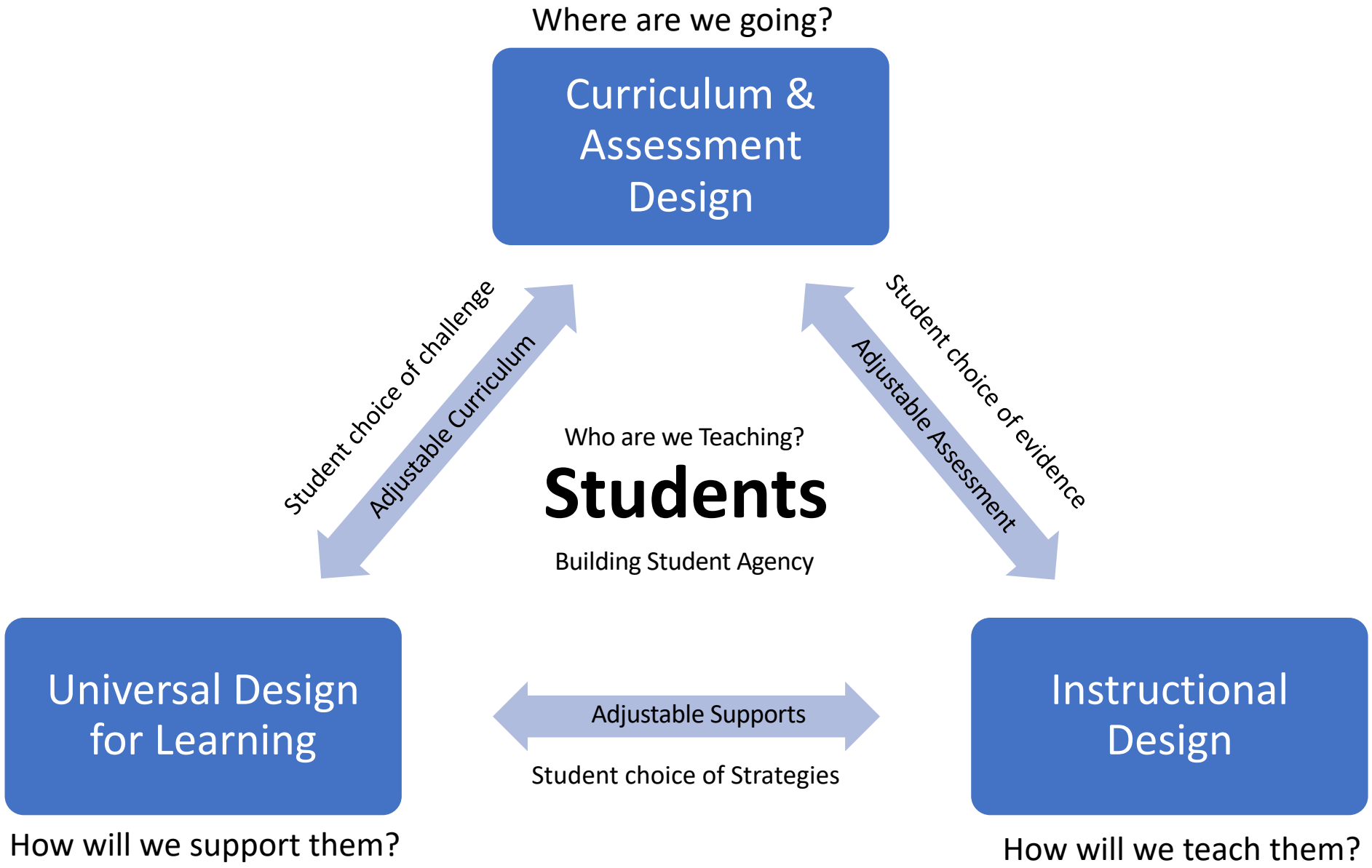
Shelley Moore, 2019

# How can we change the system?
# Designing with Equity in Mind

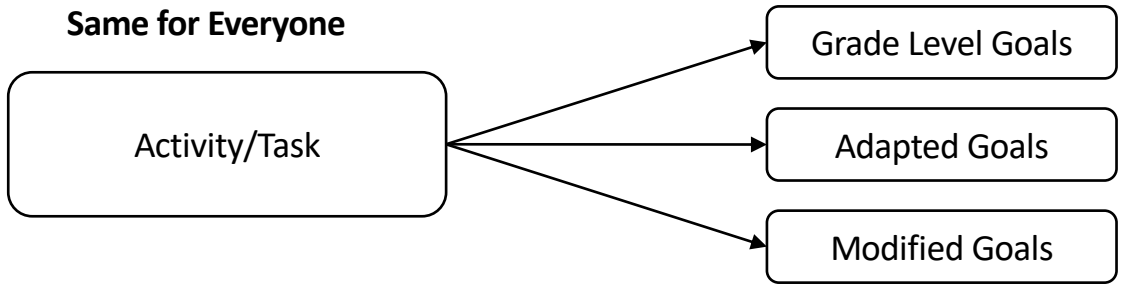


## Forward Design

**Standardized Evaluation**

**Differentiated**

**Same for Everyone**

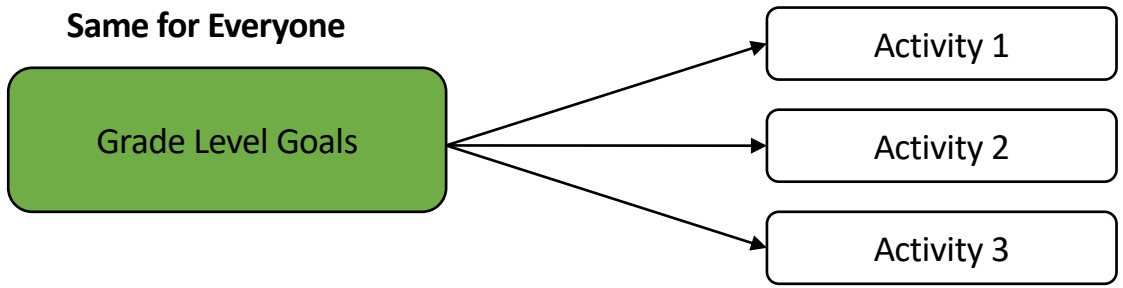



