Productive Adaptations Instructional Planning Tool

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Middle school math educators can use this guide to help get started on adapting instruction in ways that are aligned with research-based learning progressions. Instructional content can be adapted for a unit you might identify as inadequate for meeting your students' immediate learning needs. This might be relevant, for example, when students perform below or above grade level, or when you perceive lesson content to be too easy or challenging to support students' immediate learning needs.

This practice guide was developed as part of the multi-year, mixed-methods Analysis of Middle School Math Systems (AMS) study funded by the Bill & Melinda Gates Foundation. The study aimed to understand the extent to which teachers in four urban school districts plan and execute standards-based, rigorous, and culturally responsive mathematics lessons while using one of six different middle school mathematics curricula.

What does the guide include?

The guide has two main sections:

- **Section A:** Describes the purpose and context for the development of the guide and its practical applications for math classrooms.
- **Section B:** Introduces the *Productive Adaptations Instructional Planning Tool* and provides examples of how to apply the tool while you plan your unit.
- **Appendices:** Appendix A includes an example of a productive adaptation for a 7th-grade standard across three learning scenarios. Appendix B provides an extended version of the productive adaptations instructional planning tool with additional guidance for first time users.

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Who should use this guide?

Middle school math teachers, instructional coaches, or professional learning providers may use this guide and the instructional planning tool at the start of a new math unit.

- **Teachers**: Use this guide independently or consider collaborating with a peer or instructional leader to apply learning progressions into your unit planning routine and to prepare for productive adaptations.
- **Instructional coaches and professional learning providers:** Use this guide to introduce teachers to standards-based learning progressions and support their ability to plan for productive adaptations.

Prerequisite knowledge. To make the most effective use of this guide, you should have a basic understanding of the content standards used in your local context. The guide focuses on the use of Common Core State Standards for Mathematics (CCSSM).

Key terms

Mathematical learning progression: A group of related skills and knowledge that show the suggested learning path to think more deeply and effectively about math topics. These help us understand how students' math understanding grows both within a single grade and across different grade levels.

Productive adaptation: A change to instructional content that maintains alignment along the math learning progression so student learning builds toward the intended mathematical goal.

Non-productive adaptation: A change to instructional content that does not align with a mathematical learning progression.

Focal standards: Learning standards targeted by an instructional unit or lesson.

Enabling standards: An extension of the focal standard along the learning progression which can be at grade level or above grade level.

Instructional materials: Student-facing learning materials such as textbooks, workbooks, worksheets, and digital tools.

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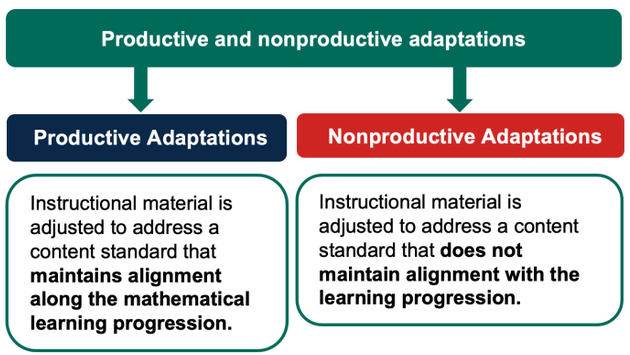
Section A. Purpose and context

Purpose

Teachers make productive adaptations to curricula to meet students' differentiated learning needs while building toward the intended mathematical goal of an instructional lesson or unit. The purpose of the *Productive Adaptations Instructional Planning Tool* is to provide step-by-step guidance on how to use mathematical learning progressions.



