CCRS Key Shifts for Mathematics

1. CCRS - Key Advances for Math Instruction

1.2 Key Shifts for Mathematics Instruction

Notes:

Welcome to the College and Career Readiness Standards (CCRS) Key Shifts for Mathematics Instruction learning module.

Click on the Next button to begin.

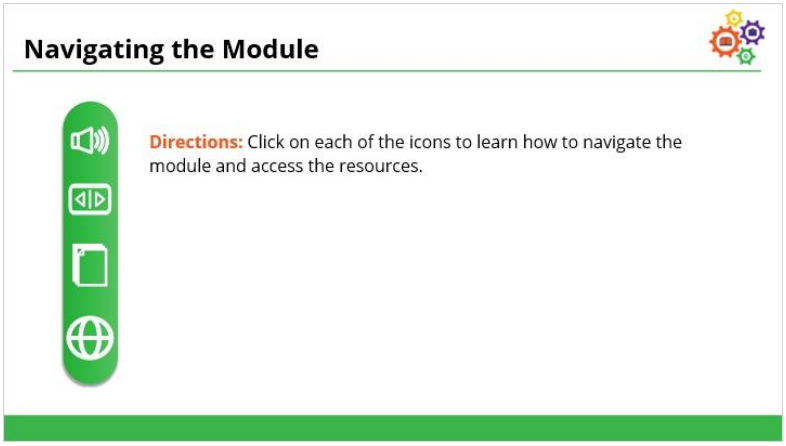
1.3 Introduction

Notes:

After viewing the module, you will have an understanding of the purpose and use of key shifts in the CCRS math standards. This module will describe how to focus

instruction on key concepts and procedures, support instructors when connecting learners to prior and future content, and show how key shifts can help instructors plan instruction.

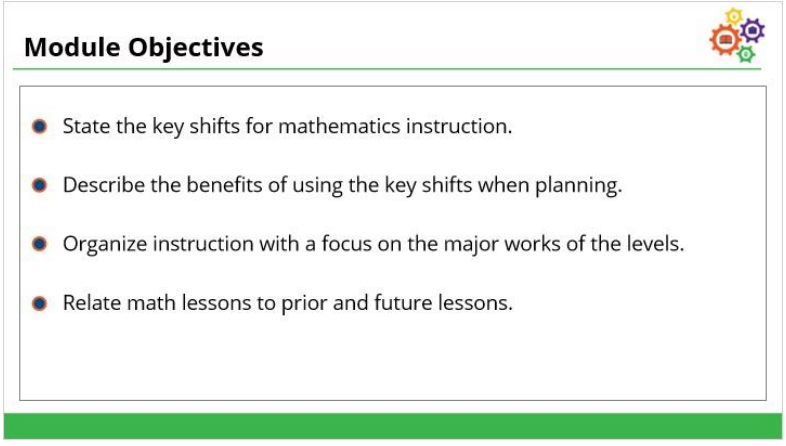
1.4 Navigation Tips



Notes:

If this is your first time participating in an online module, please click on each of the icons to learn how to navigate and access resources. When you are ready, please click Next to continue.

1.5 Module Objectives

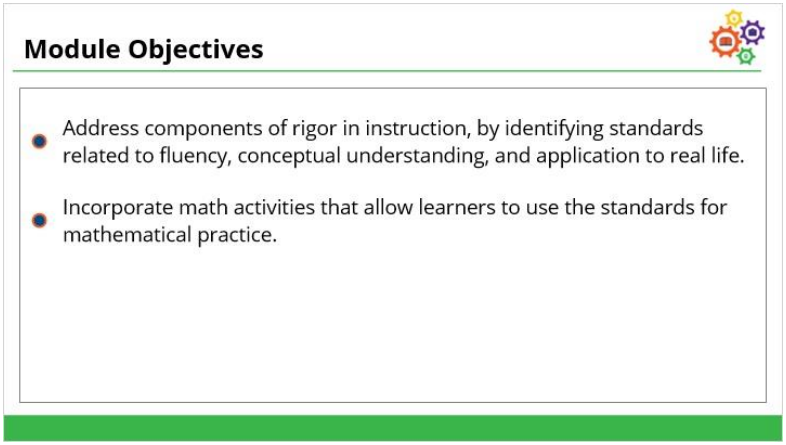


Notes:

After completing this module, you will be able to state the key shifts and describe benefits of using them. You will also be able to organize instruction so that it is

focused on the major works of the CCRS levels, and you will be able to relate the math content you are teaching to previous and future math content.

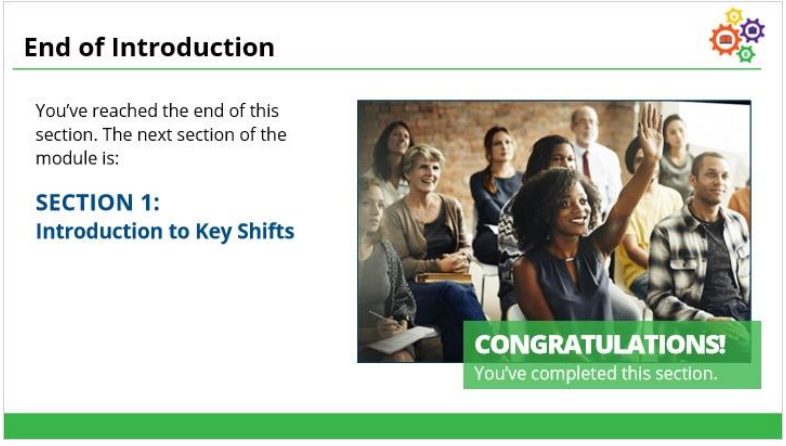
1.6 Module Objectives



Notes:

In addition, you will be able to relate math content standards to one or more components of rigor. The components include procedural skills and fluency, conceptual understanding, and application. You will be able to address these components in your instruction. Finally, you will incorporate math activities that allow learners to use the standards for mathematical practice.

