

**Access Chemistry 1**

# (#7920011)

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# Course Standards

##  [SC.912.L.18.12:](https://www.cpalms.org/Public/PreviewStandard/Preview/2055)

Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

**Clarifications:**
Annually assessed on Biology EOC.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.L.18.In.7:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8413) | Identify that special properties of water, such as the ability to moderate temperature and dissolve substances, help to sustain living things on Earth. |  |  |  |
| [SC.912.L.18.Su.6:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8414) | Identify the important role of water in sustaining life of plants and animals. |  |  |  |
| [SC.912.L.18.Pa.5:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8415) | Recognize that plants and animals use water to live. |  |  |  |
| Resources:  |  |  |  |  |

[SC.912.N.1.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/1856)

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:

1. **Pose questions about the natural world,** (Articulate the purpose of the investigation and identify the relevant scientific concepts).
2. **Conduct systematic observations,** (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines).
3. **Examine books and other sources of information to see what is already known,**
4. **Review what is known in light of empirical evidence,** (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models).
5. **Plan investigations,** (Design and evaluate a scientific investigation).
6. **Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),** (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage).
7. **Pose answers, explanations, or descriptions of events,**
8. **Generate explanations that explicate or describe natural phenomena (inferences),**
9. **Use appropriate evidence and reasoning to justify these explanations to others,**
10. **Communicate results of scientific investigations, and**
11. **Evaluate the merits of the explanations produced by others.**

**Clarifications:**

Florida Standards Connections for 6-12 Literacy in Science

For Students in Grades 9-10

LAFS.910.RST.1.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

LAFS.910.RST.1.3   Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.

LAFS.910.RST.3.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

LAFS.910.WHST.1.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

LAFS.910.WHST.3.9 Draw evidence from informational texts to support analysis, reflection, and research.

For Students in Grades 11-12

LAFS.1112.RST.1.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

LAFS.1112.RST.1.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

LAFS.1112.RST.3.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

LAFS.1112.WHST.1.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

LAFS.1112.WHST.3.9 Draw evidence from informational texts to support analysis, reflection, and research.

Florida Standards Connections for Mathematical Practices

MAFS.K12.MP.1: Make sense of problems and persevere in solving them.

MAFS.K12.MP.2: Reason abstractly and quantitatively.

MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. [Viable arguments include evidence.]

MAFS.K12.MP.4: Model with mathematics.

MAFS.K12.MP.5: Use appropriate tools strategically.

MAFS.K12.MP.6: Attend to precision.

MAFS.K12.MP.7: Look for and make use of structure.

MAFS.K12.MP.8: Look for and express regularity in repeated reasoning.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8166) | Identify a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Identify a scientific question 2. Examine reliable sources of information to identify what is already known 3. Develop a possible explanation (hypothesis) 4. Plan and carry out an experiment 5. Gather data based on measurement and observations 6. Evaluate the data 7. Use the data to support reasonable explanations, inferences, and conclusions. |  |  |  |
| [SC.912.N.1.Su.1:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8167) | Recognize a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Recognize a scientific question 2. Use reliable information and identify what is already known 3. Create possible explanation 4. Carry out a planned experiment 5. Record observations 6. Summarize results 7. Reach a reasonable conclusion. |  |  |  |
| [SC.912.N.1.Pa.1:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8168) | Recognize a problem related to a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Observe objects and activities 2. Follow planned procedures 3. Recognize a solution.  |  |  |  |
| Resources: |  |  |  |  |

[SC.912.N.1.2:](https://www.cpalms.org/Public/PreviewStandard/Preview/1857)

Describe and explain what characterizes science and its methods.

