

Science
Unit 7: Nature of Science

Essential Understandings	▪ Scientists use appropriate tools and units of measure to collect accurate information. ▪ Scientists follow the steps of the scientific method when conducting experiments. ▪ In scientific inquiry, data drives the direction of further investigation. This means the process of scientific method may not be linear. ▪ Constraint and consequences impact both scientific inquiry and technological design. ▪ Data interpretation can be affected by personal background and beliefs. ▪ Logical arguments include sensible inferences including those based on observations.
Essential Questions	▪ How do scientists both design an unbiased experiment and use the scientific method? ▪ What are variables and controls and how do they impact an experiment? ▪ How can data be interpreted in more than one way? ▪ How do personal background and beliefs affect data analysis? ▪ What is data and why is it analyzed? ▪ Why is accurate measurement so important? ▪ What is the difference between an observation and an inference?
Essential Knowledge	▪ For data to be meaningful experiments must be as unbiased as possible and data needs to be collected accurately and analyzed objectively. ▪ Scientists identify independent and dependent variables in an experiment. ▪ Scientists must strive to eliminate bias. ▪ More data increases an experiment's validity. ▪ Inference must be based on observations.
Vocabulary	▪ <u>Vocabulary Categories:</u> ○ Variables ○ Tools of Measurement ○ Metric System ○ Scientific Process
Essential Skills	▪ Use appropriate tools to make accurate measurements. ▪ Identify variables in an experiment. ▪ Interpret data. ▪ Design and conduct a scientific investigation. ▪ Distinguish between an observation and an inference. ▪ Distinguish between a sensible and non-sensible inference.

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Related Maine Learning Results	<u>Science</u> B. The Skills and Traits of Scientific Inquiry and Technological Design B1.Skills and Traits of Scientific Inquiry Students plan, conduct, analyze data from, and communicate results of investigations, including simple experiments. - Identify questions that can be answered through scientific investigations. - Design and safely conduct scientific investigations including experiments with controlled variables. - Use appropriate tools, metric units, and techniques to gather, analyze, and interpret data. - Use mathematics to gather, organize, and present data and structure convincing explanations. - Use logic, critical reasoning and evidence to develop descriptions, explanations, predictions, and models. - Communicate, critique, and analyze their own scientific work and the work of other students. C. The Scientific and Technological Enterprise C1.Understandings of Inquiry Students describe how scientists use varied and systematic approaches to investigations that may lead to further investigations. - Explain how the type of question informs the type of investigation. - Explain why it is important to identify and control variables and replicate trials in experiments. - Describe how scientists' analyses of findings can lead to new investigations. C2.Understandings About Science and Technology Students understand and compare the similarities and differences between scientific inquiry and technological design. - Explain how constraints and consequences impact scientific inquiry and technological design.
Sample Lessons And Activities	▪ Use scientific tools of measurement to collect data (meter sticks, graduated cylinders, etc). ▪ Design and conduct a scientific investigation. ▪ Present a controlled experiment with others. ▪ Identify problems with an experimental design. ▪ Detect bias in an experiment. ▪ Practice analyzing data and producing more than one interpretation.
Sample Classroom Assessment Methods	▪ Inquiry Lab Report ▪ Measurement stations assessment ▪ Tests

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Sample Resources	▪ <u>Publications:</u> ○ SCSI Handout ○ http://math.about.com/library/blpowers.htm ○ http://primaxstudio.com/stuff/scale_of_universe/ ○ www.kokoqiak.com/megapenny/default.asp
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