1.7 End of Introduction



Notes:

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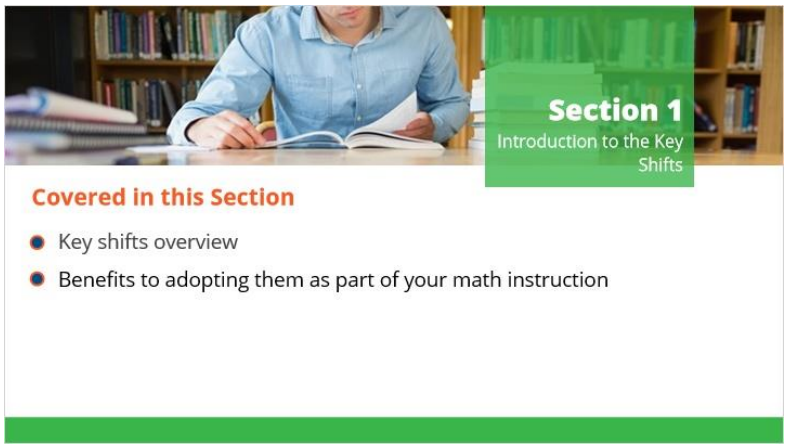
section to continue the module.

2. Introduction to the Key Shifts

2.1 Introduction to the Key Shifts

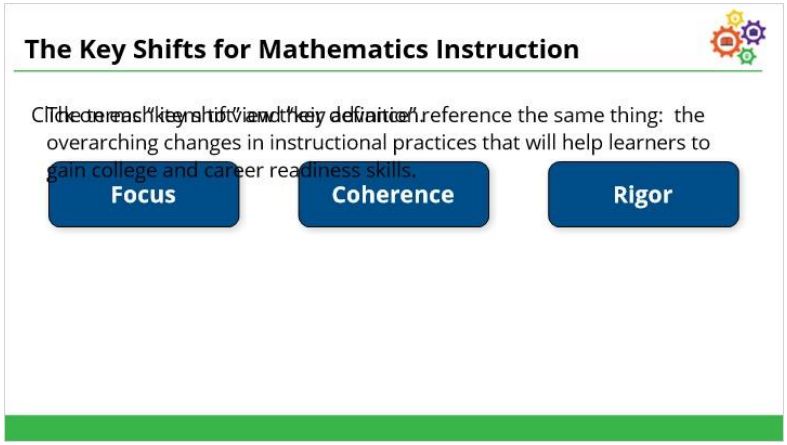


Notes:

The CCRS demands a shift in instructional practice to make the standards accessible to all adult learners. In this section, we will begin by discussing the key shifts and some benefits of adopting them as part of math instruction.

Click Next to continue.

2.2 The Key shifts for Mathematics Instruction



Notes:

CCRS Key Shifts for Mathematics

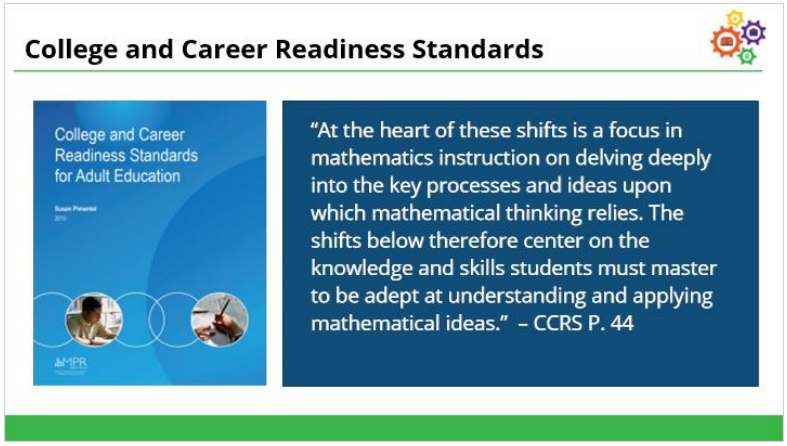
You may hear the term “key advance” in place of “key shift.” The terms “key shift” and “key advance” reference the same thing: the overarching changes in instructional practices that will help learners to gain college and career readiness skills. The three shifts are Focus, Rigor and Coherence.

Focus means focusing instruction on key content in the standards. Focusing instruction allows you to better address the depth of each standard.

Coherence refers to how math instruction progresses within levels and from level to level. Those progressions should make sense in a sequence of learning.

Rigor means instruction attends to conceptual understanding, procedural skill and fluency, and application of math content.

2.3 College and Career Readiness Standards



Notes:

The impact of the key shifts on instructional practice include diving deep into math concepts and processes. The shifts require students to have a greater ability to interpret and apply math concepts.

CCRS Key Shifts for Mathematics

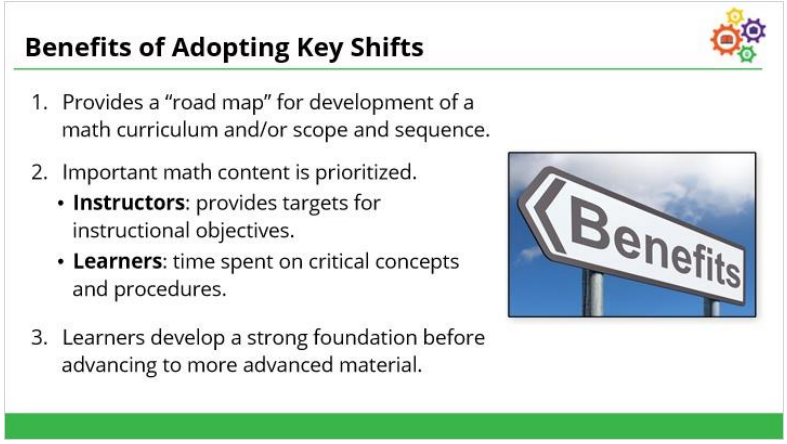
2.4 Benefits

Notes:

Take a moment to consider the key shifts. What might be the benefit of using them?

Click Next to learn about the benefits of key shifts.