**Clarifications:**
Science is characterized by empirical observations, testable questions, formation of hypotheses, and experimentation that results in stable and replicable results, logical reasoning, and coherent theoretical constructs.
Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.2:](https://www.cpalms.org/Public/PreviewAccessPoint/Preview/8169) | Describe the processes used in scientific investigations, including posing a research question, forming a hypothesis, reviewing what is known, collecting evidence, evaluating results, and reaching conclusions.  |  |  |  |
| [SC.912.N.1.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8170) | Identify the basic process used in scientific investigations, including questioning, observing, recording, determining, and sharing results.  |  |  |  |
| [SC.912.N.1.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8171) | Recognize a process used in science to solve problems, such as observing, following procedures, and recognizing results. |  |  |  |
| Resources: |  |  |  |  |

## [SC.912.N.1.4:](https://www.cpalms.org/Public/PreviewStandard/Preview/1859)

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

**Clarifications:**
Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories. Strict standards of science include controlled variables, sufficient sample size, replication of results, empirical and measurable evidence, and the concept of falsification.
Florida Standards Connections: LAFS.910.RST.1.1 / LAFS.1112.RST.1.1.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8166) | Identify a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Identify a scientific question 2. Examine reliable sources of information to identify what is already known 3. Develop a possible explanation (hypothesis) 4. Plan and carry out an experiment 5. Gather data based on measurement and observations 6. Evaluate the data 7. Use the data to support reasonable explanations, inferences, and conclusions. |  |  |  |
| [SC.912.N.1.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8167) | Recognize a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Recognize a scientific question 2. Use reliable information and identify what is already known 3. Create possible explanation 4. Carry out a planned experiment 5. Record observations 6. Summarize results 7. Reach a reasonable conclusion. |  |  |  |
| [SC.912.N.1.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8168) | Recognize a problem related to a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Observe objects and activities 2. Follow planned procedures 3. Recognize a solution.  |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.N.1.5:](https://www.cpalms.org/Public/PreviewStandard/Preview/1860)

Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.

**Clarifications:**
Recognize that contributions to science can be made and have been made by people from all over the world.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8172) | Identify that scientific investigations are sometimes repeated in different locations.  |  |  |  |
| [SC.912.N.1.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8173) | Recognize that scientific investigations can be repeated in different locations.  |  |  |  |
| [SC.912.N.1.Pa.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8174) | Recognize that when a variety of common activities are repeated the same way, the outcomes are the same.  |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.N.1.6:](https://www.cpalms.org/Public/PreviewStandard/Preview/1861)

Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

**Clarifications:**
Collect data/evidence and use tables/graphs to draw conclusions and make inferences based on patterns or trends in the data.
Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8166) | Identify a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Identify a scientific question 2. Examine reliable sources of information to identify what is already known 3. Develop a possible explanation (hypothesis) 4. Plan and carry out an experiment 5. Gather data based on measurement and observations 6. Evaluate the data 7. Use the data to support reasonable explanations, inferences, and conclusions. |  |  |  |
| [SC.912.N.1.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8167) | Recognize a problem based on a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Recognize a scientific question 2. Use reliable information and identify what is already known 3. Create possible explanation 4. Carry out a planned experiment 5. Record observations 6. Summarize results 7. Reach a reasonable conclusion. |  |  |  |
| [SC.912.N.1.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8168) | Recognize a problem related to a specific body of knowledge, including life science, earth and space science, or physical science, and do the following: 1. Observe objects and activities 2. Follow planned procedures 3. Recognize a solution.  |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.N.1.7:](https://www.cpalms.org/Public/PreviewStandard/Preview/1862)

Recognize the role of creativity in constructing scientific questions, methods and explanations.

**Clarifications:**
Work through difficult problems using creativity, and critical and analytical thinking in problem solving (e.g. convergent versus divergent thinking and creativity in problem solving).
Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; and MAFS.K12.MP.2: Reason abstractly and quantitatively.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.1.In.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8175) | Identify that scientists use many different methods in conducting their research. |  |  |  |
| [SC.912.N.1.Su.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8176) | Recognize that scientists use a variety of methods to get answers to their research questions.  |  |  |  |
| [SC.912.N.1.Pa.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8177) | Recognize that people try different ways to complete a task when the first one does not work.  |  |  |  |
| Resources: |  |  |  |  |

[SC.912.N.2.2:](https://www.cpalms.org/Public/PreviewStandard/Preview/1867)

Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

**Clarifications:**
Identify scientific questions that can be disproved by experimentation/testing. Recognize that pseudoscience is a claim, belief, or practice which is presented as scientific, but does not adhere to strict standards of science (e.g. controlled variables, sample size, replicability, empirical and measurable evidence, and the concept of falsification).
Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.2.In.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8181) | Distinguish between questions that can be answered by science and observable information and questions that can’t be answered by science and observable information.  |  |  |  |
| [SC.912.N.2.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8179) | Identify questions that can be answered by science.  |  |  |  |
| [SC.912.N.2.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8180) | Recognize an example of work by scientists.  |  |  |  |
| Resources: |  |  |  |  |

[SC.912.N.2.4:](https://www.cpalms.org/Public/PreviewStandard/Preview/1869)

Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

**Clarifications:**
Recognize that ideas with the most durable explanatory power become established theories, but scientific explanations are continually subjected to change in the face of new evidence.
Florida Standards Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them; MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.2.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8182) | Recognize that scientific knowledge can be challenged or confirmed by new investigations and reexamination.  |  |  |  |
| [SC.912.N.2.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8183) | Recognize that what is known about science can change based on new information.  |  |  |  |
| [SC.912.N.2.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8184) | Recognize a variety of cause-effect relationships related to science.  |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.N.2.5:](https://www.cpalms.org/Public/PreviewStandard/Preview/1870)

Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

**Clarifications:**
Recognize that scientific questions, observations, and conclusions may be influenced by the existing state of scientific knowledge, the social and cultural context of the researcher, and the observer's experiences and expectations. Identify possible bias in qualitative and quantitative data analysis.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.2.In.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8185) | Identify major contributions of scientists. |  |  |  |
| [SC.912.N.2.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8186) | Recognize major contributions of scientists.  |  |  |  |
| [SC.912.N.2.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8180) | Recognize an example of work by scientists.  |  |  |  |
| Resources: |  |  |  |  |

[SC.912.N.3.2:](https://www.cpalms.org/Public/PreviewStandard/Preview/1872)

Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

**Clarifications:**
Recognize that scientific argument, disagreement, discourse, and discussion create a broader and more accurate understanding of natural processes and events.
Florida Standards Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.3.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8187) | Recognize that a scientific theory is developed by repeated investigations of many scientists and agreement on the likely explanation.  |  |  |  |
| [SC.912.N.3.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8188) | Recognize that scientific theories are supported by evidence and agreement of many scientists.  |  |  |  |
| [SC.912.N.3.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8189) | Recognize examples of cause-effect descriptions or explanations related to science.  |  |  |  |
| Resources:  |  |  |  |  |

[SC.912.N.3.3:](https://www.cpalms.org/Public/PreviewStandard/Preview/1873)

Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.

**Clarifications:**
Recognize that a scientific theory provides a broad explanation of many observed phenomena while a scientific law describes how something behaves.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.3.In.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8190) | Identify examples of scientific laws that describe relationships in the natural world, such as Newton’s laws.  |  |  |  |
| [SC.912.N.3.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8191) | Recognize examples of scientific laws that describe relationships in nature, such as Newton’s laws.  |  |  |  |
| [SC.912.N.3.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8189) | Recognize examples of cause-effect descriptions or explanations related to science.  |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.N.3.5:](https://www.cpalms.org/Public/PreviewStandard/Preview/1875)

Describe the function of models in science, and identify the wide range of models used in science.

**Clarifications:**
Describe how models are used by scientists to explain observations of nature.
Florida Standards Connections: MAFS.K12.MP.4: Model with mathematics.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.3.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8192) | Identify ways models are used in the study of science.  |  |  |  |
| [SC.912.N.3.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8193) | Recognize ways models are used in the study of science.  |  |  |  |
| [SC.912.N.3.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8194) | Recognize a model used in the context of one’s own study of science. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.N.4.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/1876)

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

**Clarifications:**
Recognize that no single universal step-by-step scientific method captures the complexity of doing science. A number of shared values and perspectives characterize a scientific approach.
MAFS.K12.MP.1: Make sense of problems and persevere in solving them, and MAFS.K12.MP.2: Reason abstractly and quantitatively.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.N.4.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8195) | Identify ways scientific knowledge and problem solving benefit people. |  |  |  |
| [SC.912.N.4.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8196) | Recognize ways scientific knowledge and problem solving benefit people.  |  |  |  |
| [SC.912.N.4.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8197) | Recognize science information that helps people.  |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.8.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/1902)

Differentiate among the four states of matter.

