Required practicals: Biology paper one

Name	Variables	Equipment	Method	Expected conclusion	Possible variations
B1 - Microscopy	Investigate the structure of plant and animal cells using a microscope.	*A microscope *Slides of animal cells *Slides of plant cells	1) Put the slide on the stage 2) Turn the nose piece to the lowest power objective lens 3) Move the stage until it is almost touching the objective lens 4) Look through the eyepiece and turn the coarse adjustment knob so that the stage moves down. Do this until the cells come into focus. 5) Use the fine adjustment knob to bring the cells into clear focus. 6) Switch the nose piece to a higher power lens. 7) Use the fine adjustment knob to bring the cells back into focus. 8) Draw and label some of the cells. 9) Write your magnification underneath the drawing 10) Multiply the objective magnification by the eyepiece magnification.	You should be able to identify the nucleus, cell wall, vacuole, cell membrane, chloroplasts and the cytoplasm.	Given an image and asked to work out magnification or real size
	Video of microscopy practical: link				

Name	Variables	Equipment	Method	Expected conclusion	Possible variations
B3 – Osmosis	Investigate the effect of a range of concentrations of salt or sugar on the mass of plant tissue IV – Concentration of sugar solution DV – Percentage change in mass of potato CV – Length of potato, diameter of potato, volume of sucrose solution, duration potato is left for	*A potato *A cork borer *A ruler *A 10cm3 measuring cylinder *Labels *5 boiling tubes *A test tube rack *Paper towels *A scalpel *A white tile *A range of sugar solutions (of different concentrations) *Distilled water *A top pan balance (accurate to 0.01g).	1) Use the cork borer to cut five potato cylinders of the same diameter 2) Use the scalpel to trim the potato cylinders to the 3cm long. 3) Measure the mass of each potato cylinder using a top pan balance and record in a results table. 4) Record the mass of each cylinder 5) Measure 10cm3 of each concentration of sugar solution into 4 of the boiling tube. 6) Measure 10cm3 of distilled water and add into the fifth boiling tube 7) Add one potato cylinder into each boiling tube 8) Leave the potato cylinders in the solution for 48 hours. 9) Remove the potato cylinders using the forceps and blot them dry with paper towel. 10) Measure the new mass of each potato cylinder and record in the results table. 11) Calculate the percentage change in mass of each potato cylinder and plot a graph against concentration.	When the potato cylinder doesn't change mass, the concentration of sugar in the solution is the same as the concentration of sugar in the potato	Investigate the effect of a range of salt concentrations on a potato cylinder Investigate the effect of a range of concentrations on sugar on the size of a visking tube/raisin
	Video of osmosis practical: link				

B4 – Food tests	Use qualitative reagents to test for carbohydrates (starch and sugars), lipids, proteins	For all: *Food sample *Test tube *Pipettes Benedict's test for sugars *Benedict's solution *Water bath *Thermometer Iodine test for starch *Iodine solution Lipids – ethanol *Ethanol *Distilled water Biuret test for protein: *Biuret solution A (Copper sulphate) *Biuret solution B (sodium hydroxide)	Benedict's test for sugar 1) Set up a waterbath. 2) Put some of the food sample into a test tube. 3) Add a few drops of Benedict's solution to the sample 4) Put the test tube in the waterbath at 80^{o}C for 5 minutes. 5) Note down any colour changes in your results table. Iodine test for starch 1) Put the food sample in the test tube 2) Add a few drops of iodine solution 3) Record colour changes Ethanol test for lipids: 1) Put a food sample into the test tube 2) Add a few drops of distilled water 3) Shake gently 4) Record any observations Biuret test for protein 1) Put a food sample into the test tube. 2) Add 1cm3 of bieuret solution A (copper sulphate). Add 1 cm3 of Biuret solution B (sodium hyudroxide). 3) Shake to mix 4) Record colour changes.	Benedict's test: No sugar: Blue Sugar: green/orange/red (most sugar!) Iodine test: No starch: orange/brown Starch: blue/black Ethanol test: If lipids present, a white milky layer of oil should form on top of the mixture Biuret test: No protein: Blue Protein: Purple	May also reference Sudan (III) for fats – forms a red layer on top of the mixture
	Video of food tests practical: link				

B5 – Enzymes	Investigate the effect of pH on the rate of reaction of amylase IV – pH of buffer solution DV – time taken for starch to break down into simple sugars (iodine solution to turn from black to brown) CV – Volume of starch solution, temperature of solution, whether the mixture is stirred	Big question: *10 test tubes *Test tube rack *Water bath *Thermometer *Spotting tile *5cm^3 measuring cylinder *Pipettes *Glass rod *Stop clock *Starch solution *Amylase solution *Iodine solution *Buffer solutions (range of pH values)	1) Heat the water bath to 35^{o}C. 2) Add 2cm3 of each buffer solution into individual test tubes. Label each. 3) Add 20cm3 of starch solution into test tube labelled "starch". 4) Put a thermometer in the starch to monitor the temperature. 5) Add 10cm3 of Amylase solution to another test tube. Label "amylase". 6) Put all test tubes into the water bath. 7) Allow the solutions to reach 35^{o}C. 8) Add one drop of iodine into each depression on the spotting tile. 9) When all solutions reach 35^{o}C, take one test tube of buffer solution, add the 2cm3 of starch and 2cm3 of amylase solution. Stir mixture with a glass rod. 10) Start a stop clock. 11) After 10 seconds use a pipette to add 2cm3 of the solution to one depression on the tile. 12) Continue to do every 10 seconds until the iodine solution turns from black to orange (showing the starch has been broken down into glucose).	As pH increases, rate of reaction should increase and then begin to decrease again as enzymes become denatured.	Investigate the effect of temperature/volume of amylase on rate of reaction of amylase Investigate the effect of temperature on the rate of reaction of protease/lipase (hint: Think about the indicator you would need to use!!)
	Video of enzymes practical: link				