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| **Unit C: Role of Theories, Laws, and Models**  **Quarter 2 – 2 weeks** | | |
| **Overview** | **Standards Addressed During Unit** | **Highlighted Nature of Science Standards** |
| Students will further develop their understanding of role of theories, laws and models in science. They will actively engaged in laboratory investigations, as they make relevant learning connections. Students understand and practice safe research practices in the classroom laboratory  **Fundamental Skills:**   * Background of scientific knowledge and thinking   Science laboratory safety practices including an SDS. | [**SC.6.N.3.1**](http://www.cpalms.org/Public/PreviewStandard/Preview/1754)  [**SC.6.N.3.2**](http://www.cpalms.org/Public/PreviewStandard/Preview/1755)  [**SC.6.N.3.3**](http://www.cpalms.org/Public/PreviewStandard/Preview/1732)  [**SC.6.N.3.4**](http://www.cpalms.org/Public/PreviewStandard/Preview/1733) | **SC.6.N.3.1**  **SC.6.N.3.2**  **SC.6.N.3.4** |
| **Coherence** | | |
| *Prior Learning Experiences:*  *In the grade prior students…*   * “theory” and its role in science vs. everyday life * “law” in science vs. societal * role of models in science | | |

**Unpacking the Standards: What do we want students to Know, Understand and Do (KUD)**

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| **Unit C: Role of Theories, Laws and Models Unit Essential Question: How are theories, roles and models used in science?**  **Standards:**  [**SC.6.N.3.1**](http://www.cpalms.org/Public/PreviewStandard/Preview/1754)*Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life*  [SC.6.N.3.2](http://www.cpalms.org/Public/PreviewStandard/Preview/1755)*Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.*  [**SC.6.N.3.3**](http://www.cpalms.org/Public/PreviewStandard/Preview/1732)*Give several examples of scientific laws.*  [**SC.6.N.3.4**](http://www.cpalms.org/Public/PreviewStandard/Preview/1733)*Identify the role of models in the context of the sixth grade science benchmarks* | |
| **Understand**  *“Essential understandings,” or generalizations, represent ideas that are transferable to other contexts.* | |
| Scientists develop explanations for the things we see around us in the form of theories, laws, and models. | |
| **Know**  *Declarative knowledge: Facts, vocabulary, information.* | **Do**  *Procedural knowledge: Skills, strategies & processes that are transferrable to other contexts.* |
| 1. Scientific theories are backed by scientific evidence and are widely accepted explanations of nature.  2. Scientific laws are used to describe events that always occur in the natural world under certain conditions.  3. Models can be used to study or demonstrate scientific concepts. | 1. Conduct research on several scientific theories and document the evidence that supports these theories.  2. Cite examples of scientific laws and demonstrate how these laws are used to explain occurrences in our natural world.  3. Identify benefits of using models in science and give examples. |
| **Performance Task** | |
| As a renowned scientist, the producers of a hit crime solving TV show have asked you to help them respond to social media complaints regarding their use of the word theory. Viewers have posted on the companies social media pages that police officers on the show should not call their hunch regarding who committed the crime a theory. The producers of the show would like you to help them figure out why the viewers are upset and make a recommendation to the shows writers on better words to use. | |

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| **Key Learning: A scientific theory is a widely supported/accepted explanation of nature.** | | |
| **Concept: Scientific Theory** | **Driving Questions:** | **Sample Formative Assessment Task:** |
| [**SC.6.N.3.1**](http://www.cpalms.org/Public/PreviewStandard/Preview/1754)  *Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.* | How does the use of the term theory differ in science versus everyday life? | Explain why the statement “It’s only a theory” should not be used in science. |
| Student Investigations: |
| **Lab Manual: Quick Lab (p. 8)** |
| Vocabulary |
| scientific theory, well-supported, explanation |

