

Use these sentence starters to plan your lab. Make sure your lab report has all four major sections.

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### Research Question: Explain the problem or question to be tested

- I want to investigate....
  - This is because I have observed that...

OR

- I will test the effect of ... on ....
  - This is because I have observed that...

I have given a detailed account of a **problem** I want to investigate using scientific facts and sources, and how it is connected to the topic we are studying. I have stated the problem as a research question that includes my **variables**.

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### Variables: Explain how to *manipulate variables* and how to *collect data*

- The **independent variable** is the variable **I am changing**.
  - My independent variable is...
  - I will change the independent variable by increasing / decreasing from ... to ...
  - I will change the independent variable in increments of ...
- The **dependent variable** is the variable **I will measure**.
  - My dependent variable is...
  - I will measure the dependent variable by...
  - I will repeat my measurements ... times to be more reliable.
- The **controlled variables** are variables that I will **keep the same** to make my test more reliable. Identify at least 3-5.
  - I will control ... by ... because ...

I have given a detailed account of how to manipulate the **independent variable**, how to measure the **dependent variable** to collect sufficient relevant data, and how to manipulate all the **controlled variables**.

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### Hypothesis: Formulate a *testable hypothesis* using *scientific reasoning*

- I predict that if I increase / decrease ... then ... will ...
  - This is because...
  - Other sources that supports my hypothesis are....
- My prediction is / is not testable. I know this because ....

My hypothesis is testable and I provide details about my **variables** using words like 'increase, decrease, no change', and I have supported it clearly using correct scientific reasoning in my 'because' statement.

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### Method & Materials: Design a *safe, logical* and *complete* method

- There are some / no risks in this investigation because...
- I will **stay safe** by ...
- I will **keep others safe** by ...
- I need to use these **materials** and **equipment** in my investigation...
- I need to **carry out these steps** in my investigation...
- This is a photo / diagram of my investigation

My procedures are safe, complete, and logical. Someone else would have no problem with my lab because I describe how to work with the variables and collect data.

I have selected every material I will need, including quantities, and I won't need to ask for anything on the day of the lab.

Commonly-confused words. Make sure **you** use them correctly.

#### Facts

are *simple truths* that we use when we describe the universe. Often we can measure them.

#### Hypothesis

is a *testable prediction* that we make, with a logical *reason*.

A **scientific problem** is a **question** that we are trying to solve by making a **hypothesis** and **testing** it with an **experiment**.

**SAFETY FIRST!**



Source: [dynamator.com](http://dynamator.com)

Use these sentence starters to guide the conclusion section of your lab report.

### **Data: Collect, transform and present data**

- This table shows my measurements.
- This graph shows my final results.
- I made these **observations** while carrying out my experiment...
- I think my data were / were not reliable because...

I have correctly organized the data I collected in my experiment using **tables** that include units in the proper place. I have **processed** my **data** using proper methods and showed examples. My **graph** is correct, including titles, axis labels, and I have used lines of best fit.

### **Patterns: Interpret data and explain the results using scientific reasoning**

- My data show that ....
- My data suggest that ...
- This might be because ...
- Another source that supports this reason is... which says...
- I conclude that this experiment has / has not helped me solve my original problem. This is because...

I have correctly used knowledge and understanding of science to recognize **patterns** and draw conclusions from the data. I have correctly given a detailed account of how and why the variables are related.

### **Validity of Hypothesis: Discuss the validity of the hypothesis**

- I predicted that ...
- My data support / do not support / partially support my prediction.
- I think this because...

I have evaluated my hypothesis by weighing up the strengths and limitations of the data I collected, and have used the data to clearly state if I my hypothesis has been supported or not. I use scientific reasons and sources to help explain my reasons.

### **Validity of Method: Evaluate the validity of the method**

- The method I followed did allow / did not allow / partially allowed me to answer the research question.
  - I think this because...
- Some *strengths* in the method were...
- Some *weaknesses* in the method I was given were...
- Something I found *difficult* in carrying out the method was...
- If I wanted to test the same problem again, I would / would not use the same method. This is because...

I have evaluated my method by weighing up the strengths and limitations of my procedures and lab work. I have specifically discussed the validity and reliability of my methods in the table and addressed its significance.

### **Improvements: Explain improvements or extensions to the method**

- I could improve the method by ....
- I would make these improvements because...
- This investigation has made me think of a new question, which is...
- I could test this by...
- I would like to find out more about ... because...

I have given a detailed account of how I **suggest improvements** to specific limitations in my procedures. These suggestions are realistic and based on scientific reasoning and research.

### Commonly-confused words. Make sure **you** use them correctly.

#### **Facts**

are *simple truths* that we use when we describe the universe. Often we can measure them.

#### **Hypothesis**

is a *testable prediction* that we make, with a logical *reason*.

#### **Good scientists**

are not trying to 'prove' themselves 'right'.

Good scientists want to **test their ideas** in case they are not supported. This gives them more interesting questions to ask next

#### **'Banned words'**

- "Proves"
- "Correct"
- "Right"
- "Wrong"

*These are not scientific.*

Instead we talk about how the evidence we collect (our data) do or do not support our hypothesis.

