1. **Purpose of experiments or scientific investigations in the science classroom**

   An experiment can provide proof of a theory, and a scientific investigation is used to determine a relationship between different variables and to confirm or reject a hypothesis.

   To determine the relationship between variables you must alter ONE variable and measure or observe another variable while keeping everything else the same. Why just one? If you changed more than one variable it would be hard to figure out which change is causing what you observe.

2. **Variables**

   In science, a **variable** is any item, factor, or condition that can be controlled or changed.

   2.1 **Independent variable**
   
   The independent variable is the one that is changed by the scientist.
   
   (Independent variable = I control; the scientist controls)

   2.2 **Dependent variable**
   
   The dependent variable is the one that is observed or measured in the experiment.

   The observation or measurement of the dependent variable will change as the independent variable is altered.

   2.3 **Controlled variables**

   Controlled variables are quantities that a scientist wants to remain constant.
Experiment 1:

Aim:
To investigate how the amount of water given to a plant per day will affect its height (growth).

Investigative question:

The investigative question:
(1) Must include the independent AND the dependent variable.
(2) Must ask a QUESTION about the RELATIONSHIP between the variables.
(3) How will the …… affect the ……?
   OR
   What is the relationship between….. and ……?
(4) Must end with a question mark ?.
(5) Make sure the answer to the question is NOT yes or no. Yes or no questions are not well-formulated investigative questions.
(6) Change the aim into a question.

Hypothesis:

The hypothesis:
(1) Indicates what you expect the outcome of the investigation to be.
(2) Must include both variables and indicate the relationship between them.
(3) If ………, then ………
(4) Use words like increase, decrease, etc. to indicate that if one variable gets more/less, the other variable gets more/less.
Apparatus and method:

*Plan an investigation which is fair and will produce reliable results. Write down what you will be doing. Organise your method in steps.*

You must control an experiment. You can test only one variable at a time. (How does the amount of water effect plant growth? Keep the light, containers, soil and plants the same.) Controls are kept the same in all trials. A Control Group is the set-up that isn’t changed. (One plant gets the normal amount of water). The independent variable is the thing you change (amount of water). The dependent variable is the result of the change you made (height of plant in cm.).

Controls: Light, type of plant, amount of soil, pot, temperature.

Variables:

**Independent variable:**

**Dependent variable:**

**Controlled variables:**

(5)

Y-axis

![Diagram of Y-axis and X-axis](image)

D

ependent variable

X-axis

Independent variable
Results:
Record observations and measurements in a table. Draw graphs to illustrate the data.

<table>
<thead>
<tr>
<th>POT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td>25</td>
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<td>0</td>
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<tr>
<td>Average height of seedlings in cm</td>
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<td></td>
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<tr>
<td>Amount of water given per day</td>
<td>20 cm³</td>
<td>35 cm³</td>
<td>45 cm³</td>
<td>50 cm³</td>
<td>80 cm³</td>
</tr>
</tbody>
</table>

Conclusion:

___________________________________________________________________

___________________________________________________________________

(2)

The conclusion:
(1) Must contain both variables.
(2) Must indicate the relationship between the variables.
(3) Is the answer to the investigative question.
(4) Must confirm or reject the hypothesis.

Experiment 2:
Study the graph of an experiment that was done by a group of learners.

2.1 Formulate an investigative question.

___________________________________________________________________

(2)

2.2 Identify the:

2.2.1 Independent variable ________________________________ (1)

2.2.2 Dependent variable ________________________________ (1)

2.2.3 Controlled variables ______________________________________

___________________________________________________________________ (3)

TOTAL: 25