**Compromises the integrity of evaluation**

## Backward Design

**Differentiated**

**Same for Everyone**




**Does not compromise the integrity evaluation**

**Standards Based Evaluation**

McTigue, 2010

# Backwards Design

**What do we need to UNDERSTAND?**

**I understand …**

**What do we need to KNOW?**

**I know…**

**What do we need to DO?**

**I can…**

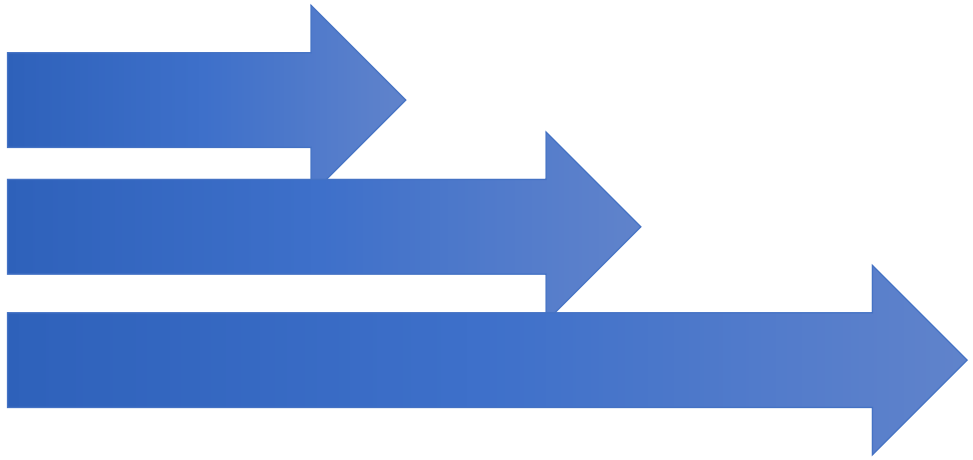
**Who do we need to BECOME?**

**I can become…**

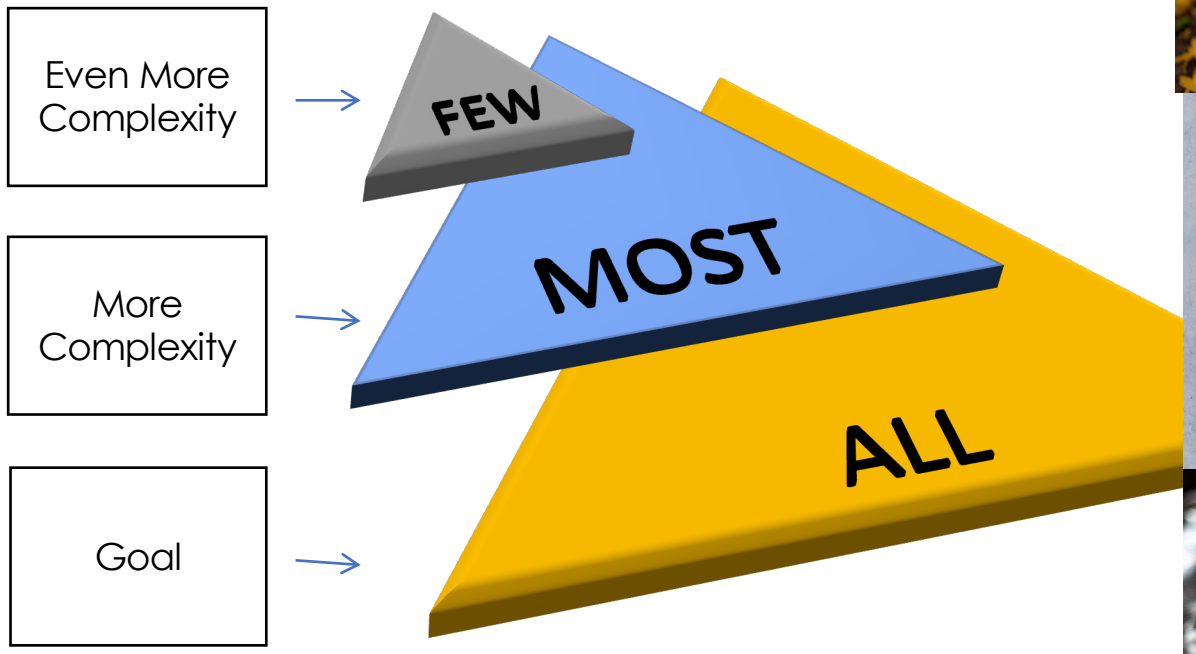
Shelley Moore, 2107

# Rubrics vs. Learning Maps

| | Essential | More complex | More complex |
|---|---|---|---|
| Learning Outcome | | | |

