**AS practical assessment**

Assessment of practical skills in AS Biology will be by written exams only. Questions in the papers have been written in the expectation that students have carried out at least the six required practical activities. 15% of the marks in the papers will relate to practical work.

**Use of apparatus and techniques**

All students taking this speciﬁcation are expected to have carried out the required practical activities to develop skills in the use of many of the following apparatus and techniques.

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| **Apparatus and Techniques** | |
| AT a | use appropriate apparatus to record a range of quantitative measurements (to include mass,  time, volume, temperature, length and pH) |
| AT b | use appropriate instrumentation to record quantitative measurements, such as a colorimeter or potometer |
| AT c | use laboratory glassware apparatus for a variety of experimental techniques to include serial  dilutions |
| AT d | use of light microscope at high power and low power, including use of a graticule |
| AT e | produce scientiﬁc drawing from observation with annotations |
| AT f | use qualitative reagents to identify biological molecules |
| AT g | separate biological compounds using thin layer/paper chromatography or electrophoresis |
| AT h | safely and ethically use organisms to measure:  • plant or animal responses  • physiological functions |
| AT i | use microbiological aseptic techniques, including the use of agar plates and broth |
| AT j | safely use instruments for dissection of an animal organ, or plant organ |
| AT k | use sampling techniques in ﬁeldwork |
| AT l | use ICT such as computer modelling, or data logger to collect data, or use software to process data |

**AS required practical activities**

The following practicals must be carried out by all students taking this course. Written papers will assess knowledge and understanding of these, and the skills exempliﬁed within each practical.

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| Required activity | Apparatus and technique reference |
| 1. Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction | a, b, c, f, l |
| 2. Preparation of stained squashes of cells from plant root tips; setup and use of an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index | d, e, f |
| 3. Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue | c, h, j, l |
| 4. Investigation into the effect of a named variable on the permeability of cell-surface membranes | a, b, c, j, l |
| 5. Dissection of animal or plant gas exchange system or mass transport system or of organ within such a system | e, h, j |
| 6. Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth | c, i |

Some of these practicals are more suitable for highly structured approaches that develop key techniques. Others allow opportunities for students to develop investigative approaches. It is important that students have opportunities to learn in both ways. This list is not designed to limit the practical activities carried out by students. A rich practical experience for students will include more than the six required practical activities.