FUNDAMENTAL ABILITIES OF INQUIRY

Grades K-4	Grades 5-8	Grades 9-12
• Ask a question about objects, organisms, and events in the environment. • Plan and conduct a simple investigation. • Employ simple equipment and tools to gather data and extend to the senses. • Use data to construct a reasonable explanation. • Communicate investigations and explanations.	• Identify questions that can be answered through scientific investigations. • Design and conduct a scientific investigation. • Use appropriate tools and techniques to gather, analyze, and interpret data. • Develop descriptions, explanations, predictions, and models using evidence. • Think critically and logically to make the relationships between evidence and explanations. • Recognize and analyze alternative explanations and predictions. • Communicate scientific procedures and explanations. • Use mathematics in all aspects of scientific inquiry.	• Identify questions and concepts that guide scientific investigations. • Design and conduct scientific investigations. • Use technology and mathematics to improve investigations and communications. • Formulate and revise scientific explanations and models using logic and evidence. • Recognize and analyze alternative explanations and models. • Communicate and defend a scientific argument.

FUNDAMENTAL UNDERSTANDINGS OF INQUIRY

• Scientific investigations involve asking and answering a question and comparing the answer with what scientists already know about the world. • Scientists use different kinds of investigations depending on the questions they are trying to answer. • Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses. • Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). • Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations. • Scientists review and ask questions about the results of other scientists' work.	• Different kinds of questions suggest different kinds of scientific investigations. • Current scientific knowledge and understanding guide scientific investigations. • Mathematics is important in all aspects of scientific inquiry. • Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations. • Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. • Science advances through legitimate skepticism. • Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data.	• Scientists usually inquire about how physical, living, or designed systems function. • Scientists conduct investigations for a wide variety of reasons. • Scientists rely on technology to enhance the gathering and manipulation of data. • Mathematics is essential in scientific inquiry. • Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge. • Results of scientific inquiry -- new knowledge and methods -- emerge from different types of investigations and public communication among scientists.

from *Inquiry and the National Science Education Standards: A Guide for Teaching and Learning.* NRC, National Academy Press: Washington, DC, 2000.