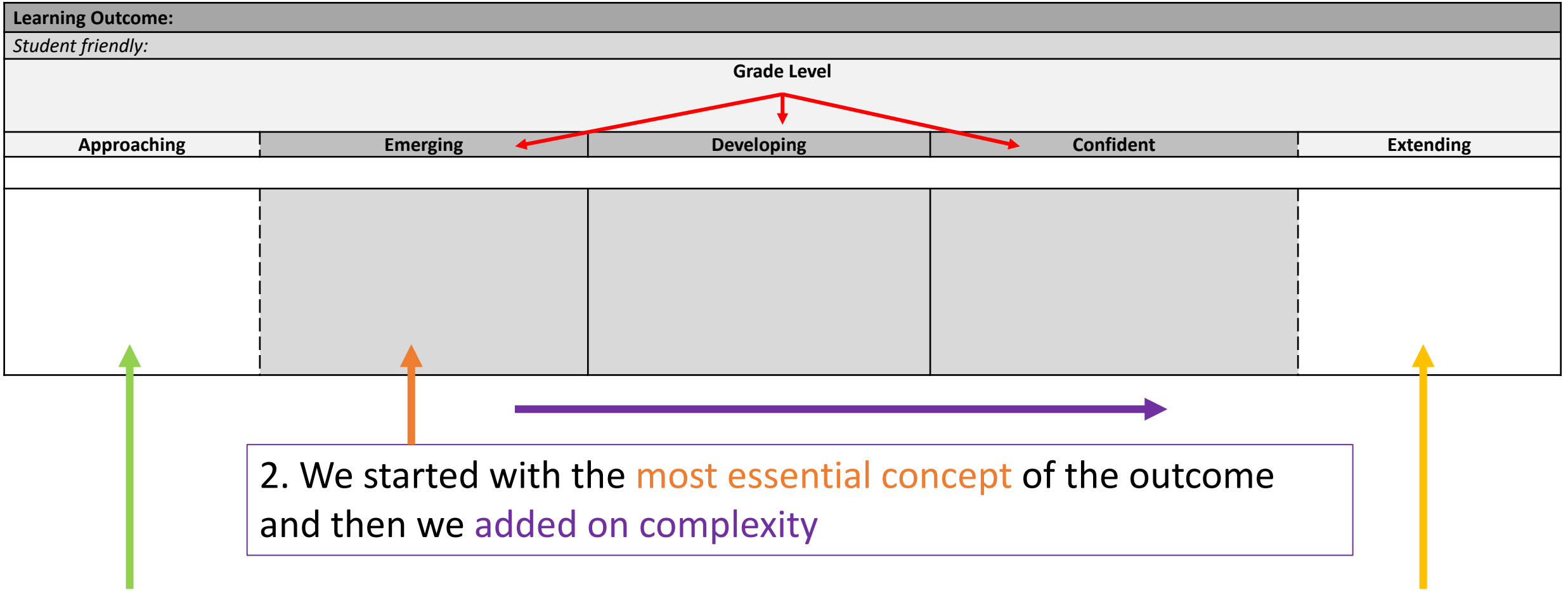


# Planning Pyramid




# Our Co-Planning Journey: Learning Continuums

1. Using the elaborations for each learning outcome, we constructed a grade-level scaffold in *student friendly language*




2. We started with the most essential concept of the outcome and then we added on complexity

3. We extended the grade level scaffold to include an access point and challenge point

# Science Templates

# Backwards Design Planning

| Grade: | Subject Area: Science | Strand/Topic: |
|---|---|---|
| Learning Standard: | | Unit Guiding Question(s): |
| Key Vocabulary: | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | Student Friendly Language |
|---|---|---|
| Science and Engineering Practices | | |
| Disciplinary Core Ideas | | |
| Crosscutting Concepts | | |

# Backwards Design Planning

| Grade: | Subject Area: Science | Strand/Topic: |
|---|---|---|
| Learning Standard: | | Unit Guiding Question(s): |
| Key Vocabulary: | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | Student Friendly Language |
|---|---|---|
| Science and Engineering Practices | | |

| Access (1) | Essential (2) | Developing (3) | Challenge (4) |
|---|---|---|---|
| | | | |

# Backwards Design Planning

| Grade: | Subject Area: Science | Strand/Topic: |
|---|---|---|
| Learning Standard: | | Unit Guiding Question(s): |
| Key Vocabulary: | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | | Student Friendly Language |
|---|---|---|---|
| Disciplinary Core Ideas | | | |
| Access (1) | Essential (2) | Developing (3) | Confident (4) |
| | | | |

# Backwards Design Planning

| Grade: | Subject Area: Science | Strand/Topic: |
|---|---|---|
| Learning Standard: | | Unit Guiding Question(s): |
| Key Vocabulary: | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | Student Friendly Language |
|---|---|---|
| Crosscutting Concepts | | |

| Access (1) | Essential (2) | Developing (3) | Challenge (4) |
|---|---|---|---|
| | | | |

# Science Example

# 5.Structure and Properties of Matter

## 5.Structure and Properties of Matter

Students who demonstrate understanding can:

**5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.** [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

**5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.]

**5-PS1-3. Make observations and measurements to identify materials based on their properties.** [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]

**5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

### Science and Engineering Practices

**Developing and Using Models**

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. (5-PS1-1)

**Planning and Carrying Out Investigations**

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)
- Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

**Using Mathematics and Computational Thinking**

Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

- Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

### Disciplinary Core Ideas

**PS1.A: Structure and Properties of Matter**

- 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 the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
- Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

**PS1.B: Chemical Reactions**

- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)
- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)