**Clarifications:**
Differentiate among the four states of matter (solid, liquid, gas and plasma) in terms of energy, particle motion, and phase transitions. (Note: Currently five states of matter have been identified.)

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8257) | Classify states of matter as solid, liquid, and gaseous.  |  |  |  |
| [SC.912.P.8.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8258) | Identify examples of states of matter as solid, liquid, and gaseous.  |  |  |  |
| [SC.912.P.8.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8259) | Select an example of a common solid, liquid, and gas.  |  |  |  |
| Resources: |  |  |  |  |

[SC.912.P.8.2:](https://www.cpalms.org/Public/PreviewStandard/Preview/1903)

Differentiate between physical and chemical properties and physical and chemical changes of matter.

**Clarifications:**
Discuss volume, compressibility, density, conductivity, malleability, reactivity, molecular composition, freezing, melting and boiling points. Describe simple laboratory techniques that can be used to separate homogeneous and heterogeneous mixtures (e.g. filtration, distillation, chromatography, evaporation).

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8260) | Compare characteristics of physical and chemical changes of matter.  |  |  |  |
| [SC.912.P.8.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8261) | Identify examples of physical and chemical changes.  |  |  |  |
| [SC.912.P.8.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8262) | Recognize a common chemical change, such as cooking, burning, rusting, or decaying. |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.P.8.3:](https://www.cpalms.org/Public/PreviewStandard/Preview/1904)

Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.

**Clarifications:**
Describe the development and historical importance of atomic theory from Dalton (atomic theory), Thomson (the electron), Rutherford (the nucleus and "gold foil" experiment), and Bohr (planetary model of atom), and understand how each discovery leads to modern atomic theory.
Florida Standards Connections: MAFS.K12.MP.4: Model with mathematics.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8263) | Identify the nucleus as the center of an atom.  |  |  |  |
| [SC.912.P.8.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8264) | Recognize that atoms are tiny particles in materials, too small to see. |  |  |  |
| [SC.912.P.8.Pa.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8265) | Recognize that the parts of an object can be put together to make a whole. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.8.4:](https://www.cpalms.org/Public/PreviewStandard/Preview/1905)

Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.

**Clarifications:**
Explain that electrons, protons and neutrons are parts of the atom and that the nuclei of atoms are composed of protons and neutrons, which experience forces of attraction and repulsion consistent with their charges and masses.
Florida Standards Connections: MAFS.K12.MP.4: Model with mathematics.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8263) | Identify the nucleus as the center of an atom.  |  |  |  |
| [SC.912.P.8.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8264) | Recognize that atoms are tiny particles in materials, too small to see. |  |  |  |
| [SC.912.P.8.Pa.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8265) | Recognize that the parts of an object can be put together to make a whole. |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.P.8.5:](https://www.cpalms.org/Public/PreviewStandard/Preview/1906)

Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.

**Clarifications:**
Use the periodic table and electron configuration to determine an element's number of valence electrons and its chemical and physical properties. Explain how chemical properties depend almost entirely on the configuration of the outer electron shell.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8266) | Recognize that the periodic table includes all known elements. |  |  |  |
| [SC.912.P.8.Su.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8267) | Recognize examples of common elements, such as oxygen and hydrogen.  |  |  |  |
| [SC.912.P.8.Pa.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8268) | Recognize that the parts of an object can be put together to make a whole. |  |  |  |
| Resources:  |  |  |  |  |

[SC.912.P.8.6:](https://www.cpalms.org/Public/PreviewStandard/Preview/1907)

Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.

**Clarifications:**
Describe how atoms combine to form molecules through ionic, covalent, and hydrogen bonding. Compare and contrast the characteristics of the interactions between atoms in ionic and covalent compounds and how these bonds form. Use electronegativity to explain the difference between polar and nonpolar covalent bonds.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8269) | Identify that compounds are made of two or more elements. |  |  |  |
| [SC.912.P.8.Su.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8270) | Recognize examples of common compounds, such as water and salt.  |  |  |  |
| [SC.912.P.8.Pa.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8271) | Match common compounds to their names or communication symbols. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.8.7:](https://www.cpalms.org/Public/PreviewStandard/Preview/1908)

Interpret formula representations of molecules and compounds in terms of composition and structure.

