NILE TUITION ACADEMY
Excellence in Science Tuition
niletuitionacademy.co.uk

GCSE Biology

Paper 1 · Required Practicals - Cheat Sheet

AQA Biology (8461) | Paper 1 | 6 Practicals

Quick-revision reference for the Required Practicals in AQA GCSE Biology. For each practical: the **aim**, the **method**, the **variables**, the expected **result**, and the **exam tips** examiners reward. Learn the method and the why, not just the what.

RP1 Microscopy of cells

AIM	Use a light microscope to observe, draw and label onion or cheek cells and calculate magnification.
METHOD	**1.** Peel a thin layer of onion epidermis, lay it flat on a slide and add a drop of iodine stain. **2.** Lower a coverslip at an angle with a mounting needle to avoid trapping air bubbles. **3.** Clip the slide on the stage, focus on low power first using the coarse focus, then switch to high power and sharpen with the fine focus. **4.** Draw the cells with a sharp pencil and label nucleus, cytoplasm, cell wall and membrane.
VARIABLES	IV: objective lens chosen · DV: detail/size of cells seen · Control: same specimen, stain and lighting
RESULT	Total magnification = eyepiece × objective. Real size = image size ÷ magnification; iodine makes the nucleus and starch grains visible.
EXAM TIPS	› Always start focusing on the lowest power objective to protect the lens and find the cells. › Convert units carefully: 1 mm = 1000 µm before dividing. › Draw clear unshaded outlines with a ruler scale line, not artistic sketches.

RP2 Microbiology - aseptic culture (separate Biology)

AIM	Investigate the effect of antiseptics or antibiotics on bacterial growth using aseptic technique.
METHOD	**1.** Sterilise the inoculating loop by passing it through a Bunsen flame until red hot, then let it cool. **2.** Spread bacteria evenly over sterile agar, then place paper discs soaked in different antiseptic concentrations onto the surface. **3.** Tape the lid on (do not seal fully) and incubate at 25°C for 24-48 hours. **4.** Measure the clear inhibition zone around each disc and calculate its area using πr^2.
VARIABLES	IV: antiseptic/antibiotic concentration · DV: area of the clear inhibition zone (cm^2) · Control: disc soaked in sterile water
RESULT	Larger inhibition zones mean greater killing of bacteria; the antiseptic that gives the biggest mean zone is most effective.
EXAM TIPS	› Work near a flame and keep the lid on as much as possible to prevent contamination. › Incubate at 25°C in school, not body temperature, to limit growth of human pathogens. › Compare areas, not diameters, so the zones are fairly judged.

RP3 Osmosis in plant tissue

AIM	Investigate the effect of sugar or salt solution concentration on the mass of potato tissue.
METHOD	**1.** Cut potato cylinders of equal length, blot them dry and record each starting mass. **2.** Place one cylinder in each of a range of sucrose concentrations (for example 0.0 to 1.0 mol/dm^3). **3.** Leave for a set time, then remove, blot dry and reweigh each cylinder. **4.** Calculate the percentage change in mass for each concentration and plot a graph.
VARIABLES	IV: sucrose concentration (mol/dm^3) · DV: percentage change in mass · Control: same potato, time, temperature and volume of solution
RESULT	Mass increases in dilute solutions (water enters) and decreases in concentrated ones (water leaves); the line crosses zero at the cell sap concentration.
EXAM TIPS	› Use percentage change, not raw mass change, so different starting masses compare fairly. › Blot gently and consistently - surface water adds false mass. › The concentration where mass change is zero equals the potato's internal solute concentration.

RP4 Food tests

AIM	Use qualitative reagents to test a food sample for starch, reducing sugars, protein and lipids.
METHOD	**1.** Starch: add iodine solution - it turns from orange-brown to blue-black if starch is present. **2.** Reducing sugar: add Benedict's solution and heat in a water bath - it changes from blue to green, yellow, orange or brick-red. **3.** Protein: add Biuret reagent - it turns from blue to purple/lilac if protein is present. **4.** Lipid: add ethanol then water (emulsion test) - a cloudy white emulsion shows lipid.
VARIABLES	IV: reagent/food sample tested · DV: final colour or appearance · Control: a known sample and a water-only negative test
RESULT	Each positive result gives a characteristic colour change; Benedict's colour grades from green to brick-red as sugar concentration rises.
EXAM TIPS	› Wear eye protection - Biuret contains sodium hydroxide which is corrosive. › Use a water bath, never a naked flame, for Benedict's because ethanol and some samples are flammable. › Run a negative control to prove the colour change is caused by the food, not the reagent.

RP5 Effect of pH on amylase

AIM	Investigate how pH affects the rate at which the enzyme amylase breaks down starch.
METHOD	**1.** Add buffer solution at a set pH, starch solution and amylase together at a fixed temperature. **2.** Every 30 seconds, transfer a drop of the mixture into iodine solution on a spotting tile. **3.** Record the time taken for the iodine to stop turning blue-black (starch fully digested). **4.** Repeat across a range of pH values and calculate rate as 1 ÷ time.
VARIABLES	IV: pH of the buffer · DV: time for starch to disappear (and rate = 1 ÷ time) · Control: same temperature, enzyme and starch volumes and concentrations
RESULT	Reaction is fastest at the optimum pH (around pH 7 for amylase); rate falls sharply either side as the active site denatures.
EXAM TIPS	› Use a water bath to keep temperature constant so only pH changes. › Take samples at regular fixed intervals to find the exact end point. › Rate is calculated as 1 ÷ time - a shorter time means a faster reaction.

RP7 Rate of photosynthesis and light

AIM	Investigate how light intensity affects the rate of photosynthesis in pondweed.
METHOD	**1.** Place a piece of pondweed (Cabomba or Elodea) in sodium hydrogencarbonate solution to supply CO_2. **2.** Position a lamp at a measured distance and let the plant settle for a minute. **3.** Count the oxygen bubbles released per minute, or measure the volume of gas collected. **4.** Repeat at increasing distances and use light intensity $\propto 1 \div \text{distance}^2$ (inverse square law).
VARIABLES	IV: light intensity (set by lamp distance) · DV: bubbles per minute or volume of O_2 · Control: same temperature, CO_2 supply and piece of pondweed
RESULT	Rate rises as light intensity increases, then levels off as another factor (CO_2 or temperature) becomes limiting.
EXAM TIPS	› Use a heat shield or water bath so the lamp does not warm the water and change temperature. › Light intensity follows the inverse square law, so doubling distance quarters the intensity. › Counting gas volume is more reliable than counting bubbles, which vary in size.