### Crosscutting Concepts

**Cause and Effect**

- Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

**Scale, Proportion, and Quantity**

- Natural objects exist from the very small to the immensely large. (5-PS1-1)
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)

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***Connections to Nature of Science***

**Scientific Knowledge Assumes an Order and Consistency in Natural Systems**

- Science assumes consistent patterns in natural systems. (5-PS1-2)

# Backwards Design Planning

| Grade: 5 | Subject Area: Science | Strand/Topic: Structures & Properties of Matter |
|---|---|---|
| **Learning Standard: 5-PS1-1**<br>Students can develop a model to describe that matter is made of particles too small to be seen | | **Unit Guiding Question(s):**<br>How can I make a model to show that matter can be made up of particles that are too small to see? |
| **Key Vocabulary:** matter, properties, structures, scale, proportion, quantity, models particles | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | Student Friendly Language |
|---|---|---|
| **Science and Engineering Practices** | Developing and Using Models | I can make and use models to help me understand |
| **Disciplinary Core Ideas** | Structure and Properties of Matter | I know how to identify and describe matter using their structures and properties |
| **Crosscutting Concepts** | Scale, Proportion, and Quantity | I know that I can use scale, proportion and quantity to describe matter that is too small to see |

# Backwards Design Planning

| Grade: 5 | Subject Area: Science | Strand/Topic: Structures & Properties of Matter |
|---|---|---|
| **Learning Standard: 5-PS1-1**<br>Students can develop a model to describe that matter is made of particles too small to be seen | | **Unit Guiding Question(s):**<br>How can I make a model to show that matter can be made up of particles that are too small to see? |
| **Key Vocabulary:** matter, properties, structures, scale, proportion, quantity, models particles | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | | Student Friendly Language |
|---|---|---|---|
| **Science and Engineering Practices** | **Developing and Using Models:**<br>I can make and use models to help me understand | | |
| **Access (1)** | **Essential (2)** | **Developing (3)** | **Challenge (4)** |
| I can follow/participate in creating a model | I can make a plan to create a model | I can build and test a model | I can adjust and improve a model |

# Backwards Design Planning

| Grade: 5 | Subject Area: Science | Strand/Topic: Structures & Properties of Matter |
|---|---|---|
| **Learning Standard: 5-PS1-1**<br>Students can develop a model to describe that matter is made of particles too small to be seen | | **Unit Guiding Question(s):**<br>How can I make a model to show that matter can be made up of particles that are too small to see? |
| **Key Vocabulary:** matter, properties, structures, scale, proportion, quantity, models particles | | |

| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | | Student Friendly Language |
|---|---|---|---|
| **Disciplinary Core Ideas** | PS1.A: Structure and Properties of Matter<br>I know how to identify and describe matter using their structures and properties | | |
| **Access (1)** | **Essential (2)** | **Developing (3)** | **Confident (4)** |
| I know that matter can be divided up into tiny parts | I know that matter can be divided up into particles that are too small to see | I know that even though there are particles that are too small to see, they still exist and can be seen using models | I know why a model can help us to see tiny particles because of how they move together in space |

# Backwards Design Planning

| Grade: 5 | Subject Area: Science | Strand/Topic: Structures & Properties of Matter |
|---|---|---|
| **Learning Standard: 5-PS1-1**<br>Students can develop a model to describe that matter is made of particles too small to be seen | | **Unit Guiding Question(s):**<br>How can I make a model to show that matter can be made up of particles that are too small to see? |
| **Key Vocabulary:** matter, properties, structures, scale, proportion, quantity, models particles | | |

