

# Arizona Science Standards - 2nd Grade



## Three Dimensions of Science

Sensemaking in science occurs with the integration of three essential dimensions.

### Science and Engineering Practices

- Ask Questions and Define Problems
- Develop and Use Models
- Plan and Carry Out Investigations
- Analyze and Interpret Data
- Use Mathematics and Computational Thinking
- Construct Explanations and Design Solutions
- Engage in Argument from Evidence
- Obtain, Evaluate, and Communicate Information

### Crosscutting Concepts

- Patterns
- Cause and Effect
- Structure and Function
- Systems and System Models
- Stability and Change
- Scale, Proportion, and Quantity
- Energy and Matter

### Core Ideas

#### Core Ideas for Knowing Science

##### Physical Science

P1: All matter in the Universe is made of very small particles.

P2: Objects can affect other objects at a distance.

P3: Changing the movement of an object requires a net force to be acting on it.

P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

##### Earth and Space Science

E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.

E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe.

##### Life Science

L1: Organisms are organized on a cellular basis and have a finite life span.

L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

L3: Genetic information is passed down from one generation of organisms to another.

L4: The unity and diversity of organisms, living and extinct, is the result of evolution.

#### Core Ideas for Using Science

U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.

U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.

U3: Applications of science often have both positive and negative ethical, social, economic, and/or political implications.

## Physical Science Standards

Students develop an understanding of observable properties of matter and how changes in energy (heating or cooling) can affect matter or materials.

|          |                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.P1U1.1 | Plan and carry out an investigation to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to develop and support an explanation. |
| 2.P1U1.2 | Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter.                                                             |
| 2.P4U1.3 | Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.                                                                                            |

## Life Science Standards

Students develop an understanding that life on Earth depends on energy from the Sun or energy from other organisms to survive.

|           |                                                                                                                                              |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 2.L2U1.9  | Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive. |
| 2.L2U1.10 | Develop a model representing how life on Earth depends on energy from the Sun and energy from other organisms.                               |

**Phenomena** are observable events that can be explained or explored. Science aims to explain the causes of these events, or phenomena, using scientific ideas, concepts, and practices (3-dimensions).

## Earth and Space Science Standards

Students develop an understanding of the distribution and role of water and wind in weather, shaping the land, and where organisms live. Wind and water can also change environments, and students learn humans and other organisms can change environments too.

Students develop an understanding of changing patterns in the sky including the position of Sun, Moon, and stars, and the apparent shape of the Moon.

|          |                                                                                                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.E1U1.4 | Observe and investigate how wind and water change the shape of the land resulting in a variety of landforms.                                                        |
| 2.E1U1.5 | Develop and use models to represent that water can exist in different states and is found in oceans, glaciers, lakes, rivers, ponds, and the atmosphere.            |
| 2.E1U2.6 | Analyze patterns in weather conditions of various regions of the world and design, test, and refine solutions to protect humans from severe weather conditions.     |
| 2.E1U3.7 | Construct an argument from evidence regarding positive and negative changes in water and land systems that impact humans and the environment.                       |
| 2.E2U1.8 | Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another. |

### Key Crosscutting Concepts in 2<sup>nd</sup> Grade

*Patterns; Cause and Effect; Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change*



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Core Ideas for Knowing Science: Elements for Physical, Earth & Space, and Life Science Standards

Elements of Physical Science Standards

- 2.P1U1.1** Plan and carry out an investigation to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to develop and support an explanation.
- All the ‘stuff’ encountered in everyday life, including air, water, and different kinds of solid substances, is called matter because it has mass and takes up space.
  - Different materials are recognizable by their properties, some of which are used to classify them as being solid or liquid, depending on temperature. Matter can be described by its observable properties. (2.P1U1.2)
- Note: According to the text, Disciplinary Core Ideas: Teaching & Learning, the study of states of matter are limited to studying solids and liquids, gases are not included. Since gases cannot be observed and are therefore much more difficult to study, students should not be asked to study gases till they are able to use equipment to make observations of gases. (Disciplinary Core Ideas: Teaching & Learning (pg.17))*
- 2.P1U1.2** Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter.
- Different materials are recognizable by their properties, some of which are used to classify them as being solid or liquid, depending on temperature. (2.P1U1.1)
  - Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.
  - Heating can cause change, as in cooking, melting solids or changing water to vapor.
- 2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.
- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Elements of Life Science Standards

- 2.L2U1.9** Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive.
- All living things need food as their source of energy as well as air, water, and certain temperature conditions. Plants can use sunlight to make the food they need and can store food that they do not immediately use. (2.L2U1.10)
  - Animals need food that they can break down, which comes either directly by eating plants or by eating animals which have eaten plants or other animals. Animals are ultimately dependent on plants for their survival. (2.L2U1.10)
- 2.L2U1.10** Develop a model representing how life on Earth depends on energy from the Sun and energy from other organisms.
- All living things need food as their source of energy as well as air, water, and certain temperature conditions. Plants use sunlight to make the food they need and can store food that they do not immediately use. (2.L2U1.9)
  - Animals need food that they can break down, which comes either directly by eating plants or by eating animals which have eaten plants or other animals. Animals are ultimately dependent on plants for their survival. (2.L2U1.9)
  - The relationships among organisms can be represented as a food chain.

Elements of Earth and Space Science Standards

- 2.E1U1.4** Observe and investigate how wind and water change the shape of the land resulting in a variety of landforms.
- Wind and water can change the shape of the land.
- 2.E1U1.5** Develop and use models to represent that water can exist in different states and is found in oceans, glaciers, lakes, rivers, ponds, and the atmosphere.
- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.
- 2.E1U2.6** Analyze patterns in weather conditions of various regions of the world and design, test, and refine solutions to protect humans from severe weather conditions.
- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.
  - The temperature, pressure, direction, speed of movement and the amount of water vapor in the air combine to create the weather. Measuring these properties over time enables patterns to be found that can be used to predict the weather.
- 2.E1U3.7** Construct an argument from evidence regarding positive and negative changes in water and land systems that impact humans and the environment.
- Plants and animals can change their environment.
  - Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air and other living things.
- 2.E2U1.8** Observe and explain the Sun’s position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another.
- There are patterns in the position of the Sun seen at different times of the day and in the shape of the Moon from one night to another.

The elements are not to be used as a check-off list, but rather a useful tool to help educators identify the specific pieces of knowledge and skill that make up the practice, crosscutting concept, or core idea at that grade-band.