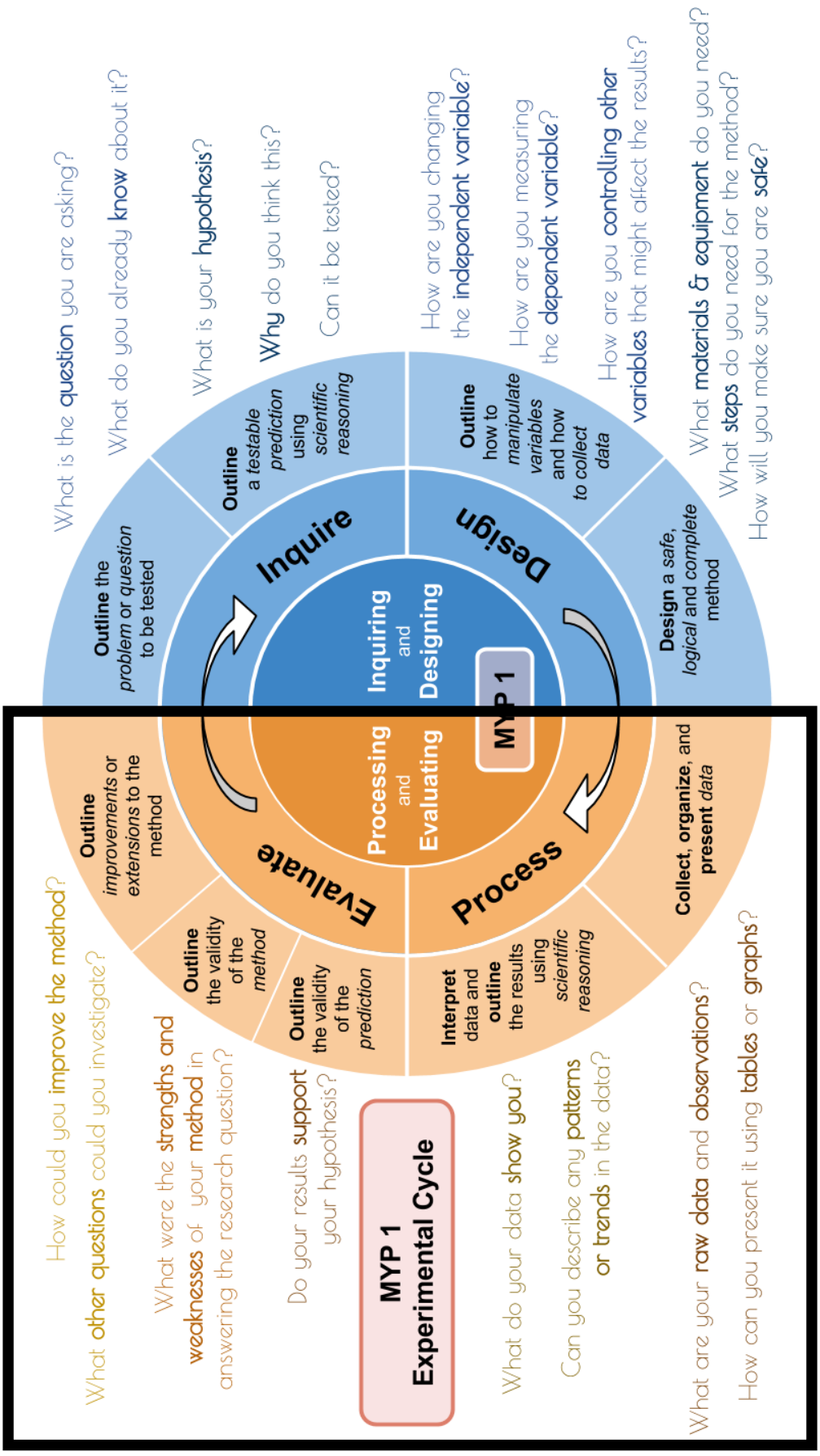
*We use the **experimental cycle** to help us plan, carry out and write about scientific investigations.*



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

Data: **Collect**, **organize** 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 **outline** 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 some details of how and the variables are related.