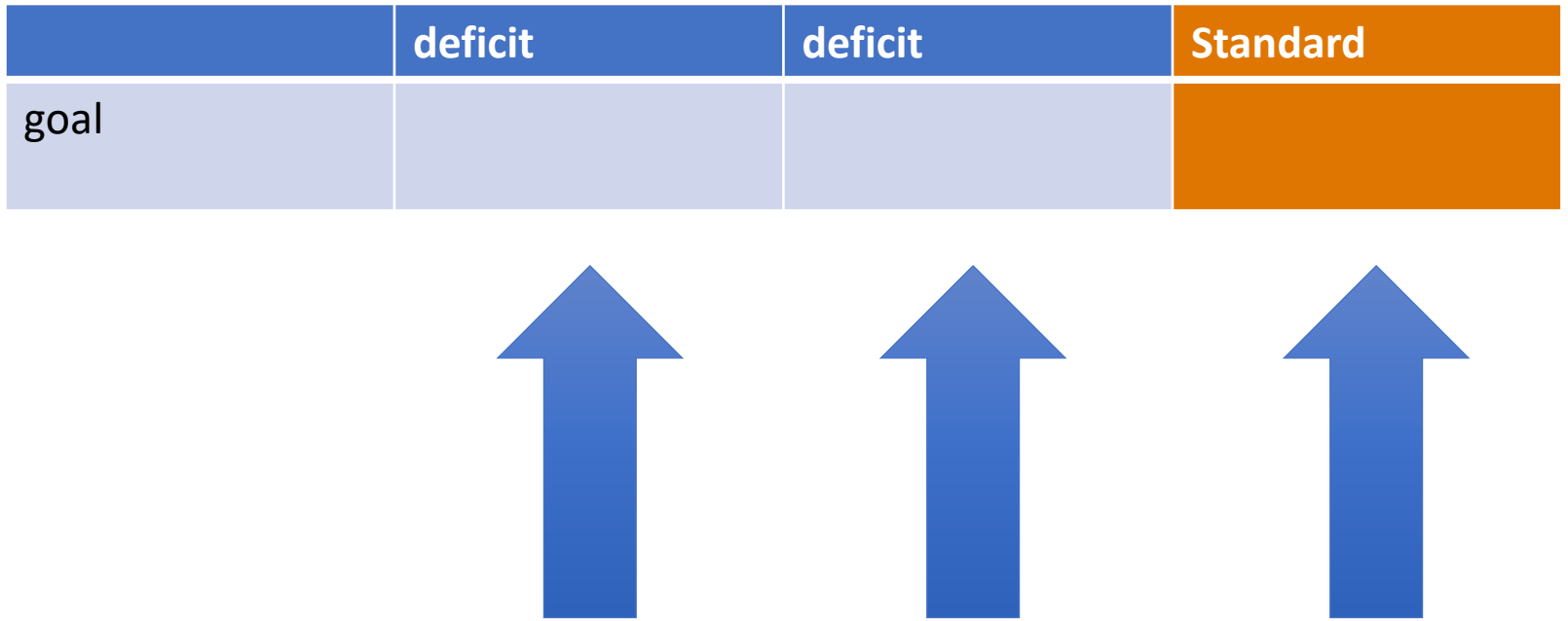
| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | | Student Friendly Language |
|---|---|---|---|
| **Crosscutting Concepts** | Scale, Proportion, and Quantity<br>I know that I can use scale, proportion and quantity to describe matter that is too small to see | | |
| **Access (1)** | **Essential (2)** | **Developing (3)** | **Challenge (4)** |
| I know what big and small is<br><br>I know what more is<br><br>I know what less is | I know what scale, proportion and quantity are | I know how scale and proportions can help describe the size of tiny particles that are too small to see | I know how to use scale and proportion to describe and compare different kinds of matter |

# Backwards Design Planning

| Grade: 5 | Subject Area: Science | Strand/Topic: Structures & Properties of Matter |
|---|---|---|
| **Learning Standard: 5-PS1-3**<br>Students can make observations and measurements to identify materials and matter based on their properties | | **Unit Guiding Question(s):**<br>How can I make observations and measurements to identify and describe materials and matter based on their properties? |
| **Key Vocabulary:** observations, measurements, materials, matter, properties, structures, scale, proportion, quantity, make a plan, investigate | | |

