Variables

When conducting a science experiment there are three types of variables:

- **Independent Variable (IV)** – the thing you deliberately change in the experiment.
- **Dependent Variable (DV)** – what you measure or observe; it depends on the IV.
- **Controlled Variables (CV)** — factors you keep the same to make the test fair.

From each scenario below, identify the IV and DV and suggest 2–3 CVs.

e.g. A student measures how long it takes for amylase to digest starch at varying pH.

DV : time taken for starch to be digested (or rate of amylase)

IV: pH

CV: (1) concentration of amylase/starch,
(2) volume of amylase/starch solution,
(3) temperature

NOTE:

DV and IV can be identified from the scenario.

When stating CVs, think about any other factors that could affect the DV, and you will *control* them to ensure the test is fair.

You will not get a mark for saying "**amount**", for CV – instead say **concentration** or **volume** of...

1. A student is investigating the effect of light intensity on photosynthesis by counting oxygen bubbles per minute at different distances from a lamp.

IV: .....

DV: .....

CV: (1) .....

(2) .....

(3) .....

2. Finding temperature change when 10cm^3 hydrochloric acid reacts with magnesium.

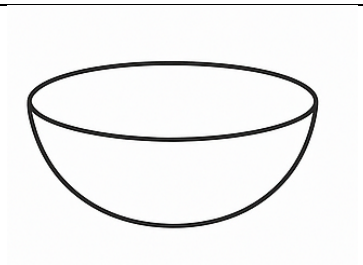
IV: .....

DV: .....

CV: (1) .....

(2) .....

(3) .....



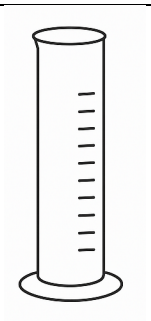
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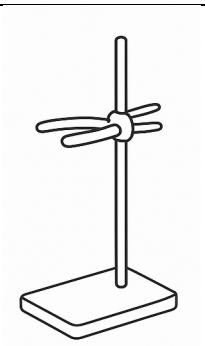
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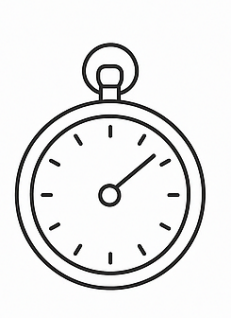
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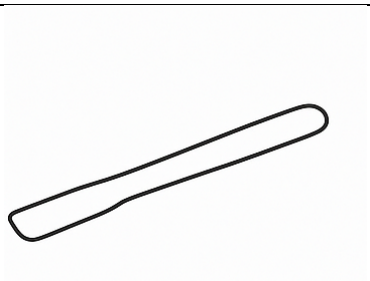
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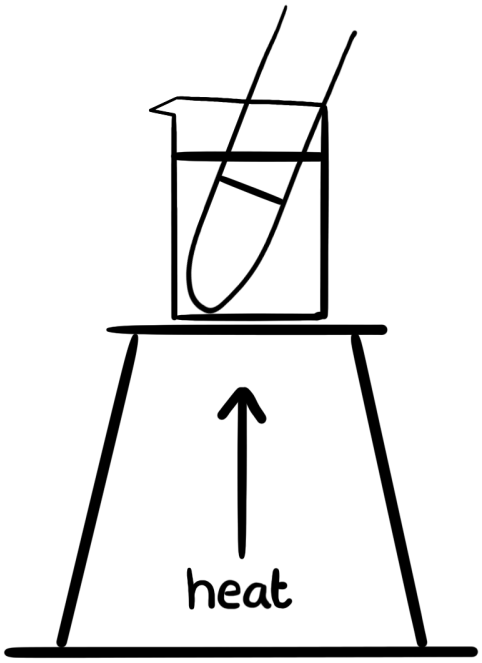
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Challenge:

What is set up in the box to the left?

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Writing a method

1. When a coil of solid magnesium is added to hydrochloric acid, the temperature of the reaction increases.

Plan an investigation to identify how changing the mass of magnesium affects the temperature change of the reaction.

Tips to answer:

1. Identify the IV, DV and suggest 2-3 CVs

2. State lab equipment

3. Write the steps for the experiment

4. Repeat

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[6 marks]

2. A student has been asked to identify three metals labelled **A**, **B** and **C**.

The metals are magnesium, copper and zinc.

Describe a method to identify the three metals by comparing their reactions with dilute hydrochloric acid. Give details of the results the student would observe.

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[6 marks]

Analysing data

1. A student investigated the effect of light intensity on the rate of photosynthesis by counting oxygen bubbles per minute at different distances from a lamp.

The table below shows the results.

Lamp distance (cm)	Trial 1	Trial 2	Trial 3	Mean bubble rate
10	32	30	33	
20	24	25	23	
30	15	16	14	
40	9	10	40	
50	5	6	5	

(a) Identify by circling the anomaly in the table.

(b) Calculate the mean bubble rate for each distance.
Show working below.

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(c) Describe the trend from the mean data you calculated in part (b).

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(d) Suggest an improvement the student could make to this experiment.

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