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| Resources | | |
| Student Text: | Student Misconceptions: | Deeper Learning Opportunities: |
| **Interactive Digital Curriculum: Scientific Knowledge**  **TE: pp.7, 28-40, 240-241**  **Student Edition: pp.14-23,**  **180-181**  **Complex Text (beyond the textbook)**  Yellowstone’s Super Volcano <https://newsela.com/articles/yellowstone-supervolcano/id/15707/>  Scientific Theory <http://www.ck12.org/book/CK-12-Physical-Science-Concepts-For-Middle-School/section/1.3/> | Page Keeley Probes; Vol. 3 p. 83 | What is a Scientific Theory?  <https://youtu.be/d80Lf76Ht18>  10 Scientific Theories & Laws You Should Know <http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm>  **Theories vs. Laws:**  [**http://chemistry.about.com/od/chemistry101/a/lawtheory.htm**](http://chemistry.about.com/od/chemistry101/a/lawtheory.htm)  [**http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm**](http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm)  [**http://thehappyscientist.com/science-experiment/gravity-theory-or-law**](http://thehappyscientist.com/science-experiment/gravity-theory-or-law)  [**http://www.nasa.gov/pdf/371711main\_SMII\_Problem23.pdf**](http://www.nasa.gov/pdf/371711main_SMII_Problem23.pdf) |

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| **Key Learning: A scientific law is a description of a relationship in the natural world.** | | |
| **Concept: Scientific Law** | **Driving Questions:** | **Sample Formative Assessment Task:** |
| [**SC.6.N.3.2**](http://www.cpalms.org/Public/PreviewStandard/Preview/1755)  *Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.*  [**SC.6.N.3.3**](http://www.cpalms.org/Public/PreviewStandard/Preview/1732)  *Give several examples of scientific laws.* | How What is a scientific law ?does an object’s state of matter depend on its kinetic energy? | Scientists create both scientific theories and scientific laws as they make observations and conduct experiments about the natural world. Which of the following statements **most accurately** compares the difference between scientific theories and scientific laws?  **A.** Scientific laws are based on evidence,  while scientific theories are not.  **B.** Scientific theories involve only biology,  while laws involve all types of science.  **C.** Scientific theories involve mathematical  equations, while scientific laws are based  on observations.  **D.** Scientific theories are ideas that explain  natural events, while scientific laws more  reliably predict natural events. |
| Student Investigations: |
| **Lab Manual: Quick Lab (pp. 12, 119, 262, 266),**  **Unit Lab (pp. 47, 289, 301, 312)**  **Scientific vs Societal Laws** [**http://www.cpalms.org/Public/PreviewResourceLesson/Preview/152833**](http://www.cpalms.org/Public/PreviewResourceLesson/Preview/152833)  **Societal vs Scientific Laws** [**http://www.cpalms.org/Public/PreviewResourceLesson/Preview/154583**](http://www.cpalms.org/Public/PreviewResourceLesson/Preview/154583) |
| Vocabulary |  |
| **\*scientific law**, (examples of laws), society, societal |  |

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| Resources | | |
| Student Text: | Student Misconceptions: | Deeper Learning Opportunities: |
| **Interactive Digital Curriculum: Scientific Knowledge**  **TE: pp. 7, 28-40, 390-401,434-**  **448**  **Student Edition: pp. 14-23,**  **300-307, 340-344**  **Complex Text (beyond the textbook)**  Scientific Laws <http://www.ck12.org/physical-science/Scientific-Law-in-Physical-Science/lesson/Scientific-Law-MS-PS/?referrer=concept_details> | Page Keeley Probes; Vol. 3 p. 83 | Original Digital Student Tutorial:  Scientific Laws  <http://www.cpalms.org/Public/PreviewResourceStudentTutorial/Preview/120488>  10 Scientific Theories & Laws You Should Know <http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm>  **Theories vs. Laws:**  [**http://chemistry.about.com/od/chemistry101/a/lawtheory.htm**](http://chemistry.about.com/od/chemistry101/a/lawtheory.htm)  [**http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm**](http://science.howstuffworks.com/innovation/scientific-experiments/10-scientific-laws-theories.htm)  [**http://thehappyscientist.com/science-experiment/gravity-theory-or-law**](http://thehappyscientist.com/science-experiment/gravity-theory-or-law)  [**http://www.nasa.gov/pdf/371711main\_SMII\_Problem23.pdf**](http://www.nasa.gov/pdf/371711main_SMII_Problem23.pdf) |