2.5 Benefits of Adopting Key Shifts



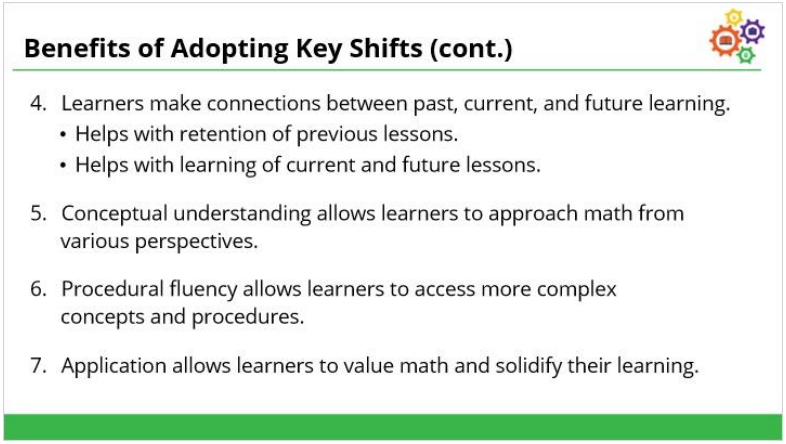
Notes:

Adopting the key shifts provides several benefits to adult education programs, instructors, and learners. One main benefit involves the support for planning of instruction.

Whether working with a curriculum or developing a scope and sequence for instruction, the key shifts and the standards provide a road map for instruction. The

key shifts help instructors approach math instruction with a focus on the most important standards and the rigor needed to learn math skills. The shifts allow instructors to focus on improving learners' conceptual understanding, procedural fluency and application skills around critical CCR Standards.

2.6 Benefits of Adopting Key Shifts (cont.)



Notes:

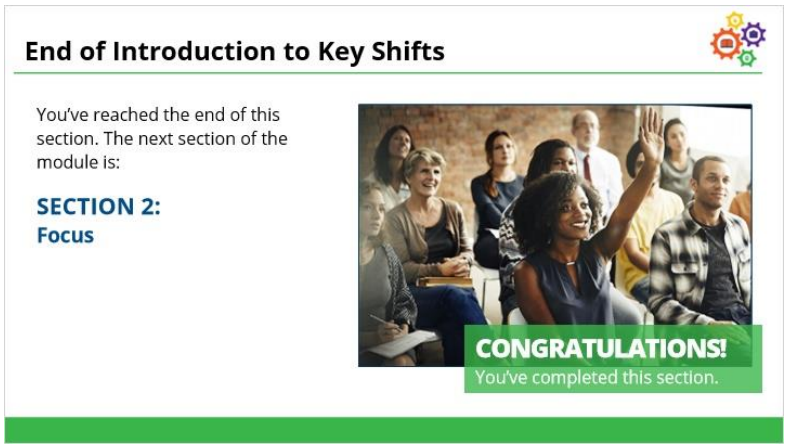
Coherence refers to connecting math lessons to prior and future learning. This helps learners to recall content from previous lessons and eventually use the skills in future lessons.

Conceptual understanding of key concepts allows learners to approach math from different perspectives, for example, applying concepts to real-life situations and solving word problems.

Learners develop procedural skills and fluency, which allow them to access more advanced content.

Learners who are able to apply math begin to value the math they learn.

2.7 End of Section



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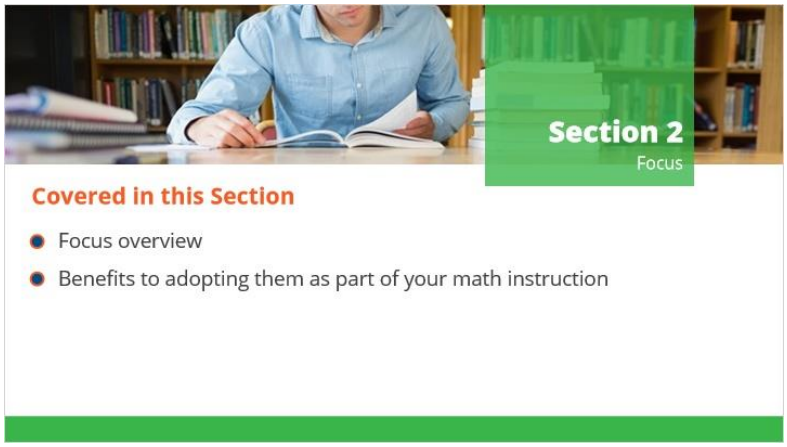
3. Focus

3.1 Focus



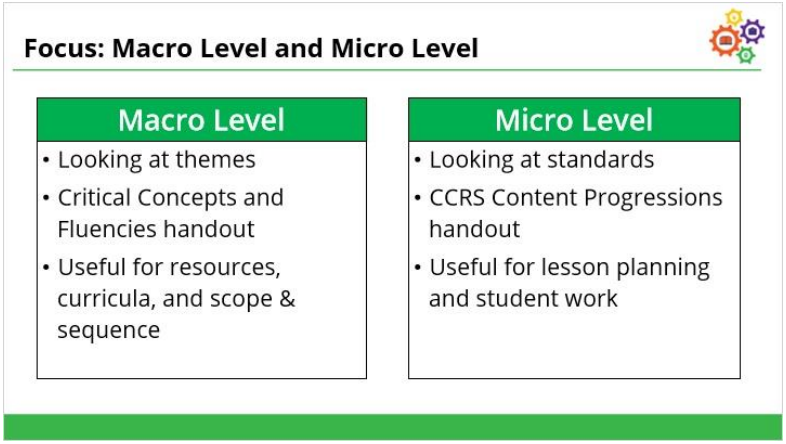
Notes:

The first key shift is Focus. Recall that this key shift directs instructors to focus instruction on key content in the College and Career Readiness standards so that the learners acquire the skills needed to be successful. Focusing instruction helps

instructors with the organization of instruction.

Click Next to continue.