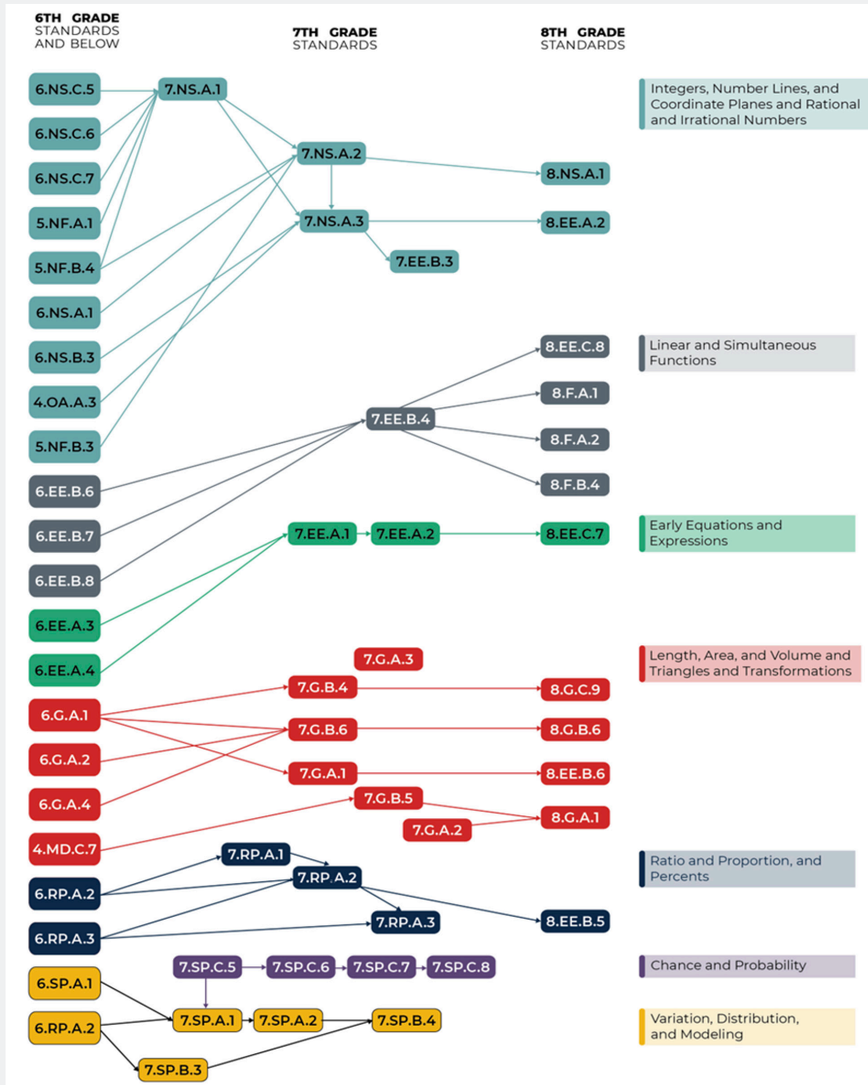
The tool has three main objectives:

1. **Uphold the definition of "productive adaptation"** by identifying a change to instructional content that maintains alignment along the mathematical learning progression, so student learning builds toward the intended goal.
2. **Build teacher capacity to make productive adaptations** to instructional units, including changes to their instructional materials, instructional strategies, or student performance tasks.
3. **Provide examples of productive adaptations** teachers can make when students perform below or above grade level.

Mathematical learning progressions

Mathematical learning progressions are groups of related skills and knowledge that show the paths students typically take as they learn to think more deeply and effectively about math topics. These paths help us understand how students' math understanding grows both within a single grade and across different grade levels (adapted from Achieve the Core, n.d., and Zimba, 2013). Within content standards, mathematical learning progressions represent "[how] standards progress from each other, coordinate with each other and most importantly cluster together into coherent bodies of knowledge" (Zimba, 2013, p. 22). Exhibit 1 provides a visual representation of the mathematical learning progressions within example math domains in the CCSSM.

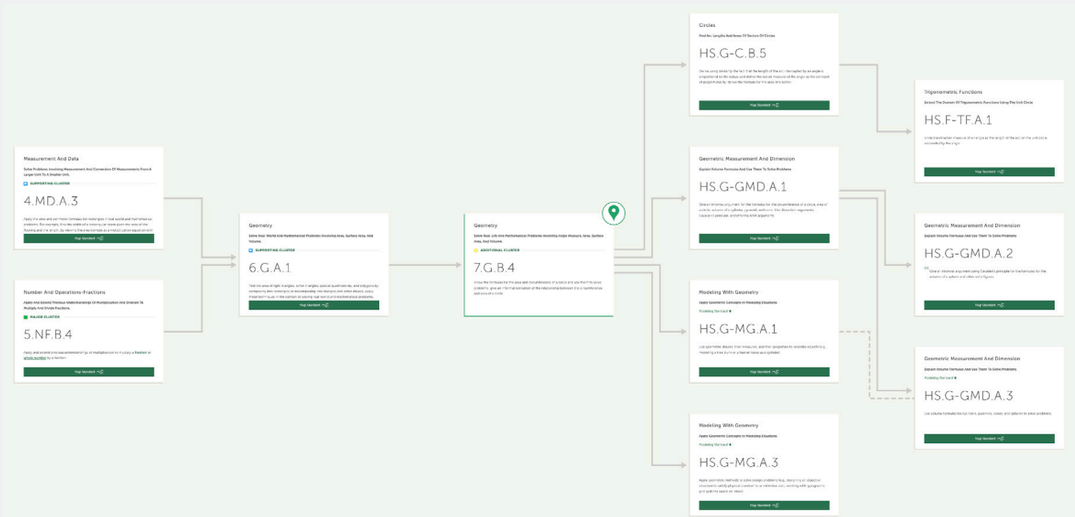
Exhibit 1. Example of mathematical learning progressions across grades 6–8



Source: Coherence Map (Achieve the Core, n.d.), Graph of the Content Standards (Zimba, 2013), and Maloney (2013).

