



# Effective Leadership for Supporting Science Instruction

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What struggles do leaders face  
in supporting science educators  
in improving science  
instruction?

# Video

## Dimension 1: Science and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

## Dimension 2: Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

### **Dimension 3: Disciplinary Core Ideas**

#### *Physical Science*

PS1: Matter and Its Interactions

PS2: Motion and Stability: Forces and Interactions

PS3: Energy

PS4: Waves and Their Applications in Technologies for Information Transfer

#### *Life Science*

LS1: From Molecules to Organisms: Structures and Processes

LS2: Ecosystems: Interactions, Energy, and Dynamics

LS3: Heredity: Inheritance and Variation of Traits

LS4: Biological Unity and Diversity

#### *Earth and Space Sciences*

ESS1: Earth's Place in the Universe

ESS2: Earth's Systems

ESS3: Earth and Human Activity

## 5-PS1-1 Matter and Its Interactions

Science & Engineering Practices	Disciplinary Core Ideas	Performance Expectations
<ul style="list-style-type: none"> <li>1 Asking questions (for science) and defining problems (for engineering)</li> <li>2 <b>Developing and using models</b> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model to describe phenomena.</li> <li>3 Planning and carrying out investigations</li> <li>4 Analyzing and interpreting data</li> <li>5 Using mathematics and computational thinking</li> <li>6 Constructing explanations (for science) and designing solutions (for engineering)</li> <li>7 Engaging in argument from evidence</li> <li>8 Obtaining, evaluating, and communicating information</li> </ul>	<p><b>Structure and Properties of Matter:</b></p> <ul style="list-style-type: none"> <li>• Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means.</li> <li>• A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects.</li> </ul>	<p><b>5-PS1-1</b> <i>Students who demonstrate understanding can:</i></p> <p><b>Develop a model to describe that matter is made of particles too small to be seen.</b></p> <p><b>Clarification Statement:</b> Examples of evidence that could be utilized in building models include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.</p> <p><b>Assessment Boundary:</b> Assessment does not include atomic-scale mechanism of evaporation and condensation or defining the unseen particles.</p>

What students are expected to do to demonstrate their understanding of science concepts and ability to explain them or make application of them.



**Crosscutting Concepts: Scale, Proportion, and Quantity**

- Natural objects exist from the very small to the immensely large.

### Oklahoma Academic Standards Connections

ELA/Literacy	Mathematics
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## Grade 5

**Standard 1: Properties of Matter and Energy – Describe characteristics of objects based on physical qualities such as size, shape, color, mass, temperature, and texture. Energy can produce changes in properties of objects such as changes in temperature. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:**

1. Matter has physical properties that can be used for identification (e.g., color, texture, shape).
2. Physical properties of objects can be observed, described, and measured using tools such as simple microscopes, gram spring scales, metric rulers, metric balances, and Celsius thermometers.

## Concepts for OAS-Science

- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means.
- A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including inflation and shape of a balloon: the effects of air on larger particles or objects.

## PASS Standards

- Matter has physical properties that can be used for identification (e.g., color, texture, shape).
- Physical properties of objects can be observed, described, and measured using tools such as simple microscopes, gram spring scales, metric rulers, metric balances, and Celsius thermometers.

## 5-PS1-1 Matter and Its Interactions

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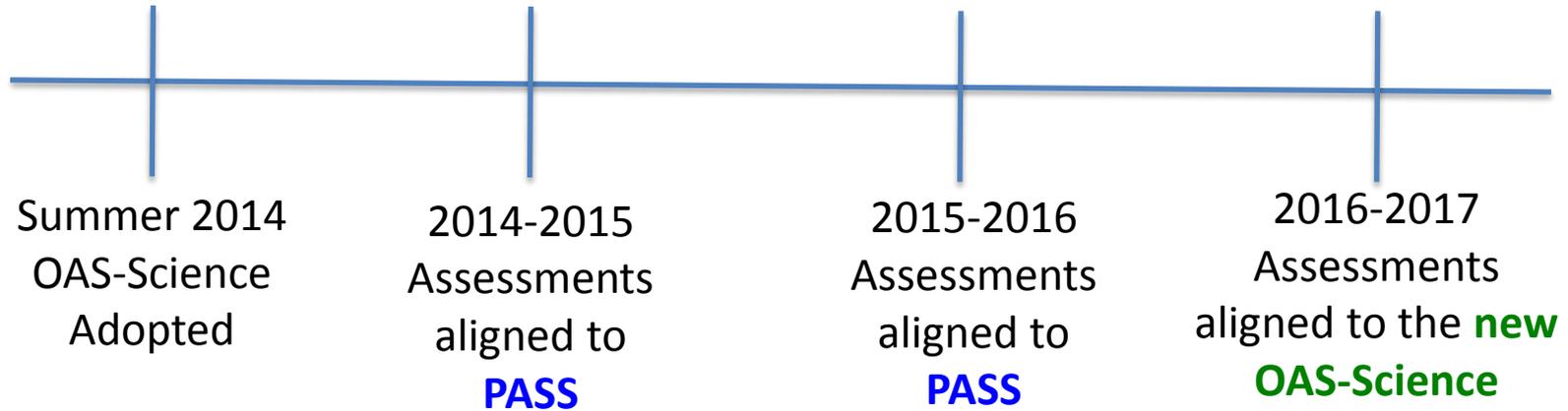
**Oklahoma Academic Standards Connections**

ELA/Literacy	Mathematics
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2nd Grade	5th Grade	6th Grade	7th Grade	8th Grade	Physical Science	Chemistry
<p>Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature.</p> <p>Matter can be described and classified by its observable properties.</p>	<p>Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means.</p> <p>A model showing that gases are made from matter particles that are too small to see and are moving</p>	<p>All living things are made Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide.</p>	<p>Substances are made from different types of atoms, which combine with one another in various ways.</p> <p>Atoms form molecules that range in size from two to thousands of atoms.</p> <p>Solids may be formed from molecules, or they may</p>	<p>Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.</p>	<p>Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.</p> <p>The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar</p>	<p>Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.</p> <p>The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar</p>

Progressions

# Implementation Timeline



# Support Strategies

How might you incorporate some of these strategies for teachers in your district in the upcoming year?

# Questions