

## **SCIENCE PROCESS SKILLS AND INQUIRY FLIP CARD**

**The Big Idea:** Science is about trying to *figure out how the world works* by making *careful observations* and trying to *make sense of those observations through structured thinking*.

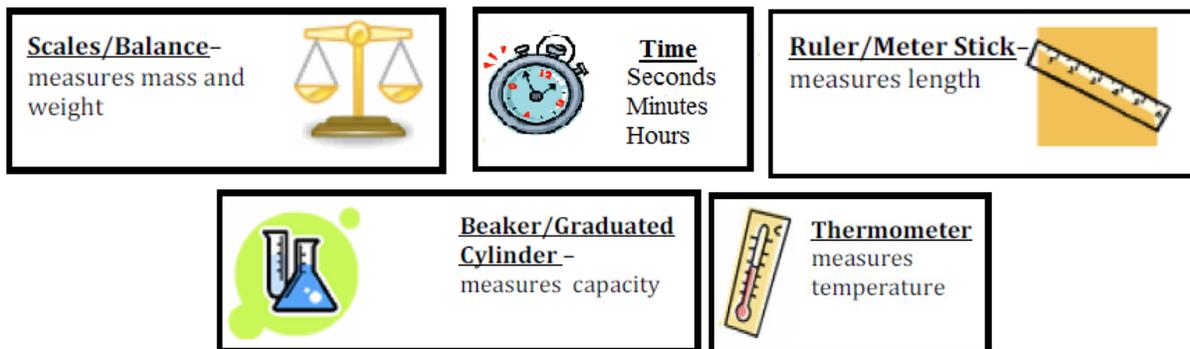
Be a science **STAR**:

<b>Sense</b>	<b>T</b> HINK	<b>A</b> CT	<b>R</b> EFLECT
Observe & quantify the subject you are studying using tools and senses.	Consider what is happening based on what you already know, previous experience, past patterns, reading, discussing.	Test your ideas through experiment or further observation.	Record, review, and communicate results to other interested people to create more ideas.

**Observing (Qualitative)** Using the 5 senses (sight, hearing, smell, taste, touch) to find out about objects and events.

**Classifying** Grouping or ordering objects or events according to similarities or differences in qualities.

**Observing/Measuring (Quantitative)** Observations are quantified using proper measuring devices and techniques.



**Observation** What can be described or measured. Scientists must be careful to describe only what is sensed or measured; if they begin with the assumption they already understand an event or phenomena, they may ignore observations that disagree with their existing view.

**Inferring** Interpreting or explaining observations. **Observation + Experience or Knowledge = Inference**

**Predicting** Forming an idea of an expected result of what will occur based upon present knowledge and understandings, observations and inferences. **Observation + Inference + Future Thinking = Prediction**

**Hypothesizing** Ideas based on evidence that can be tested through experimentation.

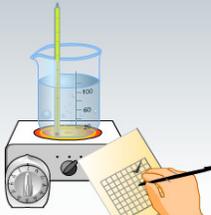
**Experimenting** Designing a model or identifying an event that can be used to test a hypothesis using procedures to get reliable data.

**Controlling Variables** Changing one factor to investigate the outcome of an event while all other factors are not changed.

**Collecting & Interpreting Data** Gathering, recording, and analyzing information about observations and measurements in a systematic way.

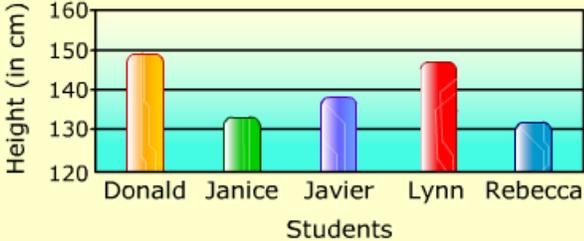
**Communicating** Using the written and spoken word, graphs, demonstrations, drawings, diagrams, or tables to transmit information and ideas to others.

**Scientific Inquiry: Curiosity about an event or phenomena leads to possible explanations that can be tested to record data and draw conclusions.**

 <p><b>Question</b></p> <p>A scientist begins an investigation by raising a question that an experiment can answer, such as "Does salted water take longer to boil?"</p>	<p><b>Hypothesis</b></p> <p>Based on early observation, a scientist forms a <b>hypothesis</b>, or explanation, that may answer his or her question. "Salt dissolved in water lowers the rate at which molecules of water can enter the air" is an example of a hypothesis. To see whether this hypothesis holds water, it must be tested.</p>	<p><b>Prediction</b></p> <p>Based on the <b>hypothesis</b>, a scientist makes and tests a prediction. Hypothesis: "Salt dissolved in water lowers the rate at which molecules of water can enter the air." Prediction: "Salted water will take longer to come to a boil."</p>
<p><b>Experiment</b></p> <p>An experiment tests a scientist's <b>hypothesis</b> and prediction. For example, two water beakers can be heated. All factors but one are the same (<b>constants</b>): amount of water and heat setting. The different factor (<b>variable</b>) is salt. Salt is added to the experimental beaker.</p>	 <p><b>Data</b></p> <p>Data is information recorded after the experiment begins. For example, the temperature of each beaker could be recorded at set times.</p>	

**Graphing and Charting** help scientists analyze data by creating visual patterns to compare or track recorded measurements.

**Height of Students in 4<sup>th</sup> Period**

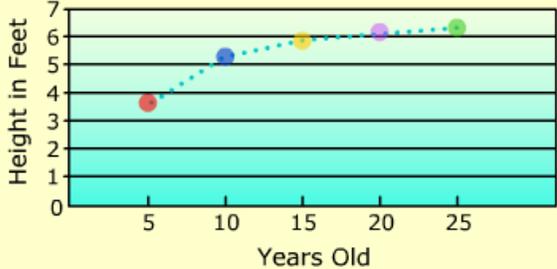


Student	Height (in cm)
Donald	150
Janice	132
Javier	138
Lynn	148
Rebecca	130

**Bar Graphs**

A **bar graph** presents data in the form of variables that can be separated by category. The categories are labeled on the horizontal x-axis. The quantity being measured is displayed on the vertical y-axis.

**Growth Graph**



Years Old	Height in Feet
5	3.5
10	5.2
15	5.8
20	6.0
25	6.2

**Line Graphs**

A **line graph** shows how one variable changes in response to another. The dependent variable is measured on the y-axis, and the independent variable is measured by the x-axis.