LEARNING UNLIMITED AS BIOLOGY PRACTICALS WEEKLY SCHEDULE

WEEK/PRACTICAL	SYLLABUS OBJECTIVE	PRACTICAL ACTIVITIES
1. BIOLOGICAL MOLECULES (IDENTIFICATION)	a. carry out tests for reducing sugars and non-reducing sugars, the iodine test for starch, the emulsion test for lipids and the biuret test for proteins to identify the contents of solutions	You are required to carry out tests, using only the reagents provided, to identify each of the solutions S1, S2 and S3. One of the solutions is glucose, another a protein and the third a carbohydrate other than glucose. You are required to identify each of the solutions, S1, S2 and S3. You must use only the reagents provided. 9700/31/M/J/08
2. BIOLOGICAL MOLECULES (QUALITATIVE)	a. carry out a semi-quantitative Benedict's test on a reducing sugar using **SIMPLE** dilution, standardising the test and using the results (colour standards or time to first colour change) to estimate the concentration	You will need to: • prepare known concentrations of sucrose solution using simple (proportional) dilution • carry out the non-reducing sugar test on these concentrations • carry out the non-reducing sugar test on the unknown concentration of sucrose solution in fruit extract, U • estimate the concentration of sucrose in fruit extract, U. 9700/33/M/J/18
3. BIOLOGICAL MOLECULES (QUANTITATIVE)	a. carry out a semi-quantitative Benedict's test on a reducing sugar using **SERIAL** dilution, standardising the test and using the results (colour standards or time to first colour change) to estimate the concentration	You are required to: • prepare different concentrations of the glucose solution G • carry out the Benedict's test on each of the concentrations of glucose solution you have prepared • carry out the Benedict's test on the solution representing blood plasma P • use the results of the Benedict's tests to estimate the concentration of glucose in P. 9700/35/M/J/16

4. ENZYMES 1 (INHIBITORY/CONCENTRATION)	a. investigate the progress of an enzyme-catalysed reaction by measuring rates of formation of products (for example, using catalase) or rates of disappearance of substrate (for example, using amylase) b. investigate and explain the effects of the following factors on the rate of enzyme-catalysed reactions: • enzyme concentration • substrate concentration • inhibitor concentration	1. You are required to investigate the effect of different concentrations of ethanol on the activity of yeast cells by measuring the change in pH, using Universal Indicator paper. 2. Simple Dilution 9700/31/M/J/09
5. ENZYMES 2 (pH/ TEMPERATURE)	a. investigate and explain the effects of the following factors on the rate of enzyme-catalysed reactions: • temperature • pH (using buffer solutions)	You are required to investigate the effect of temperature (independent variable) on the activity of a yeast cell suspension. 9700/32/M/J/16
6. FULL MICROSCOPY SESSION	a. compare the structure of typical animal and plant cells by making temporary preparations of living material and using photomicrographs b. calculate the linear magnifications of drawings, photomicrographs and electron micrographs c. use an eyepiece graticule and stage micrometer scale to measure cells and be familiar with units (millimetre, micrometre, nanometre) used in cell studies d. calculate actual sizes of specimens from drawings, photomicrographs and electron micrographs observe and draw the mitotic stages visible in temporary root e. tip squash preparations and in prepared slides of root tips of species such as those of *Vicia faba* and *Allium cepa*	• SIZE • SCALE • DRAWINGS • CALIBRATION • CALCULATIONS CONTENT EXTRACTED FROM SEVERAL PAST PAPERS
7. OSMOSIS	a. investigate diffusion and osmosis using plant tissue and non-living materials, such as Visking tubing and agar b. investigate the effects of immersing plant tissues in solutions of different water potentials, using the results to estimate the water potential of the tissues	1. You are required to investigate how much glucose diffuses through selectively permeable Visking (dialysis) tubing in 15 minutes. 2. 9700/33/M/J/10

8. LIVE SPECIMEN	a. Draw the distribution of different **LIVE** tissues in plant and animal specimens and label the drawings appropriately	1. You are required to: • observe and record the cells in S1 and the effect of adding water, W, to these cells • observe and record the onion cells to identify the concentration of the sodium chloride solutions, S2 and S3. 2. You are required to investigate the effect of staining the tissues of sweet banana with iodine solution. 9700/31/M/J/12
9. TRANSPIRATION	a. transpiration rate using simple potometers, leaf impressions, epidermal peels and grids for determining surface area b. make annotated drawings, using prepared slides of cross-sections, to show how leaves of xerophytic plants are adapted to reduce water loss by transpiration c. draw and label from prepared slides plan diagrams of transverse sections of stems, roots and leaves of herbaceous dicotyledonous plants using an eyepiece graticule to show tissues in correct proportions d. draw and label from prepared slides the cells in the different tissues in roots, stems and leaves of herbaceous dicotyledonous plants using transverse and longitudinal sections e. draw and label from prepared slides the structure of xylem vessel elements, phloem sieve tube elements and companion cells and be able to recognise these using the light microscope	You are provided with three samples, **S1**, **S2** and **S3** from plant root extracts, removed at different times of the year: • the middle of winter, when there was no plant growth • the beginning of spring, when plant growth begins • the middle of spring, during active growth. 9700/35/M/J/14
10. IMMOBILISATION OF BIOLOGICAL MOLS/ENZYMES	a. investigate and explain the effect of immobilising an enzyme in alginate on its activity as compared with its activity when free in solution	You are required • to immobilise the yeast cells in sodium alginate beads • to follow a student's procedure to investigate the independent variable, changing the surface area of the beads. 9700/32/M/J/10

11. MOVEMENT OF SUBSTANCES ACROSS MEMBRANE	c. calculate surface areas and volumes of simple shapes (including cubes) to illustrate the principle that surface area to volume ratios decrease with increasing size d. investigate the effect of changing surface area to volume ratio on diffusion using agar blocks of different sizes	You are required to investigate the effect of concentration of hydrochloric acid (independent variable) on the rate of diffusion. The investigation involves placing agar cubes containing an indicator into dilute hydrochloric acid. As the acid diffuses into the agar cubes the indicator changes colour. 9700/32/M/J/18
12. TITRATION	a. Estimate the concentration of unknown solutions from qualitative results	Manufacturers of fruit juice need to know the concentration of ascorbic acid (vitamin C) in fruit. The fruit is picked when the juice contains the highest concentration of ascorbic acid. The concentration of ascorbic acid can be estimated in a fruit extract by carrying out a test using starch solution and iodine solution. Iodine solution will be added one drop at a time using a syringe. 9700/34/O/N/18