Within the CCSSM, mathematical learning progressions can also be visualized using the Coherence Map, a digital tool developed by Achieve the Core (n.d.). Exhibit 2 provides an example of what the mapping for standard 7.G.B.4 looks like in the Coherence Map, showing the learning progression from prerequisite standards to more advanced standards. Refer to Section B of this guide to learn how to apply the Coherence Map to support your instructional planning for productive adaptations.

Exhibit 2. Example of Coherence Map for CCSSM standard 7.G.B.4



Source: Achieve the Core (n.d.).

When a teacher makes a **productive adaptation,** they adjust the content of a lesson while maintaining alignment along the mathematical learning progressions the standards are built upon. For example, a teacher may plan to cover standard 7.G.B.4 during the lesson but may adapt the content to address standard 6.G.A.1 while delivering the lesson because their students have not mastered that prerequisite content yet. This adaptation would be productive because it follows the mathematical learning progression.

A **nonproductive adaptation** occurs when a teacher adjusts the content of a lesson, but this leads to a deviation from the mathematical learning progression. For example, for the mapping in Exhibit 2, a teacher might identify a group of students in their class struggling with multiplication. The teacher sets students up in a small group to work on their multiplication facts. This adaptation aligns with standard 5.NBT.B.5 (fluently multiply multi-digit whole numbers using the standard algorithm) but deviates from the mathematical learning progression 7.G.B.4 is on. The mathematical learning goal for this group of students has changed, making it a nonproductive adaptation.

Motivation for using mathematical learning progressions to plan for instruction

Mathematical learning progressions have two key functions:

- Help teachers meet students where they are while supporting their ability to meet or exceed grade-level learning standards.
- Increase educators' understanding of how math standards, as well as specific content and skills, connect across and within grade levels to remediate or accelerate student learning.

Before preparing to engage with *The Productive Adaptations Instructional Planning Tool,* read through the overview of the tool below. After reading the overview, continue to Section B to get started!

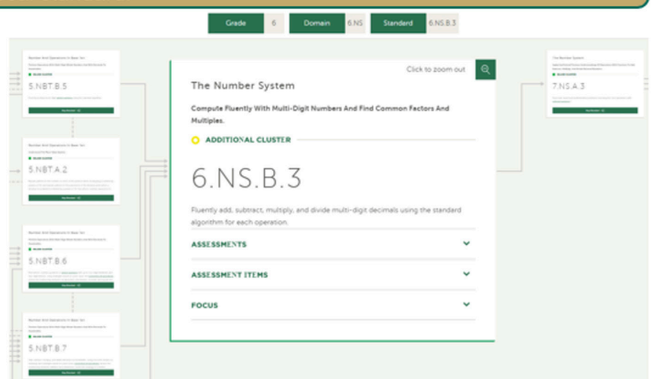
Overview of the Productive Adaptations Instructional Planning Tool

1 Identify the focal standards for the grade-level unit

Review your curriculum and other instructional material to identify the unit standards to address.

2 Map the focal standards using the coherence map

Use the Coherence map to identify the learning progression of the focal standard.



3 Assess your student data related to the focal standard to determine readiness

Diagnose student learning using formative or summative data of the focal standards. If student data are not available, consider conducting a short pre-test to determine if students are ready to learn the focal standard.

