

MAPPING GRADE 5 SCIENCE INSTRUCTION

Concept: Science Process Skills
PWC Strand: Reasoning and Logic

CMS Unit Test: Proficiency With Science Skills
SOL Reporting Category: Scientific Investigation

PWC Objective: 5.1.1 / Infused

The student will continue to practice systematized problem solving methods by planning and conducting simple investigations. Key concepts include:

- rocks, minerals and organisms are identified using a classification key **(SOL 5.1a)**
- estimations of length, mass, and volume are made **(SOL 5.1b)**
- appropriate instruments are selected and used for making quantitative observations of length, mass, volume, and elapsed time **(SOL 5.1c)**
- accurate measurements are made using basic tools (thermometer, meter stick, balance, graduated cylinder) **(SOL 5.1d)**
- data are collected, recorded and reported using appropriate graphical representation (graphs, charts, diagrams) **(SOL 5.1e)**
- predictions are made using patterns and simple graphical data are extrapolated **(SOL 5.1f)**
- manipulated and responding variables are identified **(SOL 5.1g)**
- an understanding of the nature of science **(SOL 5.1h)**

| What Students Should Know (Critical Attributes) | What Students Should Be Able To Do (Essential Skills) |
|---|---|
| <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> • What does a scientific process, or research method, allow us to do? • What are manipulated and responding variables? • What tools and units of measure should be used to measure the variables in an experiment? • What are some methods of collecting, recording, and reporting data from an experiment? <p><u>Critical Attributes:</u></p> <p>5.1a A classification key is an important tool used to help identify objects and organisms. It consists of a branching set of choices organized in levels, with most levels of the key having two choices. Each level provides more specific descriptors, eventually leading to identification. <i>Note: This critical attribute is linked to objective 5.2.1 in the Life Science strand related to the five kingdoms.</i></p> | <ul style="list-style-type: none"> • Use classification keys to identify rocks, minerals, and organisms. |

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| What Students Should Know (Critical Attributes) | What Students Should Be Able To Do (Essential Skills) |
|---|--|
| <p>5.1.b Estimation is a useful tool for making approximate measures and giving general descriptions. In order to make reliable estimates, one must have experience using the particular unit.</p> <p>5.1c, d Systematic investigations require standard measures and consistent and reliable tools. Metric measures are a standard way to make measurements and are recognized around the world.</p> <p>5.1e Systematic investigations require organized reporting of data. The way the data are displayed can make it easier to see important patterns, trends, and relationships. Bar graphs and line graphs are useful tools for reporting discrete data and continuous data, respectively</p> <p>5.1f A scientific <i>prediction</i> is a forecast about what <i>may</i> happen in some future situation. It is based on the application of factual information and principles and recognition of trends and patterns.</p> <p>5.1g By deliberately changing one thing in an investigation, another one may change as a result. A <i>manipulated variable</i> (or independent variable) is something that is deliberately changed as part of the experimental process. There should be only one independent variable in an experiment; if more than one thing changes at a time, it may not be easy to determine which variable is causing the change. <i>Responding variables</i> (or dependent variables) are those variables that will change or respond as a result of doing the experiment. Responding variables are often directly related to the question and/or control of an experiment. A control is the part of an experiment used as a comparison. It is exactly like the experiment except it does not get “treated” with the variable we plan to deliberately change (the independent or manipulated variable). Variables that must be held <i>constant</i> are those variables that must be kept the same for proven consistency in all the trials or they might otherwise influence the result</p> <p>5.1h Scientific conclusions are based both on verifiable observations (science is empirical) and on inferences.</p> <p>5.1h <i>Observation</i> is the use of senses to collect information about the environment. <i>Inference</i> is the use of prior knowledge and experience to generate conclusions about those observations.</p> | <ul style="list-style-type: none"> • Make plausible estimations of length, mass, and volume. • Select and use the appropriate instruments, including centimeter rulers, meter sticks, graduated cylinders, balances, and stopwatches, for making basic measurements. • Measure temperature, length, mass, and volume, using metric measures. This includes millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius. • Collect, record, and report data, using charts and tables, and translate numerical data into bar or line graphs. • Make predictions based on trends in data. This requires the recognition of patterns and trends and determination of what those trends may represent. • Analyze the variables in a simple experiment and identify the manipulated (independent) and responding (dependent) variables. • Define/make observations and inferences • Distinguish between observations and inferences. • Measure, record, identify, collect, and organize observations. Distinguish between qualitative and quantitative observations. <p>Teacher Note:</p> <p>It is suggested that teachers make analogies between the skills used in the PWC Information Management Process and the suggested processes for science research.</p> <p>A critical component of successful inquiry in science includes deriving meaningful questions and issues from content-related concepts. It is necessary to establish an adequate knowledge base to support investigation and develop explanations of science phenomena. Inquiry in Grade 5 Science not only allows students to strengthen their facility with basic science skills, but it also allows them to reflect on the science concepts they are learning. <i>For this reason, it is important that teachers keep the critical attributes of investigation in mind as they plan instruction to meet objectives in the Life Science, Environmental Science, Physical Science, and Earth and Space Science Strands at this level.</i></p> |