Paper 6 asks you to describe investigations, read results you did not collect, draw what you are shown and plan a fair test. The biology is Core and Supplement content you already have; the marks are for method, variables, tables, graphs and drawings.

Food tests – the five that are always examined

Starch 淀粉 — add iodine solution – orange-brown to blue-black

Reducing sugar 还原糖 — add Benedict's solution and heat in a water bath – blue to green, yellow, orange, then brick-red as the amount increases

Protein 蛋白质 — add biuret solution (or NaOH then a few drops of copper sulfate) – blue to purple/violet

Fat 脂肪 — ethanol emulsion test – add ethanol, shake, then pour into water: a white/cloudy emulsion forms

Vitamin C 维生素 C — add the sample drop by drop to DCPIP – the blue colour is decolourised; fewer drops means more vitamin C

Give both colours and the direction every time. 'It changes colour' scores nothing.

Benedict's is semi-quantitative: the final colour tells you HOW MUCH reducing sugar, so a question comparing samples wants the colour sequence, not just positive or negative.

Always describe the control: the same test on distilled water, which should give no change. It shows the result came from the food and not the reagent.

Variables and fair testing

Name the variable you change, the variable you measure, and at least three you keep the same – with HOW you keep each the same.

Control experiment 对照实验 — an identical set-up with the factor being tested removed (boiled enzyme, no light, distilled water). It is not the same as a controlled variable

For any enzyme investigation, control pH with a buffer and temperature with a water bath. Leaving either free invalidates the result and examiners look for both.

Repeat each measurement at least three times and take a mean; say so explicitly.

Use the same volumes, the same mass of tissue, the same time and the same apparatus between runs – and say it.

Where living organisms are used, say how you would treat them humanely and return them to their habitat.

Recording and presenting results

Head each column with the quantity and unit: ‘time / min’, ‘height / mm’, ‘number of bubbles per minute’.

Give raw readings to the same precision down a column, and put calculated means one decimal place beyond only if the readings justify it.

Bar chart for categories (species, food types) with gaps; line graph for two continuous variables; histogram for continuous grouped data with no gaps. Picking the wrong one loses the mark before the data is read.

Label both axes with quantity and unit, use over half the grid, plot small crosses and draw the line the points support.

Percentage change 百分比变化 — (final − initial) ÷ initial × 100 – keep the minus sign for a decrease, it is part of the answer

Rate 速率 — amount ÷ time, with a unit made from both: ‘bubbles per minute’, ‘mm^3 of gas per second’

When a question says ‘use the graph’, draw dotted construction lines and leave them there. They are the evidence for your number.

Biological drawing

Sharp pencil, single clear unbroken lines, NO shading and no sketchy overlapping strokes. Shading is explicitly penalised.

Use at least half the space given – small drawings lose marks for proportion.

Draw what you actually see in the specimen or photograph, in the proportions it has, not a textbook version from memory.

Label lines are ruled, do not cross each other, touch the structure exactly, and end at a horizontal label written outside the drawing.

Add a title naming the specimen, and a magnification or scale line if the question asks.

Magnification = image size ÷ actual size. Measure the image with a ruler in mm, and convert units before dividing – most lost marks here are conversions.

The standard investigations

Photosynthesis rate 光合速率 — count oxygen bubbles from pondweed per minute at different distances from a lamp; control temperature with a heat shield, and remember light intensity $\propto 1/\text{distance}^2$

Respiration 呼吸作用 — germinating seeds in a sealed flask with soda lime and a manometer; the control is boiled dead seeds, and a temperature rise shows respiration releases heat

Osmosis in potato 渗透 — cylinders of equal size in different sugar concentrations; measure mass before and after, calculate PERCENTAGE change so different starting masses are comparable

Transpiration 蒸腾作用 — a potometer measures water UPTAKE, which is close to but not the same as transpiration; vary wind, humidity, light and temperature one at a time

Enzyme activity 酶活性 — time a fixed change (starch disappearing with iodine, a clock reaction, gas collected) at different temperature or pH; rate = 1 ÷ time

For any of these, the expected answer names the variable, the control, the repeats and the processing – in that order. Write them as separate sentences so each is visible.