4 Make an adaptation using the productive adaptations tool

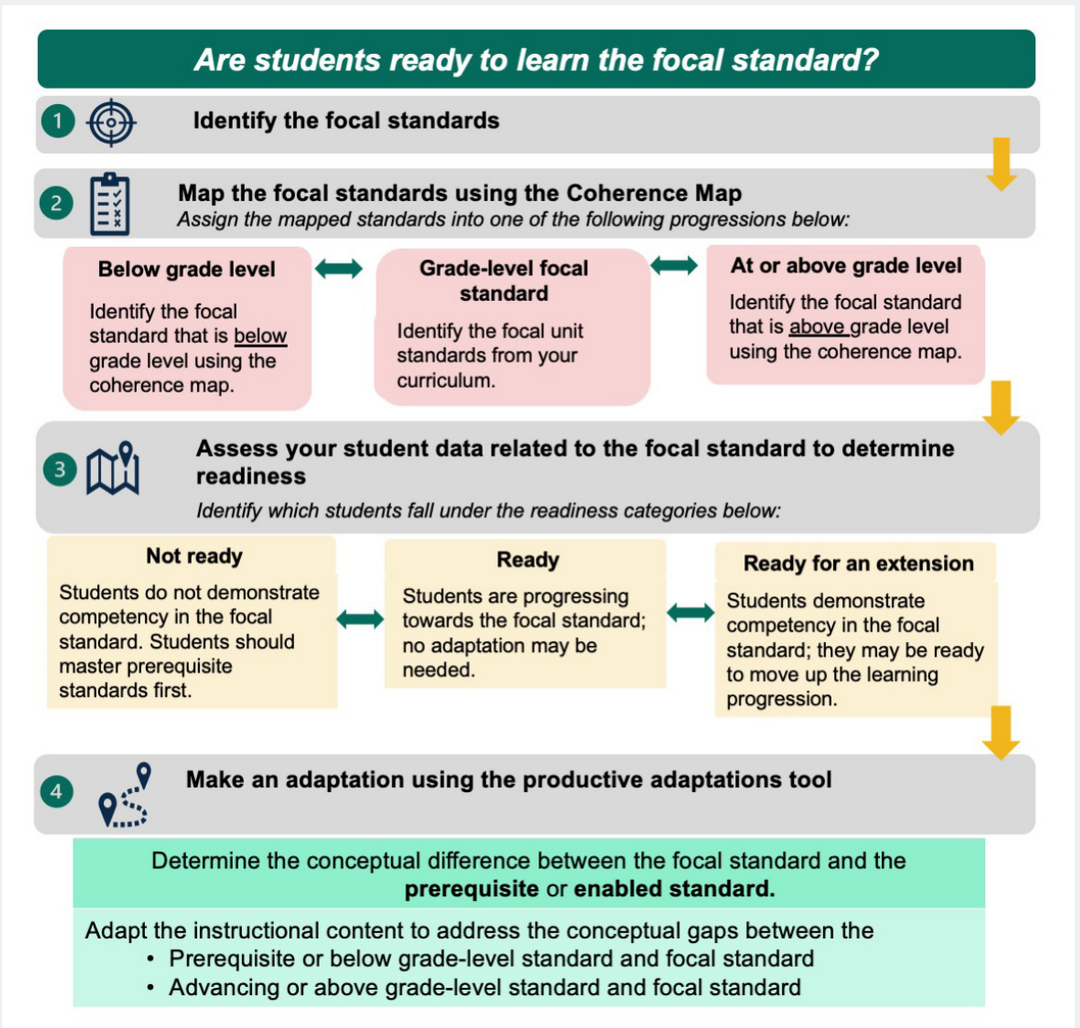
Adapt the instructional content to address the conceptual gaps between the focal standard and prerequisite or enabled standard.

Section B. Productive Adaptations Instructional Planning Tool

The *Productive Adaptations Instructional Planning Tool* (or, for simplicity, the productive adaptations tool) will introduce and enhance your understanding of mathematical learning progressions. This tool will guide you through a four-part structured approach to examine content standards and their associated mathematical learning progressions. With this knowledge, you'll be better equipped to identify whether adjusting instructional material is necessary and if so, how to make productive adaptations.

Directions: Review the readiness-to-learn flow chart (Exhibit 3) before completing the instructional planning tool. This flow chart provides an overview of the recommended steps to make productive adaptations to your instructional material. Afterward, move on to the next page to begin using tool.

Exhibit 3. Readiness-to-learn flow chart



Productive Adaptations Instructional Planning Tool

Part 1: Identify the focal standards

Review your curriculum unit and other instructional materials to identify the standards to address.

a. What unit are you planning for?

b. What grade 6–8 math domains does this unit address?

☐ Ratios and proportional relationships ☐ The number system ☐ Expressions and equations
☐ Geometry ☐ Statistics ☐ Probability ☐ Functions

c. What are the focal standards for the unit?

Part 2: Map the focal standards using the Coherence Map

Understand the mathematical learning progression the focal standards are situated within by using the Coherence Map. Then identify the prerequisite standards that come before in the learning progression and the standards that are enabled by mastering the focal standards.