3.2 Focus: Macro-Level and Micro-Level



Notes:

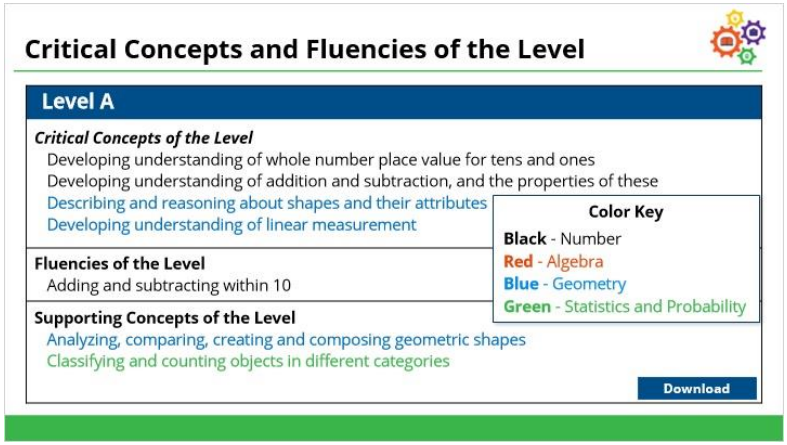
Focus can be described in two ways. At the macro level, we will consider the overall themes of math content at each level that should be prioritized. At the micro level, we will look at specific standards that should be prioritized.

The Critical Concepts and Fluencies of the Level **tool #?** can help you identify the themes to prioritize, while the CCRS Content Progressions **(tool #2)** helps prioritize specific standards.

The next two slides will discuss how looking at overall themes can assist you in evaluating resources or curricula and developing a scope and sequence while looking at specific standards that can help you with lesson planning and reviewing student work.

CCRS Key Shifts for Mathematics

3.3 Critical Concepts and Fluencies of the Level



Notes:

This slide shows Level A of the critical concepts and fluencies tool. Remember, concepts refer to things learners should understand, while fluency requires learners be able to perform specific tasks **efficiently**. The concepts and fluencies are color-coded by domain, with black representing number sense; blue represents geometry; and green represents statistics and probability. On the handout, red represents algebra, which you can see is not part of Level A.

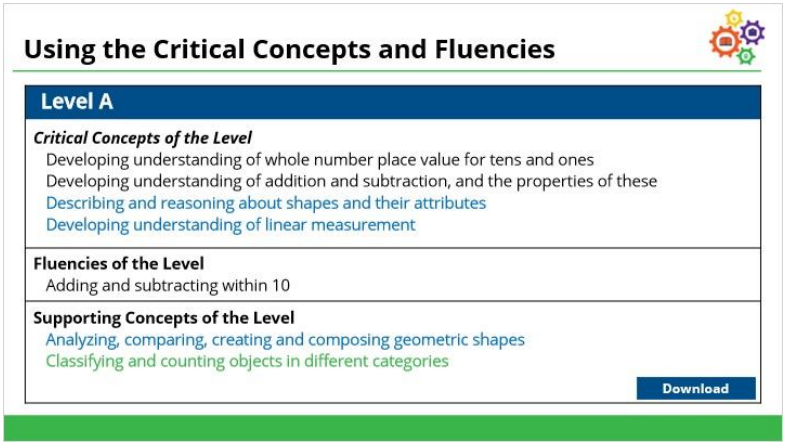
There are four critical concepts and only one fluency for Level A. Part of the focus is working with one- and two-digit numbers and understanding place value, as well as addition and subtraction. Learners should also develop understandings of shapes and linear measurement. These basic understandings will enable them to move on to more advanced concepts.

In terms of fluency, learners should be able to add and subtract one-digit numbers in their heads. If they struggle to do this, they will not be ready to progress to Level B math, which involves adding and subtracting multi-digit numbers among other things.

The supporting concepts should not be prioritized in instruction but may be incorporated to support learners in understanding the critical concepts. For example, classifying and counting objects in different categories may be part of a lesson that prioritizes describing and reasoning about shapes and their attributes.

Finally, while there are standards in Level A within the algebra domain, they involve ways for learners to think about addition and subtraction, which supports the critical concepts already identified. While you will do some work to develop algebraic thinking in low-level learners, it is not prioritized in this level.

3.4 Using the Critical Concepts and Fluencies



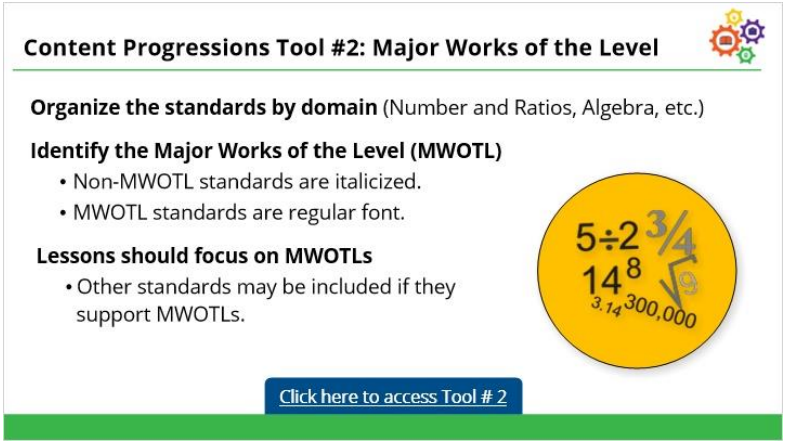
Notes:

Consider, how you might use this information.

This information is useful in prioritizing concepts in instruction.

For example, instructors or program administrators can prioritize the listed concepts and procedures for learners at the beginning levels by using this document to develop a scope and sequence for their class or program or by using the information to select texts or online resources.

3.5 Content Progressions Tool #2



Notes:

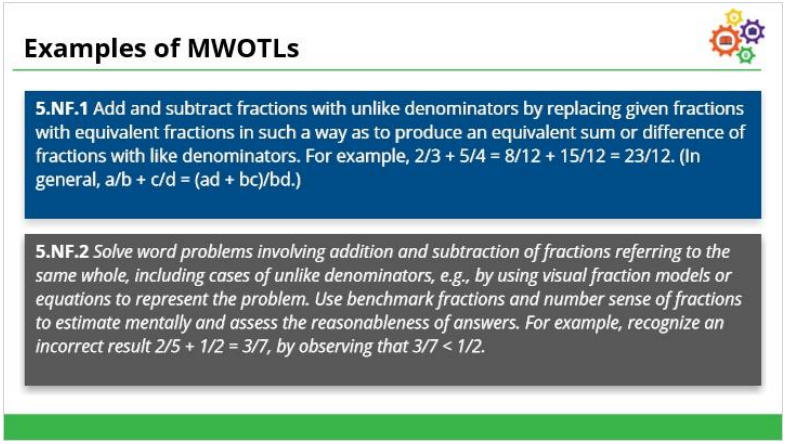
The content progressions handout is helpful for looking closely at the content

standards themselves. It organizes the standards by domain, allowing you to see how the content progresses level by level through numbers and ratios, then algebra and functions, and so on.