**Clarifications:**
Write chemical formulas for simple covalent (HCl, SO2, CO2, and CH4), ionic (Na+ + Cl- +NaCl) and molecular (O2, H2O) compounds. Predict the formulas of ionic compounds based on the number of valence electrons and the charges on the ions.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8272) | Identify formulas for common compounds, such as H2O and CO2.  |  |  |  |
| [SC.912.P.8.Su.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8273) | Match common chemical formulas to their common name, such as H2O to water.  |  |  |  |
| [SC.912.P.8.Pa.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8271) | Match common compounds to their names or communication symbols. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.8.8:](https://www.cpalms.org/Public/PreviewStandard/Preview/1912)

Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.

**Clarifications:**
Classify chemical reactions as synthesis (combination), decomposition, single displacement (replacement), double displacement, and combustion.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8260) | Compare characteristics of physical and chemical changes of matter.  |  |  |  |
| [SC.912.P.8.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8261) | Identify examples of physical and chemical changes.  |  |  |  |
| [SC.912.P.8.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8262) | Recognize a common chemical change, such as cooking, burning, rusting, or decaying. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.8.9:](https://www.cpalms.org/Public/PreviewStandard/Preview/1913)

Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.

**Clarifications:**
Recognize one mole equals 6.02 x 10^23 particles (atoms or molecules). Determine number of particles for elements and compounds using the mole concept, in terms of number of particles, mass, and the volume of an ideal gas at specified conditions of temperature and pressure. Use experimental data to determine percent yield, empirical formulas, molecular formulas, and calculate the mass-to-mass stoichiometry for a chemical reaction.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8260) | Compare characteristics of physical and chemical changes of matter.  |  |  |  |
| [SC.912.P.8.Su.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8261) | Identify examples of physical and chemical changes.  |  |  |  |
| [SC.912.P.8.Pa.2:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8262) | Recognize a common chemical change, such as cooking, burning, rusting, or decaying. |  |  |  |
| Resources:  |  |  |  |  |

[SC.912.P.8.11:](https://www.cpalms.org/Public/PreviewStandard/Preview/1910)

Relate acidity and basicity to hydronium and hydroxyl ion concentration and PH.

**Clarifications:**
Use experimental data to illustrate and explain the pH scale to characterize acid and base solutions. Compare and contrast the strengths of various common acids and bases.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.8.In.7:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8274) | Identify properties of common acids and bases.  |  |  |  |
| [SC.912.P.8.Su.7:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8275) | Categorize common materials or foods as acids or bases. |  |  |  |
| [SC.912.P.8.Pa.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8276) | Recognize that some acids and bases can be dangerous and identify related hazard symbols.  |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.10.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/1916)

Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

**Clarifications:**

Differentiate between kinetic and potential energy. Recognize that energy cannot be created or destroyed, only transformed. Identify examples of transformation of energy: Heat to light in incandescent electric light bulbs; Light to heat in laser drills; Electrical to sound in radios; Sound to electrical  in microphones; Electrical to chemical in battery rechargers; Chemical to electrical in dry cells; Mechanical to electrical in generators [power plants]; Nuclear to heat in nuclear reactors; Gravitational potential energy of a falling object is converted to kinetic energy then to heat and sound energy when the object hits the ground.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8279) | Identify examples of energy being transformed from one form to another (conserved quantity).  |  |  |  |
| [SC.912.P.10.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8280) | Recognize energy transformations that occur in everyday life, such as solar energy to electricity.  |  |  |  |
| [SC.912.P.10.Pa.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8281) | Observe and recognize examples of the transformation of electrical energy to light and heat.  |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.10.5:](https://www.cpalms.org/Public/PreviewStandard/Preview/1865)

Relate temperature to the average molecular kinetic energy.

