# 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. |