this mark scheme for guidance on how to mark this question.

Level 1 (1–2 marks)
The method described is basic but shows some understanding of the sequence of an investigation.

Level 2 (3–4 marks)
The method described is clear and will enable valid results to be collected.

Level 3 (5–6 marks)
The method described is clear and detailed and will enable valid results to be collected.

Examples of biology points made in the response:
use of identical seedlings;
suitable sample size;
how light intensity will be varied;
suitable range of light intensities;
how growth will be measured.

Total 8 marks