**Clarifications:**

Recognize that the internal energy of an object includes the energy of random motion of the object's atoms and molecules, often referred to as thermal energy.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8285) | Relate the transfer of heat to the states of matter, including gases result from heating, liquids result from cooling a gas, and solids result from further cooling a liquid.  |  |  |  |
| [SC.912.P.10.Su.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8286) | Observe and recognize ways that heat travels, such as through space (radiation), through solids (conduction), and through liquids and gases (convection).  |  |  |  |
| [SC.912.P.10.Pa.3:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8287) | Recognize the source and recipient of heat transfer.  |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.10.6:](https://www.cpalms.org/Public/PreviewStandard/Preview/1919)

Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.

**Clarifications:**

Construct and interpret potential energy diagrams for endothermic and exothermic chemical reactions, and for rising or falling objects. Describe the transformation of energy as a pendulum swings.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8279) | Identify examples of energy being transformed from one form to another (conserved quantity).  |  |  |  |
| [SC.912.P.10.Su.1:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8280) | Recognize energy transformations that occur in everyday life, such as solar energy to electricity.  |  |  |  |
| [SC.912.P.10.Pa.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8288) | Identify materials that provide protection (insulation) from heat. |  |  |  |
| Resources:  |  |  |  |  |

[SC.912.P.10.7:](https://www.cpalms.org/Public/PreviewStandard/Preview/1665)

Distinguish between endothermic and exothermic chemical processes.

**Clarifications:**
Classify chemical reactions and phase changes as exothermic (release thermal energy) or endothermic (absorb thermal energy).

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8289) | Describe a process that gives off heat (exothermic), such as burning, and a process that absorbs heat (endothermic), such as water coming to a boil.  |  |  |  |
| [SC.912.P.10.Su.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8290) | Recognize common processes that give off heat (exothermic), such as burning, and processes that absorb heat (endothermic), such as water coming to a boil.  |  |  |  |
| [SC.912.P.10.Pa.4:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8288) | Identify materials that provide protection (insulation) from heat. |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.P.10.9:](https://www.cpalms.org/Public/PreviewStandard/Preview/1666)

Describe the quantization of energy at the atomic level.

**Clarifications:**

Explain that when electrons transition to higher energy levels they absorb energy, and when they transition to lower energy levels they emit energy. Recognize that spectral lines are the result of transitions of electrons between energy levels that correspond to photons of light with an energy and frequency related to the energy spacing between levels (Planck's relationship E = hv).

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8291) | Identify that atoms can be changed to release energy, such as in nuclear power plants, and recognize one related safety issue.  |  |  |  |
| [SC.912.P.10.Su.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8292) | Recognize that nuclear power plants generate electricity and can be dangerous.  |  |  |  |
| [SC.912.P.10.Pa.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8293) | Recognize the universal symbols for radioactive and other hazardous materials. |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.P.10.12:](https://www.cpalms.org/Public/PreviewStandard/Preview/1667)

Differentiate between chemical and nuclear reactions.

**Clarifications:**

Describe how chemical reactions involve the rearranging of atoms to form new substances, while nuclear reactions involve the change of atomic nuclei into entirely new atoms. Identify real-world examples where chemical and nuclear reactions occur every day.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8291) | Identify that atoms can be changed to release energy, such as in nuclear power plants, and recognize one related safety issue.  |  |  |  |
| [SC.912.P.10.Su.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8292) | Recognize that nuclear power plants generate electricity and can be dangerous.  |  |  |  |
| [SC.912.P.10.Pa.5:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8293) | Recognize the universal symbols for radioactive and other hazardous materials. |  |  |  |
| Resources: |  |  |  |  |

### [SC.912.P.10.18:](https://www.cpalms.org/Public/PreviewStandard/Preview/1926)

Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.

**Clarifications:**

Describe the electromagnetic spectrum (i.e., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays and gamma rays) in terms of frequency, wavelength and energy. Solve problems involving wavelength, frequency, and energy.

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.10.In.9:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8305) | Identify common applications of electromagnetic waves moving through different media, such as radio waves, microwaves, x-rays, or infrared. |  |  |  |
| [SC.912.P.10.Su.10:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8306) | Recognize examples of electromagnetic waves moving through different media, such as microwave ovens, radios, and x-rays. |  |  |  |
| [SC.912.P.10.Pa.10:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8307) | Recognize primary and secondary colors in visible light. |  |  |  |
| Resources: |  |  |  |  |

[SC.912.P.12.10:](https://www.cpalms.org/Public/PreviewStandard/Preview/1939)

Interpret the behavior of ideal gases in terms of kinetic molecular theory.