To save the focal standard's Coherence Map, select option 1 or 2 below.

Option 1: Use the table on the right to copy and paste the standards in the learning progression from the Coherence Map.

Option 2: Reference the learning progression from the Coherence Map website as you complete the next steps.

Reflections from mapping the learning progression

Mapping the focal-standard learning progression		
Prerequisite standards *or lower in the progression*	**Focal standard**	Enabled standards* *or above in the learning progression*

a. How do the prerequisite or enabled standards fit within the current unit?

b. What common mistakes might students make when learning the focal standard's math content?

Part 3: Assess student data related to the focal standard to determine readiness

Map students' current mathematical knowledge and skills to the learning progression using student learning data.

a. Do you have access to summative or formative classroom data related to the standards to inform your instructional planning? Consider the following forms of student outcome data:

- ☐ State assessments
- ☐ District assessments or interims
- ☐ Curricular diagnostic tools
- ☐ Pre- or post-unit tests
- ☐ Entrance or exit tickets
- ☐ Observational data
- ☐ Other:

Limited classroom data. If you do not have data related to the focal standard, consider the following data collection opportunities:

- / Use an entrance or exit ticket to assess competency in the focal standard. Achieve the Core provides example tasks that are aligned to the CCSSM.
- / Use formative assessments in the curriculum to inform your instructional planning.

b. Are students demonstrating competency in the focal standards?

Review your student data and complete the table below to determine the status of your students' understanding of the focal standards along the learning progression. Please note that your school or district context should determine how student data are interpreted and how readiness is assessed.

c. After reviewing your classroom data, identify which students are:

(1) Ready to learn the focal standards

(2) Ready for an extension of content or to advance

(3) Need to master prerequisite content

Group 1: Ready to learn focal standards

Student names/class period:

Group 2: Ready for an extension of content or to advance

Student names/class period:

Group 3: Need to learn prerequisite content before progressing to the focal standards

Student names/class period:

d. How do you know students are ready to learn the focal standards, ready for an extension of content or to advance, or need to master prerequisite content?

For example, you may list the formative or summative data you reviewed in Parts 3a and 3b above.

What data suggest these students are ready to learn the focal standards?

What data suggest these students are ready for an extension?

What data suggest these students need additional support on the prerequisite (or below-grade-level) standards?

Part 4: Make an adaptation using the productive adaptations tool

To make a productive adaptation, consider which content in the instructional materials you may adapt to focus on groups of students who are either (1) ready for an extension or to advance or (2) may need to master prerequisite content.

Group 1: Ready to learn focal standards

For students ready to learn the focal standards, consider if any adaptations are needed to help them learn the math content. If not, consider other adaptations that support multilanguage learners and culturally responsive teaching as detailed in the practice guide for teachers of multilingual math learners in middle school classrooms and the culturally responsive mathematics teaching practice guide.

Group 2: Ready for an extension of content or to advance

For students ready for an extension of content or ready to advance, consider how to adapt the content of the instructional materials to meet the advancing standard. Review the **enabling or above-grade-level** standards from the Coherence Map in Part 2 of this tool.

1. What is the conceptual difference between the focal standards and extension standards? In other words, is there a learning gap between the extension and focal standard that a content adaptation can address?

2. Consider your response above. Brainstorm a few ways you could adapt the content of the instructional materials to meet the advancing or above-grade-level standards.

3. Confirm and implement. Do the proposed content adaptations align with the focal-standard learning progression? If not, consider reviewing your responses to Question 1. Then, revise your proposed content adaptations. You may repeat this process as necessary.

Group 3: Need to learn prerequisite content

For students needing additional support, consider how to adapt the content of instructional materials to meet the prerequisite standard. Review the **prerequisite or below-grade-level standards** from Part 2.

1. What is the conceptual difference between the focal standards and below-grade-level standards? In other words, is there a learning gap between the prerequisite and focal standard that a content adaptation can address?

2. Consider your response above. Brainstorm a few ways you could you adapt the content of the instructional materials to meet the prerequisite or below-grade-level standards.