It also emphasizes the major works of the level. Standards that are **not** major works of the level are in italics. Standards that are major works of the level are in regular font.

As you develop lesson plans or learning activities, instruction should focus on major works of the level. Supporting standards may be included if they support learners mastering the major works of the level.

3.6 Examples of MWOTLs

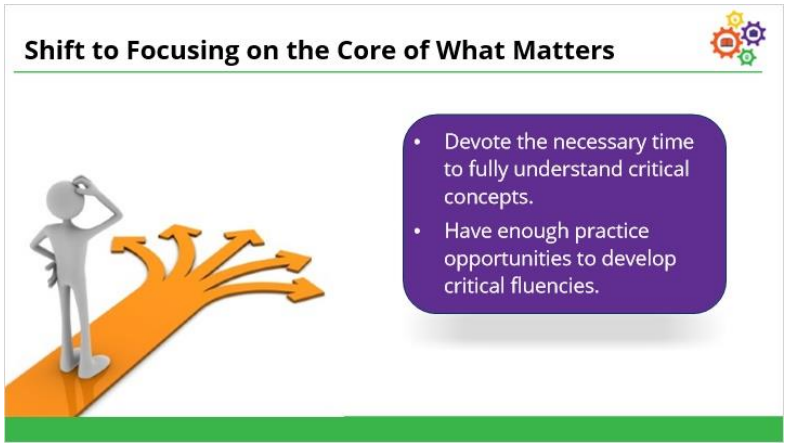


Notes:

The two standards on this slide both refer to adding and subtracting fractions. Note that they are 5th grade standards, and learners would have learned to add and subtract fractions with like denominators previously. The first standard involves learners using equivalent fractions to convert fractions with unlike denominators into fractions with like denominators. This is a critical procedure, and is considered a major work of the level.

The second standard requires learners to solve word problems involving addition and subtraction of fractions. It is italicized, meaning it is not a major work of the level. This does not mean you wouldn't have your learners do word problems in class. It simply means that solving word problems involving addition and subtraction of fractions would not be the priority for a math lesson. The lesson would focus on the procedure, and you could use word problems as a means for learners to apply and practice what they have learned, perhaps as an extension activity.

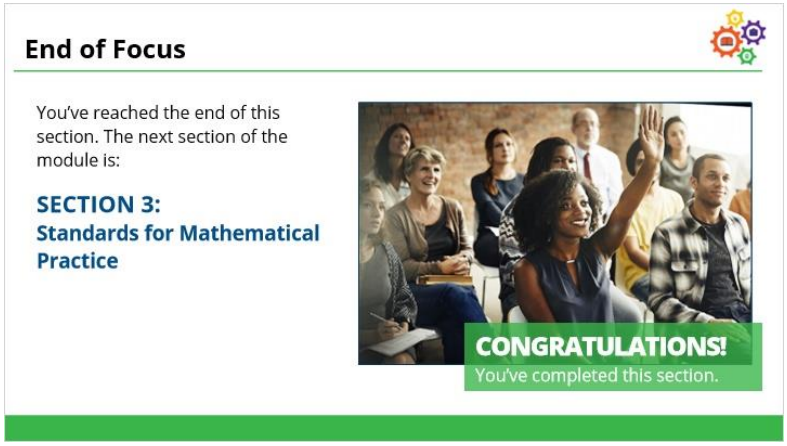
3.7 Shift to Focusing on the Core of What Matters



Notes:

Focusing on too many topics has a negative impact on learner performance; Focusing gives learners a strong foundation and uses instructional time productively. The shift to focusing on the core of what matters most is what all adults need in order to be successful in their 21st century lives and jobs.

3.9 End of Section

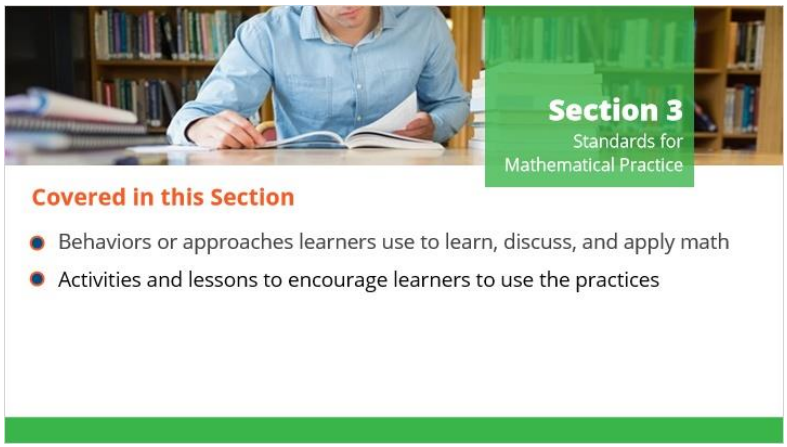


Notes:

Congratulations, you've reached the end of this section. Please advance to the next section to continue the module.

4. Standards for Mathematical Practice

4.1 Standards for Mathematical Practice



Notes:

We have discussed the content standards that are part of the math CCRS, specifically focusing on the critical concepts and fluencies along with the major works of the levels.

The Standards for Mathematical Practice, or simply the Math Practices are a set of practices or approaches that learners use when tackling math problems. CCRS Math instruction also focuses on the Math Practices. These will be further addressed in a separate module devoted specifically to the Math Practices. However, we will review them as they relate to the key shifts.

Click Next to continue.