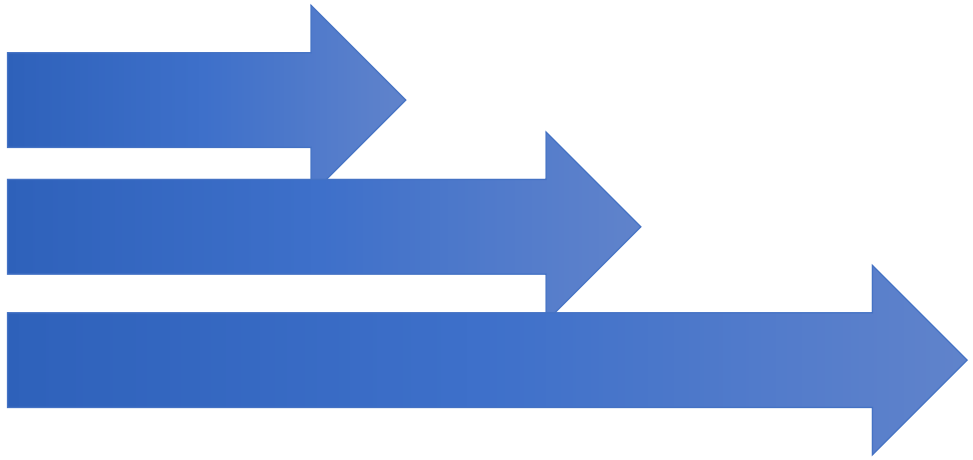
| Learning Goals | Curricular Language<br>What do Students need to Know and Do? | Student Friendly Language |
|---|---|---|
| **Science and Engineering Practices** | Planning and Carrying Out Investigations | I can make a plan to investigate matter |
| **Disciplinary Core Ideas** | Structure and Properties of Matter | I know how to identify and describe matter using their structures and properties |
| **Crosscutting Concepts** | Scale, Proportion, and Quantity | I know that I can use scale, proportion and quantity to describe matter that I can see |

# Rubrics vs. Learning Progressions

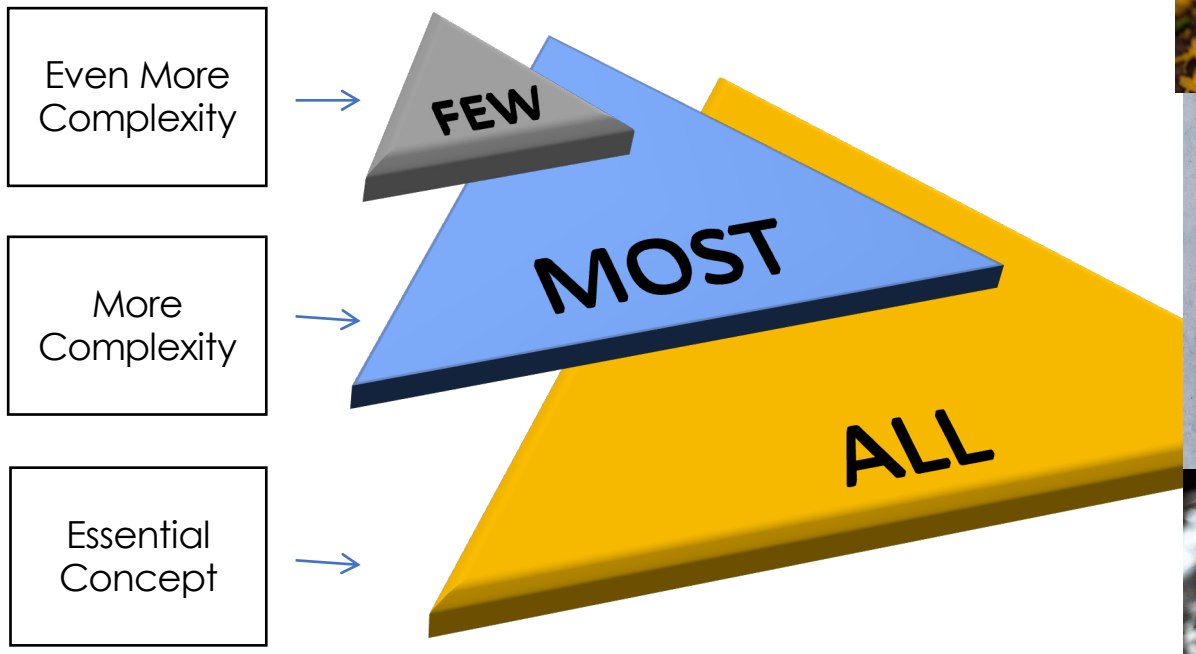


# Reductive vs vs. Additive

| | Essential | More complex | More complex |
|---|---|---|---|
| Learning Outcome | | | |

