

# Steps to Scientific Inquiry Notes

## “QOIHEDC”.

The first step of Scientific Inquiry is:



- **Pose a Question.**
- Scientists usually begin an investigation with a question about something that is unexplained.
- Ex: Does the shape of ice affect how quickly the ice melts.

*After they pose this question, scientists make Observations and Inferences.*



- Observations involve using one or more of your senses to gather information.
- Examples of Observations:
  - color of ice
  - surface texture of ice
  - surface area of ice



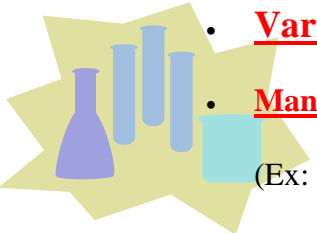
- Inferences are interpretations (or assumptions) based on observations and prior knowledge.
- Examples of Inferences: The ice was made from water.

*The fourth step of Scientific Inquiry is to develop a Hypothesis.*




- A hypothesis is a possible explanation for a set of observations or an answer to a scientific question. It must be something that can be tested.
- After a hypothesis is tested once, it must be tested several other times to make sure the results are consistent.
- Example of a hypothesis: The shape of an object (ice) has no effect on the speed of melting.

*The fifth step of Scientific Inquiry is to design an Experiment.*


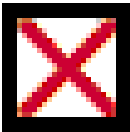

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- Variables – all the factors that could affect the outcome of an experiment
  - Manipulated variable – the factor that scientists change  
(Ex: shape of ice)
  - Controlled experiment – one in which there is only 1 manipulated variable and all other variables are kept constant

*While conducting an experiment, scientists collect DATA (the sixth step of Scientific Inquiry)*

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- Data – facts, figures and other evidence collected in an experiment. It comes in the forms of descriptions or measurements.
  - Once all the data have been collected, scientists need to interpret, or find the meaning of, these data. Interpreting data involves looking for patterns or trends.

Data can be displayed in: diagrams tables graphs

*The last step of Scientific Inquiry is drawing a Conclusion.*

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- After all data are interpreted, scientists are ready to draw a conclusion.
  - Sometimes the data will support the hypothesis.
  - Sometimes it will show the hypothesis is incorrect and that's OK. Eliminating a hypothesis is as important as proving it.
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- Sometimes no conclusion can be reached. This means that scientists need to design more experiments to gather more data.
  - Usually any findings will lead to a new question and a new experiment!!
  - The conclusion should be in paragraph form and include:
    - Restate the problem.
    - Restate the hypothesis.
    - State the results of the study by describing the data
    - State if the hypothesis was correct or not correct
    - Predict the next question (problem) that could be tested
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- Ex: In my experiment I was testing to determine if the shape of ice affects the melting speed of the ice. I hypothesized that the shape would not affect the speed of melting. The experiment was conducted 5 times. The long rectangular shaped ice melted an average of 4 minutes before the square block. This data does not support my hypothesis. I will continue this experiment with larger volumes of ice in the same shapes.