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GCSE Biology

Paper 2 · Required Practicals - Cheat Sheet

AQA Biology (8461) | Paper 2 | 4 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.

RP7 Reaction Time

AIM	Investigate the effect of a factor (e.g. practice or caffeine) on human reaction time using a falling-ruler test.
METHOD	**1.** Sit the subject with their forearm resting on a table, hand overhanging the edge, thumb and finger ready to catch. **2.** Hold a ruler vertically so the 0 cm mark sits level with the gap between their finger and thumb; drop it without warning. **3.** The subject catches the ruler as fast as they can; record the distance fallen (cm) at the top of the thumb. **4.** Repeat several times, discard anomalies and calculate a mean; convert distance to time using a ruler-drop conversion table.
VARIABLES	IV: the factor tested (e.g. with/without caffeine, or trial number) · DV: distance the ruler falls (cm), proportional to reaction time · Control: same person, same hand, same ruler, no warning given each drop
RESULT	A shorter fall distance means a faster reaction time; the factor (such as caffeine or practice) typically decreases the distance, showing reduced reaction time.
EXAM TIPS	› Distance is NOT reaction time − a longer fall means a slower reaction; only the conversion gives the actual time. › Take repeats and a mean to reduce random error from the catcher anticipating the drop. › Drop the ruler at random moments so the subject cannot predict and pre-react.

RP8 Plant Responses (Tropisms)

AIM	Investigate the effect of light or gravity on the direction of growth of newly germinated seedlings.
METHOD	**1.** Soak and germinate cress or pea seedlings on damp cotton wool in identical Petri dishes or boiling tubes. **2.** For phototropism: place dishes in a light-proof box with light coming from one side only; keep one in all-round light as a control. **3.** For gravitropism: lay germinated seedlings horizontally in the dark so only gravity acts as a stimulus. **4.** Leave for several days under identical conditions, then observe and measure the direction and angle of shoot and root growth.
VARIABLES	IV: direction of the stimulus (light from one side, or orientation relative to gravity) · DV: direction/angle the shoots and roots grow · Control: water, temperature, seedling type and age, and time kept the same
RESULT	Shoots grow towards light (positive phototropism) and away from gravity (negative gravitropism); roots grow away from light and towards gravity − caused by unequal distribution of the hormone auxin.
EXAM TIPS	› Keep gravitropism dishes in the dark so light does not act as a second variable. › Auxin accumulates on the shaded/lower side − in shoots it speeds growth, in roots it slows growth, giving opposite bending. › Use several seedlings per dish and the same species to make results reliable and comparable.

RP9 Distribution and Sampling (Quadrats and Transects)

AIM	Measure the population size or distribution of a common species using random sampling with quadrats and a transect line.
METHOD	**1.** To estimate population size: lay two long tapes at right angles and use random number coordinates to place a quadrat at random positions. **2.** Count the number (or percentage cover) of the chosen species in each quadrat and calculate a mean per quadrat. **3.** Scale up: mean per quadrat × total area ÷ quadrat area to estimate the population of the whole field. **4.** To study distribution along an environmental gradient, place quadrats at regular intervals along a transect line and record abundance plus an abiotic factor (e.g. light or soil moisture).
VARIABLES	IV: distance along the transect / the abiotic gradient · DV: abundance or percentage cover of the species sampled · Control: same quadrat size, same species, same counting method and sampler each time
RESULT	Random quadrats give an unbiased estimate of population size; the transect shows how abundance changes along the gradient, revealing how an abiotic factor affects distribution.
EXAM TIPS	› Use random coordinates (not your own choice of spot) for population estimates to avoid sampling bias. › Use a systematic transect − not random placement − when investigating how distribution changes across a gradient. › More quadrats give a more reliable mean and a better estimate of the true population.

RP10 Rate of Decay (Decomposition)

AIM	Investigate the effect of temperature on the rate of decay of fresh milk by measuring the change in pH.
METHOD	**1.** Add a fixed volume of fresh milk and the same volume of dilute sodium carbonate solution plus a few drops of cresol red indicator to a tube. **2.** Add a set volume of lipase, start a stopclock and place the tube in a water bath at a chosen temperature. **3.** Lipase breaks down fats into fatty acids, lowering the pH; the indicator changes from purple/pink to yellow at around pH 6.5. **4.** Record the time taken for the colour change; repeat at a range of temperatures (e.g. 10 °C to 50 °C) and calculate rate as 1 ÷ time.
VARIABLES	IV: temperature of the water bath (°C) · DV: time for the indicator to change colour (decay rate = 1 ÷ time) · Control: volume of milk, sodium carbonate, lipase and indicator, and the milk type kept the same
RESULT	Decay rate increases with temperature up to an optimum then falls as the lipase enzyme denatures; warm, moist conditions speed decomposition by microbes and enzymes.
EXAM TIPS	› Decay is fastest in warm, moist, oxygen-rich conditions because microbe and enzyme activity rises. › Above the optimum the enzyme denatures, so rate drops − the relationship is not simply linear. › Use 1 ÷ time as the measure of rate: a shorter time means a faster rate of decay.