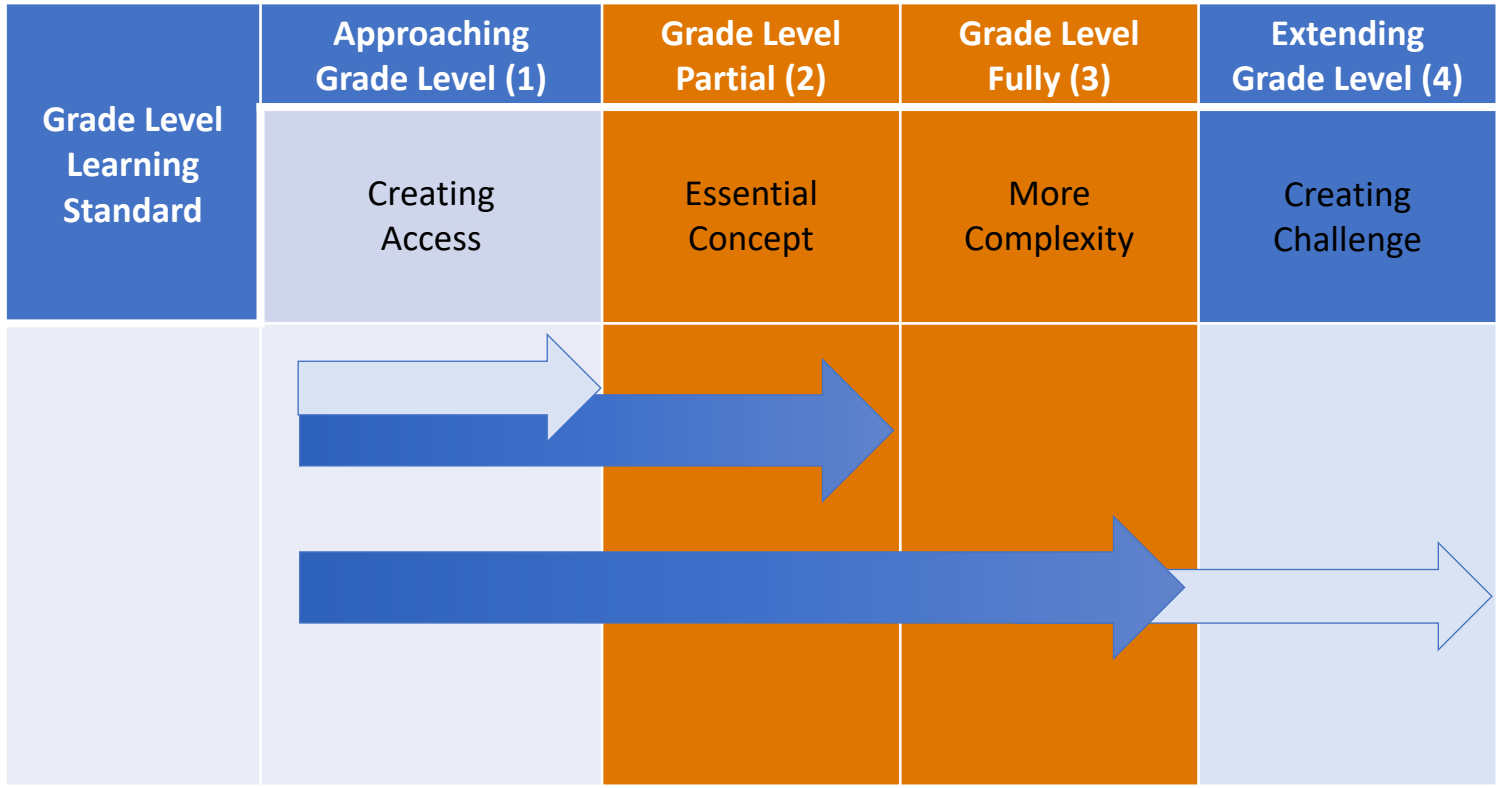


# The Planning Pyramid: Differentiated Curriculum




Start from access, build on challenge

# An Additive Continuum of Proficiency



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