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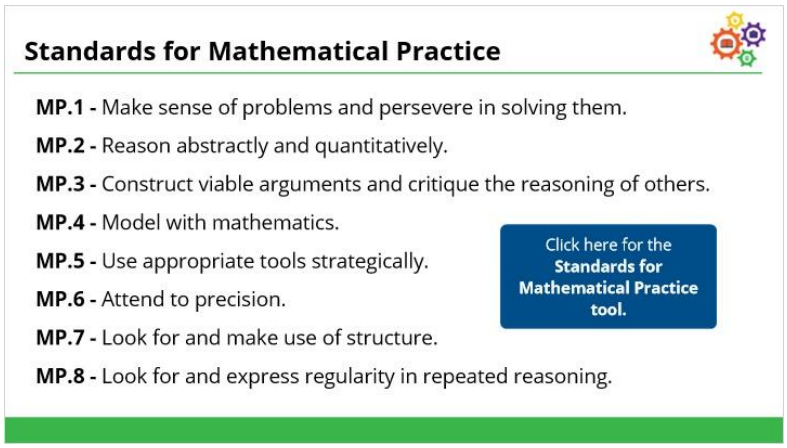
4.2 Standards for Mathematical Practice

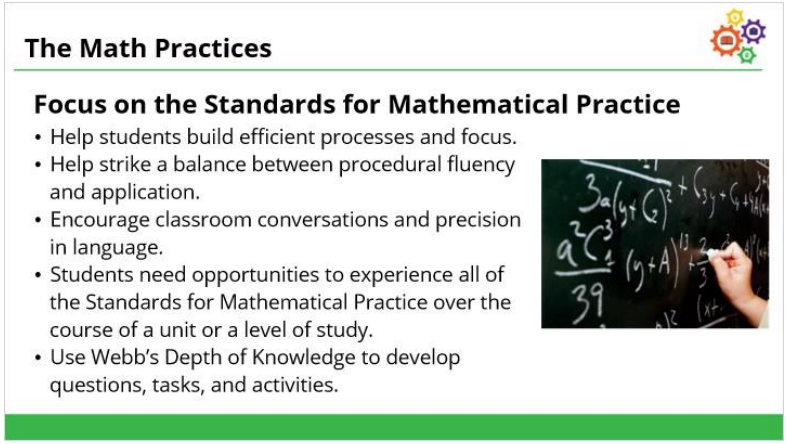


Notes:

Mathematically proficient learners can do these eight practices. Instructional activities should provide learners ample time to develop their mathematical practice.

Next, we'll take a look at a problem that encourages learners to use the Math Practices. For this exercise, you will need the the **Standards for Mathematical Practice** tool.

4.6 The Math Practices



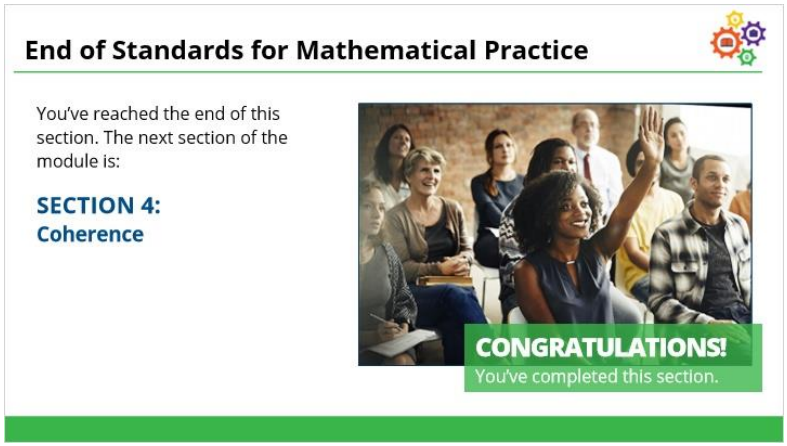
Notes:

Students need opportunities to experience all of the Standards for Mathematical Practice over the course of a unit or a level of study. It is important, therefore, to include specific opportunities in lesson plans. Specific prompts or questions may

need to be used in order for instructors to learn more about their students' thought processes around math.

Mathematically proficient students use the math practices when approaching the rigorous math tasks called for by the CCR standards. The math practices are useful to students who are faced with deeper dives into math topics; this includes rigorous activities which pursue conceptual understanding, fluency and procedure skill, as well as when linking their learning to previous and upcoming lessons. In that way, the math practices connect to the three key shifts. The math practices are approaches to the type of math that is required by the key shifts of the CCRS.

4.8 End of Section

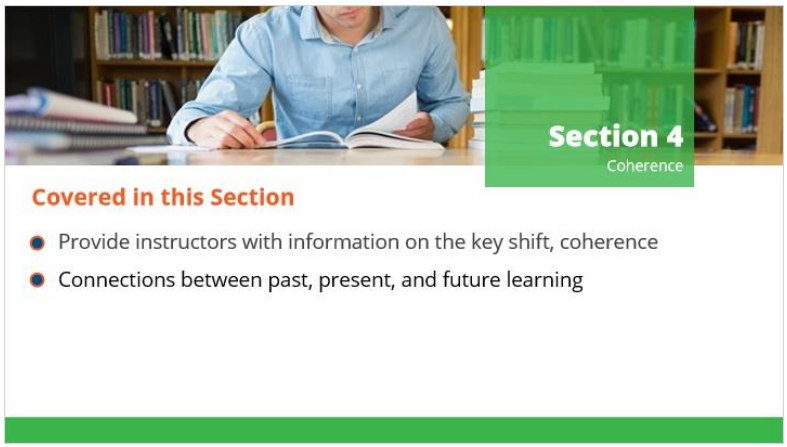


Notes:

Congratulations, you've reached the end of this section. Please advance to the next section to continue the module.