**Clarifications:**

Using the kinetic molecular theory, explain the behavior of gases and the relationship between pressure and volume (Boyle's law), volume and temperature (Charles's law), pressure and temperature (Gay-Lussac's law), and number of particles in a gas sample (Avogadro's hypothesis).

### Related Access Points

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [SC.912.P.12.In.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8323) | Identify that gases exert pressure in a closed surface, such as pressure inside a basketball or a hot air balloon. |  |  |  |
| [SC.912.P.12.Su.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8324) | Recognize that a gas can exert pressure, such as in balloons, car tires, or pool floats. |  |  |  |
| [SC.912.P.12.Pa.6:](https://www.cpalms.org/public/PreviewAccessPoint/Preview/8325) | Recognize that some objects contain air, such as balloons, tires, and balls. |  |  |  |
| Resources:  |  |  |  |  |

### [SC.912.P.12.11:](https://www.cpalms.org/Public/PreviewStandard/Preview/1940)

Describe phase transitions in terms of kinetic molecular theory.

**Clarifications:**

Explain, at the molecular level, the behavior of matter as it undergoes phase transitions.

[SC.912.P.12.12:](https://www.cpalms.org/Public/PreviewStandard/Preview/1942)

Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

**Clarifications:**

Various factors could include:  temperature, pressure, solvent and/or solute concentration, sterics, surface area, and catalysts. The rate of reaction is determined by the activation energy, and the pathway of the reaction can be shorter in the presence of enzymes or catalysts. Examples may include: decomposition of hydrogen peroxide using manganese (IV) oxide; nitration of benzene using concentrated sulfuric acid; hydrogenation of a C=C double bond using nickel.

[SC.912.P.12.13:](https://www.cpalms.org/Public/PreviewStandard/Preview/1943)

Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.

**Clarifications:**

Identify and explain the factors that affect the rate of dissolving (e.g., temperature, concentration, surface area, pressure, mixing). Explain that equilibrium is established when forward and reverse-reaction rates are equal.

[MA.K12.MTR.1.1:](https://www.cpalms.org/PreviewStandard/Preview/15875) Actively participate in effortful learning both individually and collectively.

Mathematicians who participate in effortful learning both individually and with others:

* Analyze the problem in a way that makes sense given the task.
* Ask questions that will help with solving the task.
* Build perseverance by modifying methods as needed while solving a challenging task.
* Stay engaged and maintain a positive mindset when working to solve tasks.
* Help and support each other when attempting a new method or approach.

**Clarifications:**
Teachers who encourage students to participate actively in effortful learning both individually and with others:

* Cultivate a community of growth mindset learners.
* Foster perseverance in students by choosing tasks that are challenging.
* Develop students’ ability to analyze and problem solve.
* Recognize students’ effort when solving challenging problems.

[MA.K12.MTR.2.1:](https://www.cpalms.org/PreviewStandard/Preview/15876) Demonstrate understanding by representing problems in multiple ways.

Mathematicians who demonstrate understanding by representing problems in multiple ways:

* Build understanding through modeling and using manipulatives.
* Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
* Progress from modeling problems with objects and drawings to using algorithms and equations.
* Express connections between concepts and representations.
* Choose a representation based on the given context or purpose.

**Clarifications:**
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

* Help students make connections between concepts and representations.
* Provide opportunities for students to use manipulatives when investigating concepts.
* Guide students from concrete to pictorial to abstract representations as understanding progresses.
* Show students that various representations can have different purposes and can be useful in different situations.

[MA.K12.MTR.3.1:](https://www.cpalms.org/PreviewStandard/Preview/15877) Complete tasks with mathematical fluency.

Mathematicians who complete tasks with mathematical fluency:

* Select efficient and appropriate methods for solving problems within the given context.
* Maintain flexibility and accuracy while performing procedures and mental calculations.
* Complete tasks accurately and with confidence.
* Adapt procedures to apply them to a new context.
* Use feedback to improve efficiency when performing calculations.

