



The Science Curriculum: Scope and Sequence

In the chart below, specific terminology from [Project 2061: Benchmarks for Science Literacy](#), the Pennsylvania Department of Education Standards, and the NYC Department of Education has been used to describe key ideas already in place. More content-specific information can be found in the program description. In the table below, we have indicated points at which we expect typical students to have the skill or concept introduced (B), developed (D), and secure (S).

Experimental Design Skills	N	K	1	2	3	4	5	6
Carefully observe phenomenon using appropriate senses and connect new ideas to prior knowledge	B	B	D	D	S	S	S	S
Describe, discuss, compare, and classify objects using observable characteristics	B	B	D	D	D	S	S	S
Order and sequence objects or events, observe cause and effect relationships and patterns	B	B	D	D	D	S	S	S
Generate testable questions in response to observations, events, and other experiences. Understand that different questions require different kinds of investigations.	B	B	B	D	D	D	S	S
Recognize that a variety of approaches may need to be tried when attempting to solve a problem or answer a question	B	B	D	D	D	D	S	S
Make predictions based on prior experiences and/or information	B	B	D	D	D	S	S	S
Identify control and variables in experimental design.			B	B	D	D	S	S
Observe, collect, record, and organize data using appropriate representation		B	B	D	D	D	S	S
Interpret observations and experimental data to draw potential conclusions	B	B	D	D	D	S	S	S
Critique experimental design for limitations, additional variables, bias			B	B	D	D	S	S

Communication Skills	N	K	1	2	3	4	5	6
Describe and compare real world objects in terms of number, shape, texture, size, weight, color, and motion	B	B	B	D	D	D	S	S
Draw pictures that portray some features of the thing being described		B	D	D	D	D	S	S
Interpret oral descriptions, pictures, drawings, and videos of real-world objects and events	B	B	D	D	D	S	S	S
Give written and oral instructions that others can follow to carry out a procedure			B	D	D	D	S	S
Make sketches or diagrams to aid in explaining procedures or ideas			B	D	D	D	S	S
Use numerical data in describing and comparing objects and events			B	D	D	S	S	S
Read simple tables and graphs produced by others and describe what they show			B	D	D	D	S	S
Interpret written descriptions of real-world objects and events			B	D	D	D	S	S
Write a clear and accurate description of a real-world object or event			B	D	D	S	S	S
Explain ideas clearly and completely through writing			B	D	D	D	S	S
Keep clear and accurate records of investigations and observations				B	D	D	S	S
Locate information in print and electronic resources			B	D	D	D	S	S
Evaluate and verify information in print and electronic resources						B	D	D
Use models to illustrate concepts		B	D	D	D	D	S	S
Understand that clear communication is an essential part of doing science. It enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world			B	D	D	D	D	S

Manipulation and Observation	N	K	1	2	3	4	5	6
Use basic tools (hammers, screwdrivers, clamps, scissors, saws) to shape materials and fasten them together		B	D	D	D	S	S	S
Assemble, take apart, and reassemble constructions using interlocking blocks or other interconnecting pieces	B	B	D	D	D	S	S	S
Make something out of paper, cardboard, cloth, wood, plastic, metal, or existing objects that can actually be used to perform a task	B	D	D	D	S	S	S	S
Choose appropriate common materials for making simple mechanical constructions and repairing things		B	D	D	D	S	S	S

Measure the length in whole units of objects using rulers and tape measures		B	D	D	S	S	S	S
Measure objects consistently using metric or English systems		B	D	D	D	D	S	S
Measure length or time with precision using appropriate fractions or decimals					B	D	D	S
Weigh objects using a balance or scale		B	D	D	S	S	S	S
Measure out a prescribed amount of liquid or dry powder using a measuring cup, measuring spoon, or scale		B	D	D	D	S	S	S
Use photography, audio, and video recording devices for capturing information					B	D	D	D

Computation and Estimation	N	K	1	2	3	4	5	6
Explain to other students how they go about solving numerical problems		B	D	D	S	S	S	S
Make quantitative estimates of time intervals and the lengths and weights of familiar objects			B	D	D	S	S	S
Make calculations when necessary to solve real-world problems and decide whether to make the calculation mentally, on paper, or with the help of calculator or computer			B	D	D	D	S	S
Use appropriate units when describing quantities			B	D	D	S	S	S
Make rough estimates of numerical calculations and use them to judge whether the results of a calculation are reasonable			B	D	D	S	S	S
Analyze data through basic statistics (sum, mean, median, mode) and examine the limitations of those tools				B	D	D	D	S

Scientific Habits of Mind	N	K	1	2	3	4	5	6
Values, Attitudes and Critical Response Skills								
Raise questions about the world and be willing to seek answers to these questions by making careful observations and trying things out	B	D	D	S	S	S	S	S
Offer reasons for claims and consider reasons suggested by others	B	D	D	S	S	S	S	S
Support their statements with observations, experimental evidence or information from reliable sources, identify sources, and expect others to do the same	B	D	D	D	D	D	S	S
Recognize when comparisons might not be fair because some conditions are not kept the same			B	D	D	D	S	S
Understand the role of control groups in formal experimentation and the difficulty in limiting variables to design a “fair test”					B	D	D	D

Be skeptical of claims, evaluate sample size and potential bias			B	D	D	D	S	S
Notice and criticize the reasoning in arguments in which fact and opinion are intermingled or in which the claims are not consistent with evidence		B	D	D	D	D	D	D
The Scientific Worldview								
Understand science is a process of trying to figure out how the world works by making careful observations and trying to make sense of those observations	B	D	D	D	D	D	S	S
Understand that when a science investigation is done the way it was done before or in a different place, we expect to get a very similar result. When we do not, it is important to try to figure out why		B	D	D	D	S	S	S
Understand that sometimes similar investigations give different results because of differences in the things being investigated, the methods used, the circumstances in which the investigation is carried out or because of uncertainties in observations. It is not always easy to tell which.	B	D	D	D	D	D	S	S
Understand when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide	B	D	D	D	D	D	S	S
Understand that even with similar results, scientists may wait until an investigations has been repeated many times before accepting the results as correct			B	D	D	D	D	D
Understand some matters cannot be examined usefully in a scientific way. Among them are matters that by their nature cannot be tested against observations.	B	D	D	D	D	D	D	D
Understand that different explanations can be given for the same observations and it is not always possible to tell which one is correct	B	D	D	D	D	D	S	S
Understand scientists' explanations about what happens in the world come partly from what they observe, partly from what they think	B	D	D	D	D	D	D	D
Understand everyone can do science and it is practical in daily life	B	D	D	D	D	S	S	S
Understand that in doing science, it is helpful to work with a team and to share findings with others. However, all team members should reach their own individual conclusions about what the findings mean.		B	D	D	D	D	S	S
Understand doing science involves many different kinds of work and engages people of all ages and backgrounds	B	D	D	D	D	D	S	S
Understand that scientific knowledge shapes our daily lives and is used to develop technology			B	D	D	D	S	S

Classroom and Community Skills: (These are emphasized equally at every grade level)
Verbalize ideas clearly, participate in class discussions, ask connected questions
Demonstrate effort on a regular basis
Maintain focus
Persevere when challenged
Listen and share appropriately
Cooperate with classmates, independently work through conflicts
Accept responsibility for own behavior
Identify with classroom procedures and rules
Treat living things with kindness and respect for their needs