# 2018 Science Standards of Learning

# Science and Engineering Practices Progression Chart K-5

|  | **K** | **1** | **2** | **3** | **4** | **5** |
| --- | --- | --- | --- | --- | --- | --- |
| **asking questions and defining problems** | ask questions based on observations |  ask questions and make predictions based on observations | ask questions that can be investigated | ask questions that can be investigated and predict reasonable outcomes | identify scientific and non-scientific questions | ask testable questions based on observations and predict reasonable outcomes based on patterns |
| make predictions based on observations |   |  make predictions based on observations and prior experiences | ask questions about what would happen if a variable is changed | develop hypotheses as cause and effect relationships | develop hypotheses as cause and effect relationships |
|  identify a problem based on need |   identify a simple problem that can be solved through the development of a new tool or improved object | identify a simple problem that can be solved through the development of a new tool or improved object | define a simple design problem that can be solved through the development of an object, tool, process, or system  | define a simple design problem that can be solved through the development of an object, tool, process, or system | define design problems that can be solved through the development of an object, tool, process, or system  |

|  | **K** | **1** | **2** | **3** | **4** | **5** |
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| **planning and carrying out investigations** |   |   |   |   |  identify variables when planning an investigation |  identify independent and dependent variables and constants |
|  make observations to collect data |  with guidance, conduct investigations to produce data | with guidance, plan and conduct simple investigations to produce data | with guidance, plan and conduct investigations | collaboratively plan and conduct investigations | collaboratively plan and conduct investigations to produce data  |
|  identify characteristics and properties of objects by observations | identify characteristics and properties of objects by observations |   |   |   |   |
| measure relative length and weight of common objects |   |   | estimate length, mass, volume, and temperature  |   |   |
|   |   |   | use appropriate methods and/or tools for collecting data |  | determine data that should be collected to answer a testable question |
|   | use tools to measure relative length, mass, volume, and temperature of common objects | use appropriate tools to measure length, mass, volume, and temperature of common objects using U.S. Customary units | measure length, mass, volume, and temperature in metric and U.S. Customary units using proper tools | take metric measurements using appropriate tools |  take metric measurements using appropriate tools |
|   |   | measure time intervals using proper tools |  measure elapsed time | measure elapsed time |   |
| record information from investigation |   |   | use tools and/or materials to design and/or build a device that solves a specific problem | use tools and/or materials to design and/or build a device that solves a specific problem |  use tools and/or materials to design and/or build a device that solves a specific problem |
|  | **K** | **1** | **2** | **3** | **4** | **5** |
| **interpreting, analyzing, and evaluating data** |   | use and share pictures, drawings, and/or writings of observations |   |   |   |   |
| describe patterns | describe patterns and relationships |   |   |   |   |
|  classify and/or sequence objects based on a single physical characteristic or property |  classify and arrange objects based on a single physical characteristic or property |   |   |   |   |
|  organize and represent data |  organize and represent various forms of data using tables, picture graphs, and object graphs | organize and represent data in pictographs and bar graphs | organize and represent data in pictographs or bar graphs | organize and represent data in bar graphs and line graphs | organize simple data sets to reveal patterns that suggest relationships |
|   | read and interpret data displayed in tables, picture graphs, and object graphs, using the vocabulary *more, less, fewer, greater than, less than, and equal to* | read and interpret data represented in pictographs and bar graphs | read, interpret, and analyze data represented in pictographs and bar graphs |  interpret and analyze data represented in bar graphs and line graphs |  represent and analyze data using tables and graphs  |
|   |   |   |   | compare two different representations of the same data (e.g., a set of data displayed on a chart and a graph)  |  compare and contrast data collected by different groups and discuss similarities and differences in their findings |
|   |   |   |  analyze data from tests of an object or tool to determine if it works as intended | analyze data from tests of an object or tool to determine if it works as intended |  use data to evaluate and refine design solutions |
|  | **K** | **1** | **2** | **3** | **4** | **5** |
| **constructing and critiquing conclusions and explanations** |  make simple conclusions based on data or observations |  make simple conclusions based on data or observations | make simple conclusions based on data or observations |   |   |   |
|   |   |   | use evidence (measurements, observations, patterns) to construct or support an explanation | use evidence (measurements, observations, patterns) to construct or support explanations and to make inferences | construct and/or support arguments with evidence, data, and/or a model |
|   |   |  distinguish between opinion and evidence |   |   |   |
|   |  recognize unusual or unexpected results | recognize unusual or unexpected results |   |   |   |
|   |   |   | generate and/or compare multiple solutions to a problem |   | generate and compare multiple solutions to problems based on how well they meet the criteria and constraints |
|   |   |   | describe how scientific ideas apply to design solutions |   |  describe how scientific ideas apply to design solutions |

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|  | **K** | **1** | **2** | **3** | **4** | **5** |
|  **developing and using models** |  distinguish between a model and an actual object |   use physical models to demonstrate simple phenomena and natural processes | use models to demonstrate simple phenomena and natural processes | use models to demonstrate simple phenomena and natural processes | develop and/or use model to explain natural phenomena | develop models using an analogy, example, or abstract representation to describe a scientific principle or design solution |
|   |   |   | develop a model (e.g., diagram or simple physical prototype) to illustrate a proposed object, tool, or process |   |   |
|   |   |   |   | identify limitations of models |  identify limitations of a model |

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|  | **K** | **1** | **2** | **3** | **4** | **5** |
|  **obtaining, evaluating, and communicating information** |   |   |   |  read and comprehend reading-level appropriate texts and/or other reliable media | read and comprehend reading-level appropriate texts and/or other reliable media |  read and comprehend grade-level appropriate texts and/or other reliable media |
| communicate comparative measures (e.g., heavier, lighter, longer, shorter, more, less, hotter, colder) |   |   |   |   |   |
| communicate observations using pictures, drawings, and/or speech | communicate observations and data using simple graphs, pictures, drawings, numbers, speech and/or writing |  communicate observations and data using simple graphs, drawings, numbers, speech, and/or writing  | communicate scientific information, design ideas, and/or solutions with others. | communicate scientific information design ideas and/or solutions with others.  | communicate scientific information, design ideas, and/or solutions with others.  |