Validity of Hypothesis: **Discuss** the *validity* of the *prediction*

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

I have **evaluated my hypothesis** by considering many possibilities. I 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: **Discuss** 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 considering the strengths and limitations of my procedures and lab work. I have discussed the validity and reliability of my methods, and addressed its significance.

Improvements: **Describe** 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 provided details of how I **suggest improvement** to 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.

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Criterion C: Processing & Evaluating

i. present collected and transformed data
ii. interpret data and outline results using scientific reasoning
iii. discuss the validity of a prediction based on the outcome of the scientific investigation
iv. discuss the validity of the method
v. describe improvements or extensions to the method

Level	*The student is able to:*
1-2	i. **collect and present** data in numerical and/or visual forms ii. **interpret** data iii. **state** the validity of a prediction based on the outcome of a scientific investigation, **with limited success** iv. **state** the validity of the method based on the outcome of a scientific investigation, **with limited success** v. **state** improvements or extensions to the method that would benefit the scientific investigation, **with limited success**.
3-4	i. **correctly collect and present** data in numerical and/or visual forms ii. **accurately interpret** data and **outline** results iii. **state** the validity of a prediction based on the outcome of a scientific investigation iv. **state** the validity of the method based on the outcome of a scientific investigation v. **state** improvements or extensions to the method that would benefit the scientific investigation.
5-6	i. **correctly collect, organize and present** data in numerical and/or visual forms ii. **accurately interpret** data and **outline** results **using scientific reasoning** iii. **outline** the validity of a prediction based on the outcome of a scientific investigation iv. **outline** the validity of the method based on the outcome of a scientific investigation v. **outline** improvements or extensions to the method that would benefit the scientific investigation.
7-8	i. **correctly collect, organize, transform and present** data in numerical and/or visual forms ii. **accurately interpret** data and **outline** results **using correct scientific reasoning** iii. **discuss** the validity of a prediction based on the outcome of a scientific investigation iv. **discuss** the validity of the method based on the outcome of a scientific investigation v. **describe** improvements or extensions to the method that would benefit the scientific investigation.

Self Reflection Rubric

C	***i.*** *present collected and transformed data*	***ii.*** *interpret data and outline results using scientific reasoning*	***iii.*** *discuss the prediction of a based on the outcome of the scientific investigation*	***iv.*** *discuss the validity of the method*	***v.*** *describe improvements or extensions to the method*
1-2	I have presented the data I collected in my experiment using **tables** or **graphs**.	I have attempted to recognize **patterns** and draw conclusions from the data.	I have **evaluated my hypothesis**.	I have **evaluated my method**.	I have stated how I **suggest improvement** to my procedures.
3-4	I have presented the data I collected in my experiment by using the correct type of **graph**, including titles, axis labels.	I have used knowledge and understanding of science to recognize **patterns** and draw conclusions from the data.	I have **evaluated my hypothesis** by stating if it has been supported or not, based on my data.	I have **evaluated my method** by listing errors in my procedures and lab work.	I have stated how I **suggest improvement** to limitations in my procedures.
5-6	I have organized the data I collected in my experiment using **tables** that include units in the proper place. My **graph** is the correct type, including titles, axis labels, and I have used lines of best fit.	I have correctly used knowledge and understanding of science to recognize **patterns** and draw conclusions from the data. I have given some details of how and the variables are related.	I have **evaluated my hypothesis** by briefly mentioning the data to state if I my hypothesis has been supported or not, based on my data.	I have **evaluated my method** by briefly considering my procedures and lab work.	I have given brief details of how I **suggest improvement** to limitations in my procedures.
7-8	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.	I have correctly used knowledge and understanding of science to recognize **patterns** and draw conclusions from the data. I have correctly given some details of how and the variables are related.	I have **evaluated my hypothesis** by considering many possibilities. I 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.	I have **evaluated my method** by considering the strengths and limitations of my procedures and lab work. I have discussed the validity and reliability of my methods, and addressed its significance.	I have provided details of how I **suggest improvement** to limitations in my procedures. These suggestions are realistic and based on scientific reasoning and research.

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