SCIENCE IS...

- **Scientific investigations use a variety of methods.** Science involves using multiple scientific methods, comprised of flexible steps, tools and procedures, depending on the phenomenon being investigated. The practices of science - the ways scientists engage in scientific investigation - are well defined and can be applied in various ways. Scientific ways of thinking and doing are organized around disciplinary domains (such as field biology, cell biology, astrophysics, geology, etc.), that share standards for making decisions regarding the values, methods, models, and evidence that should be used.
- **Scientific knowledge is based on testable evidence.** In science there are accepted methodologies, standards of evidence, and logical ways of answering questions, all of which are based on using observations, tests and other types of empirical (based on testing or experience) data to provide evidence. The acceptance or rejection of a scientific idea depends upon the quality of relevant evidence and the strength of connection between the evidence and the idea it supports. Scientific arguments are strengthened by multiple lines of evidence supporting a single explanation.
- **Scientific knowledge is open to revision.** Scientists are very careful about what they claim to know and how they know it. Scientists are tentative about their findings and focus on whether the evidence supports or doesn't support their idea. This is because scientific explanations can improve based on new evidence or on new interpretations of the evidence. Scientists use argumentation to evaluate the relationship between scientific ideas and the evidence supporting an explanation. Answering one question can often inspire deeper and more detailed questions for further research–the more we know, the more we are aware of what we can't yet explain. Because scientific ideas are revised and improved in an ongoing basis, science is ultimately self-correcting. This is viewed as a strength of science, not a weakness.
- **Science concepts and theories explain natural phenomena.** Scientific explanations must show an explicit cause and effect relationship based on the observable evidence. They involve looking for patterns and correlations and creating models that can be used to test ideas. Scientific theories are based on a body of evidence that has been tested extensively and confirmed by the scientific community. Scientific explanations specifically describe the natural world, and are not focused on answering supernatural questions. If an explanation offers no way to be tested, or does not have the potential to be shown to be false by evidence, it is not scientific.
- **Scientific knowledge assumes consistency in the way nature works.** A major activity of science is examining cause and effect relationships and trying to determine the mechanism for what is observed. In order to test these explanations science assumes that objects and events in natural systems occur in consistent patterns. Scientists assume that if they conduct an investigation more than once, under the same conditions, that they will see the same results. A scientific explanation needs to do more than provide a plausible account; it must fit all the observable facts better than alternative explanations. It must be consistent with all available evidence, not just selected evidence.
- **Science is a human endeavor.** The scientific community is the people and organizations that generate scientific ideas, test those ideas, publish scientific journals, organize conferences, train scientists, and distribute research funds. This community develops the cumulative knowledge base that allows science knowledge to build upon itself. Anyone can have an idea in science; it is non-discriminating and it should not be encumbered by an adherence to tradition. One of the requirements for participation in the activities of scientists is that they share common values such as: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings. This is why the scientific community is best qualified to ratify explanations and judge the evidence for scientific arguments. Creativity is involved in all aspects of science whether it is developing new questions, innovative techniques, or novel explanations and hypotheses. Individual scientists may have different agendas for putting forth a variety of potentially subjective opinions, and scientific experts in one field may not be the best judge of explanations related to other fields of science.