

CIE Biology GCSE

General practical skills

Planning experiments and improving technique

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Planning your own experiment

Think about the best way to test whatever it is you are investigating. Remember there are many types of experiment, as well as ways to collect and analyse data. One of the first things to consider is your **independent variable - IV** (what you will change) and **dependent variable - DV** (what you will measure). You will also need to identify **control variables** (what you will make sure to keep the same). It may be beneficial to do a **trial run** of your experiment; this will help you to choose an appropriate range of values for your IV, know what values you should expect to achieve for your DV, and be aware of any other variables that need to be controlled.

Many experiments need two groups, namely an **experimental group** and a **control group**. This is because if you only have a group where you change your IV (an experimental group), you cannot tell what would have happened if you did not change your IV. Therefore a control group involves replicating everything about the experimental group, except for keeping the IV the same. This allows you to test if the IV is having a **true** effect on the DV.

You should plan to include at least two **repeats** in your experiment. This will make the results more **reliable**, and help you to rule out **anomalies**.

Think carefully about what **apparatus** you will use. It is important to choose **precise** equipment, with an appropriate **resolution** for your measurements. It should also be **sensitive** enough to detect the change you expect to see in your DV.

Another important aspect of planning an experiment is carrying out a **risk assessment**. You must identify any potential hazards involved in your experiment e.g. a risk of burns if heat is involved, or a risk of cuts if glass is involved. This doesn't mean you can't have any risks in your experiment, but rather that you need to be **aware** of the risks and take **precautions** to avoid accidents happening.

Reflecting on how well your plan worked

Did you choose the right range of values for your IV? Was your DV affected by your IV in the way you expected? Was your measuring equipment sensitive enough to detect the change? Were there any confounding variables that you were unaware of, or unable to control for? Did you choose the right apparatus for your needs?

Suggesting improvements

Here are some common issues that can affect the results of experiments;

- Small **sample size**
- Experiment was **not repeated**
- Equipment **not precise**
- Certain variables were **not controlled**