5. Coherence

5.1 Coherence

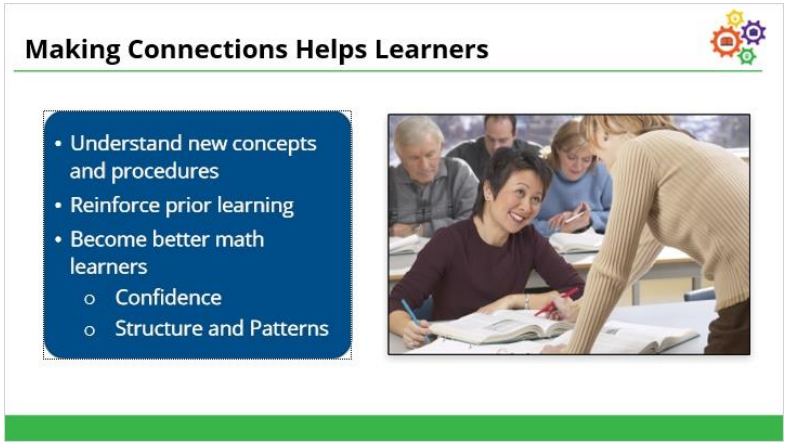


Notes:

This section will provide instructors with information on the key shift Coherence. This key shift supports instructors in planning learning activities such that learners make connections between past, present, and future learning.

Click Next to continue.

5.2 Making Connections Helps Learners



Notes:

Supporting learners in connecting their learning to prior learning, helps learners in

many ways. It also reinforces their prior learning, both by revisiting it and extending it to new situations.

Making connections between prior, current, and future learning will also help your learners to build upon what they've learned and connect it to the new content. Learners begin to see the structure and patterns that exist in math. (Patterns and structures are mentioned in the Standards for Mathematical Practice, numbers 7 and 8.)

Math is not a list of disconnected topics. The standards were designed in coherent progressions. Which means that each standard does not stand alone; it generally builds upon or extends previous learning (of the previous standards). Coherence means that topics are organized in a way that makes sense to a sequence of learning.

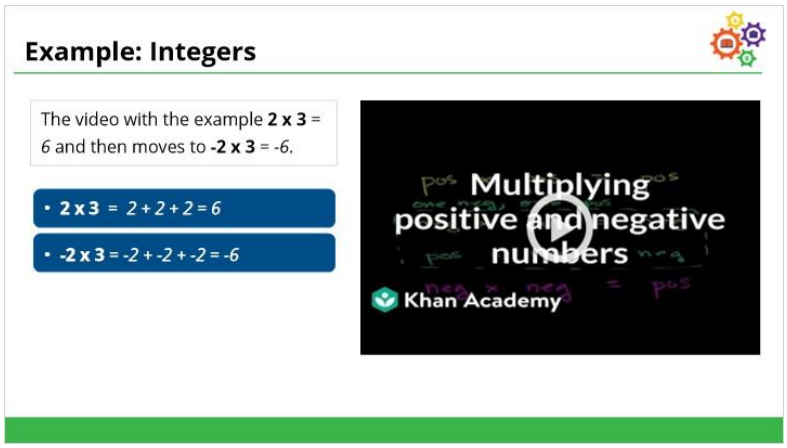
5.3 Example: Integers

Notes:

Click on the image to watch the Khan Academy video on multiplying a positive and negative number, which is a topic many learners struggle with.

https://youtu.be/47wjId9k2Hs

5.4 Example: Integers



Notes:

Before looking at a multiplication problem with a negative number, though, he references something the learners already know, the problem 2 times 3, which equals 6. He then introduces the actual problem, negative 2 times 3, and builds from there. As you may notice, this isn't anything intense, just a quick mention to help learners see the similarity or pattern.

Representing 2 times 3 as 2 plus 2 plus 2 to get 6 is something learners already know at this point. They can do the same thing with negative 2 times 3, which can be negative 2 plus negative 2 plus negative 2 to get negative 6.

By referencing previous standards or skills that have been learned (or taught), the instructor explicitly makes the connection for the student. This is how coherence is implemented. To further enforce coherence, teachers may ask students to identify how skills connect to previous learning. They may even ask students to think about how skills connect to future learning.

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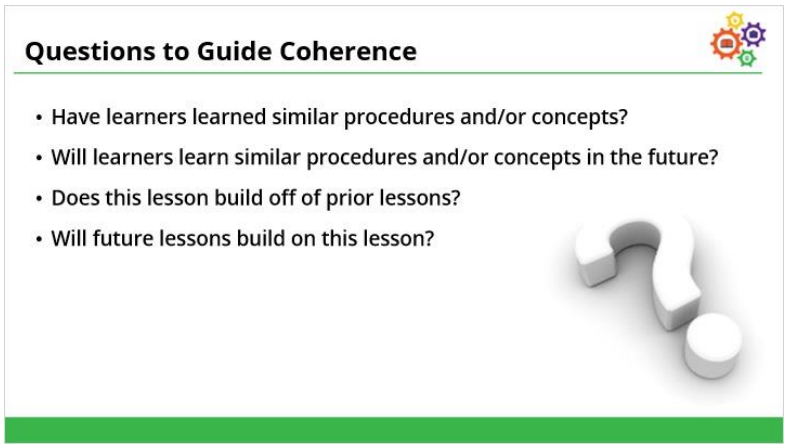
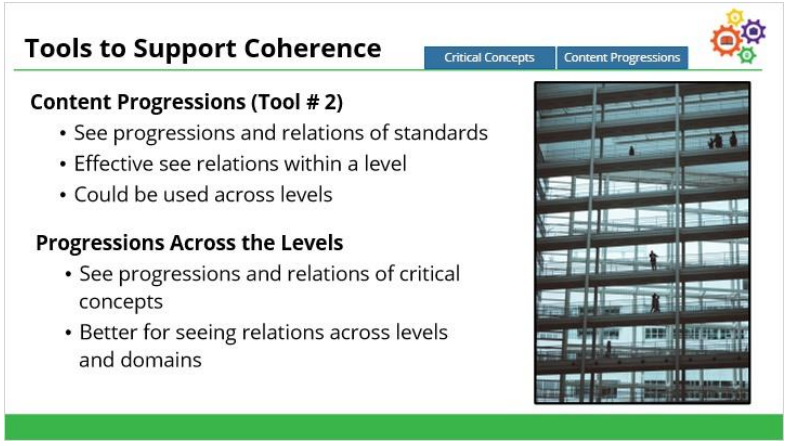
5.6 Questions to Guide Coherence



Notes:

Here are some questions to support instructors as they identify opportunities to apply coherence to their lessons. This is not a checklist but can help with decision-making around lesson planning.