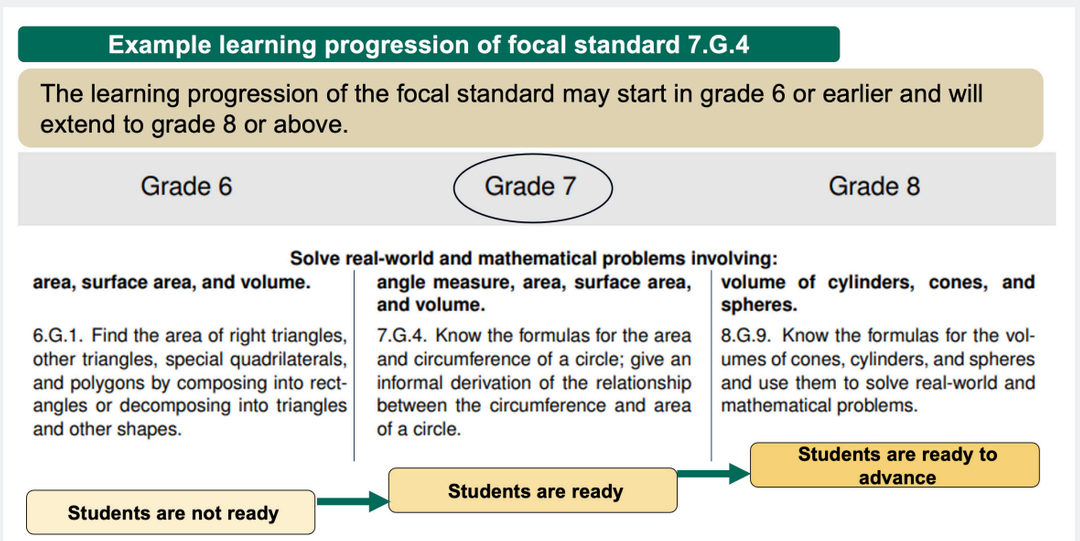
3. How will you know when your students are ready to return to the focal standards?

4. Confirm and implement. Do the proposed content adaptations align with the focal-standard learning progression? If not, consider reviewing your responses to Question 1. Then, revise your proposed content adaptations. You may repeat this process as necessary.

Appendix A. Examining a Mathematical Learning Progression for Standard 7.G.4

A student is ready to learn the focal standard when they demonstrate competency across the learning progression leading up to the focal standard. Exhibit A.1 provides a scenario where a teacher is preparing to teach standard 7.G.4 for 7th-grade geometry. There are a few scenarios for you to consider as you review the exhibit.

Exhibit A.1. Example of learning progression for grade 7



Scenario 1: Students are ready to learn the focal standard.

- Students must demonstrate competency in 6.G.1 before addressing the focal standard. That means students must be able to find the area of triangles, quadrilaterals, and polygons before learning 7.G.4.

Scenario 2: Students are ready for an extension of the content or to advance.

- Students must demonstrate competency in 6.G.1 and 7.G.4 to be ready to learn 8.G.9. An adaptation may be necessary to support students who are ready to advance based on demonstrated competency in 6.G.1 and 7.G.4 on a formative or summative assessment.
- Adaptation to consider: For students to demonstrate competence using the formula of area and circumference, provide them with opportunities to explore real-world applications.
  - Example 1: Ask students to design a space such as a community garden, pool, or home with varying geometric shapes so they can calculate the area or circumference.
  - Example 2: Pose hypothetical scenarios for students to consider with real-world implications, such as identifying the area covered by a rotating sprinkler system. Does the sprinkler system reach the entire area? What area is not covered, and what are the implications, if any?

Scenario 3: Students are not ready.

- 7th grade: Students have not demonstrated competency in 6.G.1. on a formative or summative assessment. An adaptation might be necessary for students to be prepared to learn 7.G.4.
- 8th grade: Students have not demonstrated competency in 7.G.4 or 6.G.1 on a formative or summative assessment. An adaptation might be necessary for students to be prepared to learn 8.G.9.
- Adaptation to consider: Given that finding angle measure, area, surface area, and volume requires students to use and apply formulas, an adaptation might be to ask students to compose polygons into rectangles or decompose polygons into other shapes. This will prepare students to think flexibly about two-dimensional shapes to prepare them to solve for volume and surface area.

Appendix B. Productive Adaptations Instructional Planning Tool – Extended Guidance

Part 1: Identify the focal standards

Review your curriculum unit and other instructional materials to identify the standards to address.

Guiding question: What are you preparing to teach students?

a. What unit are you planning for?

b. What grade 6-8 math domains does this unit address?

☐ Ratios and proportional relationships ☐ The number system ☐ Expressions and equations

☐ Geometry ☐ Statistics ☐ Probability ☐ Functions

c. What are the focal standards for the unit?