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| **Key Learning: Models are used in science to better understand difficult concepts and make predictions.** | | |
| **Concept: Models** | **Driving Questions:** | **Sample Formative Assessment Task:** |
| [**SC.6.N.3.4**](http://www.cpalms.org/Public/PreviewStandard/Preview/1733)  *Identify the role of models in the context of the sixth grade science benchmarks.* | How does an object’s state of matter How are models useful in science? | **Explain the role computer models in predicting the movement of storms.** |
| Student Investigations: |
| **Lab Manual: Quick Labs (pp. 23, 26, 72, 75,**  **143, 184, 189, 196, 206, 335, 339, 359,**  **378, 405, 421, 424, 491)** |
| Vocabulary |  |
| **\*model**, physical model, mathematical model, scale model | Samples of models around the room with discussion on their uses and role in explanation of science. |

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| Resources | | |
| Student Text: | Student Misconceptions: | Deeper Learning Opportunities: |
| **Interactive Digital Curriculum: Scientific Knowledge, Representing Data**  **TE: pp. 7, 9, 28-40, 58-70, 134-141, 145, 568-569**  **Student Edition: pp. 14-23, 38-47, 435-437**  **Complex Text (beyond the textbook)**  Cloud Models <https://student.societyforscience.org/article/particles-air-help-fatten-clouds%E2%80%99-water-droplets?mode=blog&context=80>  Dinosaur Computer Models <https://student.societyforscience.org/article/picture-plesiosaurs-swam-penguins> | Page Keeley Probes; Vol. 4, p. 73 | **Models:**  [**http://www.learner.org/courses/essential/physicalsci/session2/closer1.html**](http://www.learner.org/courses/essential/physicalsci/session2/closer1.html)  **Models in Science** [**https://youtu.be/i-9RhLyuqWg**](https://youtu.be/i-9RhLyuqWg)  **Model Inquiry Activity** – Students are given a concept (ie. Solar system, tropical rain forest, human skeleton, etc.) that they must make a model and have others guess what it is. They are assigned to do a picture model (drawing with no words), a lego (3d) model, or can orally describe their concept.  **Original Digital Student Tutorial**  Models in Science  <http://www.cpalms.org/Public/PreviewResourceStudentTutorial/Preview/123013> |

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| **Unit C:** Theories, Laws and Models | | |
| Grade Concept: Theory | | |
| **Sample Scale** | | **Sample Performance Tasks** |
| **Score 4.0** | **In addition to Score 3.0, in-depth inferences and applications that go beyond what was taught.** | * *Research a specific scientific theory and law and create a presentation that describes each one and explain the justification that makes it a theory or a law.* |
| **Score 3.5** | I can do everything at a 3.0, and I can demonstrate partial success at score 4.0. | |
| **Score 3.0** | I can:   * can recognize that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. * Can explain why a scientific theory is a widely accepted explanation of nature and is not simply a claim posed by an individual. * Can understand the use of the term theory in science is very different than how it is used in everyday life. | * Use examples of scientific theories to explain the difference between scientific use and everyday use of the word theory. * Write to distinguish between a claim, hypothesis, law and theory * Engage in an Scientific Argumentation session refuting the claim that “Scientific theories become laws when they are proven” |
| **Score 2.5** | I can do everything at a 2.0, and I can demonstrate partial success at score 3.0. | |
| **Score 2.0** | I can   * Can identify questions which can be investigated by scientifically and those that cannot * Can explain the characteristics of a scientific law * Can describe a claim |  |
| **Score 1.5** | I can do everything at a 1.0, and I can demonstrate partial success at score 2.0. | |
| **Score 1.0** | **With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes.** |  |