Next Generation Science Standards

Science and Engineering Practices • Grades 6–8

	Virtual City	City Essay	City Model	City Presentation	Project Plan
Practice 1: Asking questions (for science) and defining problems (for engineering)					
Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information.	●	●	●		●
Ask questions to identify and/or clarify evidence and/or the premise(s) of an argument.	●	●	●	●	●
Ask questions to determine relationships between independent and dependent variables and relationships in models.	●	●	●		●
Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.	●	●	●	●	●
Ask questions that require sufficient and appropriate empirical evidence to answer.	●	●	●		●
Ask questions that challenge the premise(s) of an argument or the interpretation of a data set.	●	●	●	●	●
Define a design problem that can be solved through the development of an object, tool, process, or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.	●	●	●	●	●
Practice 2. Developing and using models					
Evaluate limitations of a model for a proposed object or tool.	●		●		●
Develop or modify a model—based on evidence—to match what happens if a variable or component of a system is changed.	●		●		
Use and/or develop a model of simple systems with uncertain and less predictable factors.	●		●		
Develop and/or revise a model to show the relationships among variables.	●		●		
Develop and/or use a model to predict and/or describe phenomena.	●		●		
Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.	●		●		
Practice 3. Planning and carrying out investigations					
Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.	●	●	●		●

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Practice 4. Analyzing and interpreting data					
Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships.	●				
Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.	●			●	
Distinguish between causal and correlational relationships in data.		●		●	●
Analyze and interpret data to provide evidence for phenomena.		●		●	●
Analyze data to define an optimal operational range for a proposed object, tool, process, or system that best meets criteria for success.		●			●
Practice 5. Using mathematics and computational thinking					
Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.	●				
Use mathematical representations to describe and/or support scientific conclusions and design solutions.		●			
Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.	●		●		
Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.	●	●			
Practice 6. Constructing explanations (for science) and designing solutions (for engineering)					
Construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s)phenomena.	●	●	●	●	●
Construct an explanation using models or representations.	●	●	●	●	
Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	●	●	●	●	●
Apply scientific ideas, principles, and/or evidence to construct, revise, and/or use an explanation for real world phenomena, examples, or events.	●	●	●	●	●
Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion.	●	●	●	●	
Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process, or system.	●	●	●	●	

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Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.	●	●	●	●	●
Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.	●	●	●	●	●
Practice 7. Engaging in argument from evidence					
Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.	●	●	●		
Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.	●	●	●	●	●
Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.	●	●	●	●	●
Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.	●	●	●	●	●
Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	●	●	●	●	●
Practice 8. Obtaining, evaluating, and communicating information					
Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).		●			
Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.		●			
Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.		●			
Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.		●			
Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.		●		●	