Part 2: Map the focal standards using the Coherence Map

Understand the mathematical learning progression the focal standards are situated within by using the Coherence Map. Then identify the prerequisite standards that come before in the learning progression and the standards that are enabled by mastering the focal standards.

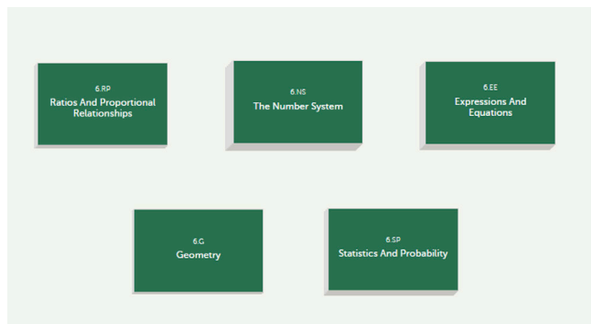
Guiding questions:

- What is the learning progression of the focal standards identified in Part 1?
- What other standards map to the focal standard within the learning progression?

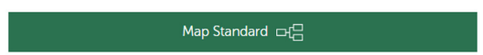
Steps to identify the mathematical learning progressions:

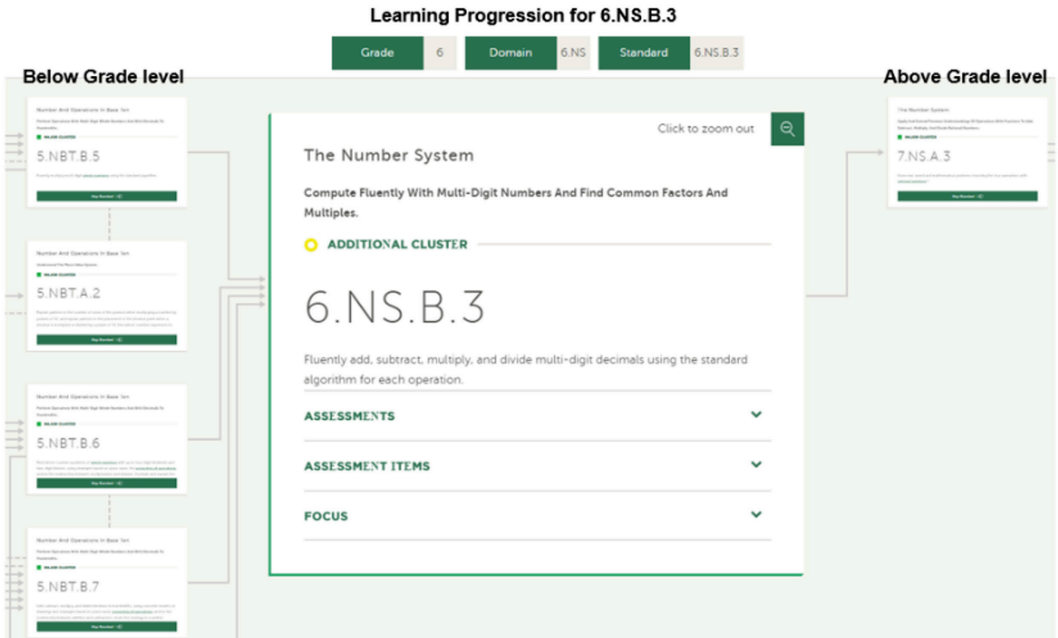
1. **Access the Coherence Map.**
   - **a.** **Follow the** Coherence Map link.
   - **b.** Click on the grade level of the focal standard.

   - **c.** Click on the grade-level math standard domain.



   - **d.** Locate the focal standard.
   - **e.** Click "Map Standard."





After the Coherence Map has mapped the focal standard, use the table below to organize the standard learning progressions.

2. **Map the learning progression. Complete the table on the right side of this page to map the focal-standard learning progression using the descriptions from the Coherence Map website.**

Mapping the focal-standard learning progression

Directions: Copy and paste the Coherence Map focal standard descriptions below.

Note: *Some standards may not map below grade level or above grade level.*

Prerequisite standards *or lower in the progression*	**Focal standard** ⟷	Enabled standards[a] *or above in the learning progression*
[Below grade level] **4.MD.A.1** - Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4-ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs.	**6.RP.A.1** - Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."	***[Above learning progression]*** **6.RP.A.2** - Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* *Expectations for unit rates in this grade are limited to non-complex fractions.

[a] You may modify this table as necessary, including the column headers. For example, if the focal standard maps to the same grade-level standard (including a different math domain), then you may rename this header to "extended grade-level standard."