**Clarifications:**
Teachers who encourage students to complete tasks with mathematical fluency:

* Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
* Offer multiple opportunities for students to practice efficient and generalizable methods.
* Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

[MA.K12.MTR.4.1:](https://www.cpalms.org/PreviewStandard/Preview/15878) Engage in discussions that reflect on the mathematical thinking of self and others.

Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

* Communicate mathematical ideas, vocabulary and methods effectively.
* Analyze the mathematical thinking of others.
* Compare the efficiency of a method to those expressed by others.
* Recognize errors and suggest how to correctly solve the task.
* Justify results by explaining methods and processes.
* Construct possible arguments based on evidence.

**Clarifications:**
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

* Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
* Create opportunities for students to discuss their thinking with peers.
* Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
* Develop students’ ability to justify methods and compare their responses to the responses of their peers.

[MA.K12.MTR.5.1:](https://www.cpalms.org/PreviewStandard/Preview/15879) Use patterns and structure to help understand and connect mathematical concepts.

Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

* Focus on relevant details within a problem.
* Create plans and procedures to logically order events, steps or ideas to solve problems.
* Decompose a complex problem into manageable parts.
* Relate previously learned concepts to new concepts.
* Look for similarities among problems.
* Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**
Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

* Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
* Support students to develop generalizations based on the similarities found among problems.
* Provide opportunities for students to create plans and procedures to solve problems.
* Develop students’ ability to construct relationships between their current understanding and more sophisticated ways of thinking.

[MA.K12.MTR.6.1:](https://www.cpalms.org/PreviewStandard/Preview/15880) Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

* Estimate to discover possible solutions.
* Use benchmark quantities to determine if a solution makes sense.
* Check calculations when solving problems.
* Verify possible solutions by explaining the methods used.
* Evaluate results based on the given context.

**Clarifications:**
Teachers who encourage students to assess the reasonableness of solutions:

* Have students estimate or predict solutions prior to solving.
* Prompt students to continually ask, “Does this solution make sense? How do you know?”
* Reinforce that students check their work as they progress within and after a task.
* Strengthen students’ ability to verify solutions through justifications.

[MA.K12.MTR.7.1:](https://www.cpalms.org/PreviewStandard/Preview/15881) Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

* Connect mathematical concepts to everyday experiences.
* Use models and methods to understand, represent and solve problems.
* Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

**Clarifications:**
Teachers who encourage students to apply mathematics to real-world contexts:

* Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
* Challenge students to question the accuracy of their models and methods.
* Support students as they validate conclusions by comparing them to the given situation.
* Indicate how various concepts can be applied to other disciplines.

[ELA.K12.EE.1.1:](https://www.cpalms.org/PreviewStandard/Preview/15201) Cite evidence to explain and justify reasoning.

**Clarifications:**
K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they’ve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

[ELA.K12.EE.2.1:](https://www.cpalms.org/PreviewStandard/Preview/15202) Read and comprehend grade-level complex texts proficiently.

**Clarifications:**
See [Text Complexity](https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/best/la/appendixb.pdf) for grade-level complexity bands and a text complexity rubric.

[ELA.K12.EE.3.1:](https://www.cpalms.org/PreviewStandard/Preview/15203) Make inferences to support comprehension.

**Clarifications:**
Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

[ELA.K12.EE.4.1:](https://www.cpalms.org/PreviewStandard/Preview/15204) Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**
In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think \_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_.” The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

[ELA.K12.EE.5.1:](https://www.cpalms.org/PreviewStandard/Preview/15205) Use the accepted rules governing a specific format to create quality work.

**Clarifications:**
Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

[ELA.K12.EE.6.1:](https://www.cpalms.org/PreviewStandard/Preview/15206) Use appropriate voice and tone when speaking or writing.

**Clarifications:**
In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

[ELD.K12.ELL.SC.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/8643)

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.

[ELD.K12.ELL.SI.1:](https://www.cpalms.org/Public/PreviewStandard/Preview/8640)

English language learners communicate for social and instructional purposes within the school setting.