3. Reflections

a. How do the standards above or below grade level fit within the current unit?

b. What misconceptions might students have that could influence how they learn this content?

In the next part, you will look at student data to understand where your students fall on the learning progression captured in the table above.

Part 3: Assess student data related to the focal standard to determine readiness

Map students' current mathematical knowledge and skills to the learning progression in Part 2 using student learning data.

Guiding question: *Are students ready to learn the focal content standards?*

1. Are classroom data accessible to inform your instructional planning?

Summative and formative data provide valuable information about students' current math understanding. Consider the following types of data points throughout your instructional planning to understand what students know, don't know, or are ready to learn.

Select the student data you have access to:

☐ State assessments

☐ District assessments or interims

☐ Curricular diagnostic tools

☐ Pre- or post-unit tests

☐ Entrance or exit tickets

☐ Observational data

Other: _____

Other: _____

Limited classroom data. If you do not have data related to the focal standard, consider the following data collection opportunities:

/ Use an entrance or exit ticket to assess competency in the focal standard. Achieve the Core provides example tasks that are aligned to the CCSSM.

/ Use formative assessments in the curriculum to inform your instructional planning.

2. Are students demonstrating competency in the focal standards?

Review your student data and complete the table below to determine the status of your students' understanding of the focal standards along the learning progression. Please note that your school or district context should determine how student data are interpreted and how readiness is assessed.

a) After reviewing your classroom data, identify which students are: (1) Ready to learn the focal standards (2) Ready for an extension of content or to advance (3) Need to master prerequisite content	**b) Why are these students ready to learn the focal standards, ready for an extension of content or to advance, or need to master prerequisite content?** *For example, you may list the formative or summative data you reviewed in Parts 3a and 3b above.*
Group 1: Ready to learn focal standards Student names/class period:	➡ **What data suggest these students are ready to learn the focal standards?**
Group 2: Ready for an extension of content or to advance Student names/class period:	➡ **What data suggest these students are ready for an extension?**
Group 3: Need to learn prerequisite content before progressing to the focal standards Student names/class period:	➡ **What data suggest these students need additional support on the prerequisite (or below-grade-level) standards?**

Part 4: Make an adaptation using the productive adaptations tool

To make a productive adaptation, consider which content in the instructional materials you may adapt to focus on groups of students who are either (1) ready for an extension or to advance or (2) may need to master prerequisite content.

Guiding question: *How will you plan to productively adapt instruction across the mathematical learning progressions?*

Group 1: Ready to learn focal standards

For students ready to learn the focal standards, consider if any adaptations are needed to help them learn the math content. If not, consider other adaptations that support multilanguage learners and culturally responsive teaching as detailed in the practice guide for teachers of multilingual math learners in middle school classrooms and the culturally responsive mathematics teaching practice guide.

Group 2: Ready for an extension of content or to advance

For students ready for an extension of content or ready to advance, consider how to adapt the content of the instructional materials to meet the advancing standard. Review the **enabling or above-grade-level** standards from Part 2.

1. What is the conceptual difference between the focal standards and extension standards? In other words, is there a learning gap between the prerequisite and focal standard that a content adaptation can address?

2. Consider your response above. Brainstorm a few ways you could adapt the content of the instructional materials to meet the advancing or above-grade-level standards.

3. Confirm and implement. Do the proposed content adaptations align with the focal-standard learning progression? If not, consider reviewing your responses to Question 1. Then, revise your proposed content adaptations. You may repeat this process as necessary.

Group 3: Need to learn prerequisite content

For students needing additional support, consider how to adapt the content of instructional materials to meet the prerequisite standard. Review the prerequisite or below-grade-level standards from Part 2.

1. What is the conceptual difference between the focal standards and below-grade-level standards? In other words, is there a learning gap between the prerequisite and focal standard that a content adaptation can address?

2. Consider your response above. Brainstorm a few ways you could you adapt the content of the instructional materials to meet the prerequisite or below-grade-level standards.

3. How will you know when your students are ready to return to the focal standards?

4. Confirm and implement. Do the proposed content adaptations align with the focal-standard learning progression? If not, consider reviewing your responses to Question 1. Then, revise your proposed content adaptations. You may repeat this process as necessary.

References

Achieve the Core. (n.d.). *Coherence map. Retrieved December 15, 2023, from* https://tools.achievethecore.org/coherence-map/

Zimba, J. (2013). *A graph of the content standards. Student Achievement Partners.* https://achievethecore.org/page/844/a-graph-of-the-content-standards

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