5.7 Tools to Support Coherence



Notes:

The Content Progressions tool we looked at as part of Focus can help instructors develop coherence by allowing them to see how various standards are related. It is especially helpful for looking explicitly at how standards within a level can be organized in a way that allows for coherence, over several lessons, at a given level.

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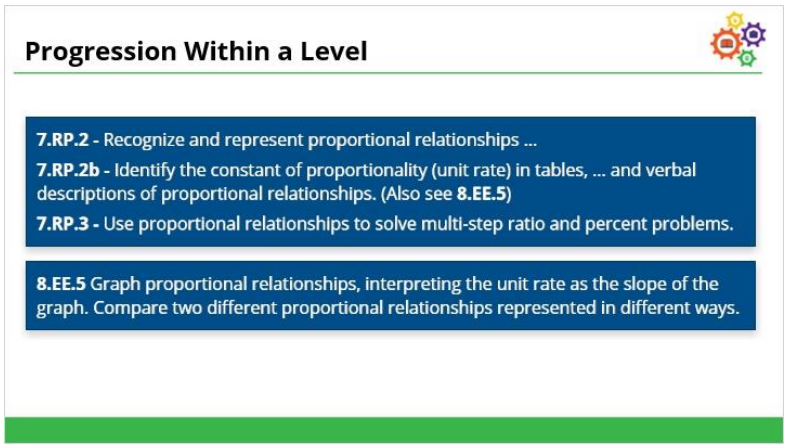
The Progressions Across the Levels tool highlights the critical concepts for each domain, organized by level. This provides a broader view of how math content progresses as learners move from one level to the next.

5.8 Progression Within a Level



Notes:

As previously mentioned, we can also look at the progression within a level. Let's look at an example.

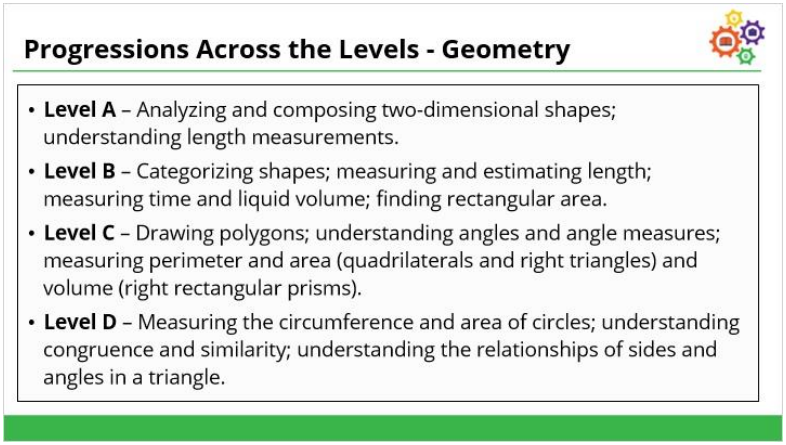
Here are Level D standards that build on one another. The first standard introduces proportional relationships. Learners that develop a good understanding of proportional reasoning will benefit greatly with numerous applications.

You can see how the next standard builds on that, with learners extending their understanding of proportions to working with unit rate. Note that this standard references Standard **8.EE.5**, which we will look at soon.

Another standard within ratios and proportions at Level D has learners using their understanding of proportional relationships to work with percentages. This allows learners to understand percent, as opposed to trying to memorize procedures such as moving the decimal left or right!

Also, Standard **8.EE.5** is part of algebra that involves slope. This is another essential concept that many learners struggle with. Introducing it within the context of unit rate is a very practical way for learners to understand the concept. Referencing the work they've done with proportions and unit rate when introducing slope is a great example of coherence.

5.9 Progressions Across the Levels - Geometry



Notes:

Now, let's look at an example of progressions across the levels. This slide shows most of the critical concepts for geometry and measurement at levels A through D. Let’s highlight some progressions that could be emphasized as learners advance.

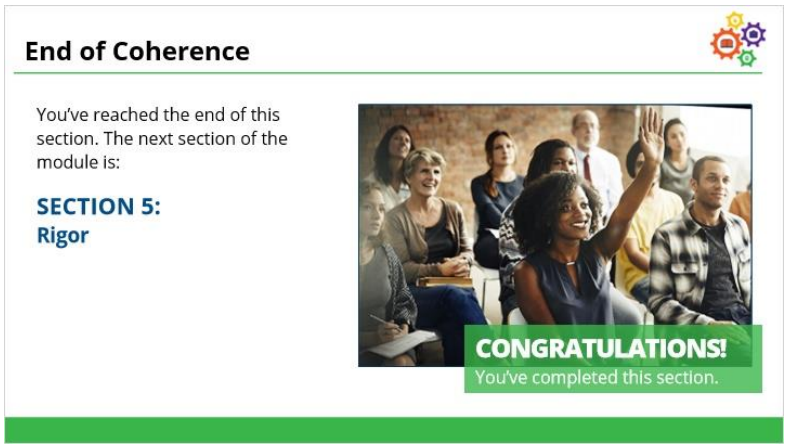
Notice at Level A, the focus is on composing two-dimensional shapes and understanding length measurements. These concepts are very general.

When advancing to Level B, learners still work with general shapes, but begin to categorize them. This builds on the general analysis from Level A. They are now measuring length, whereas, in Level A, they simply understood the concept of length measurement. Measurement of time and liquid volume is also added for Level B, and area is also introduced, but only for rectangles.

Level C builds on Level B by introducing angles and angle measurement. Learners expand on their work finding area of rectangles to now find area for quadrilaterals and triangles and volume of rectangular prisms built off mastery of area of a rectangle.

Level D builds on the area and perimeter concepts, adding circles to the mix. It also expands the learners’ basic understanding of angles from Level C to working with how the angles in a triangle are related.

5.11 End of Section

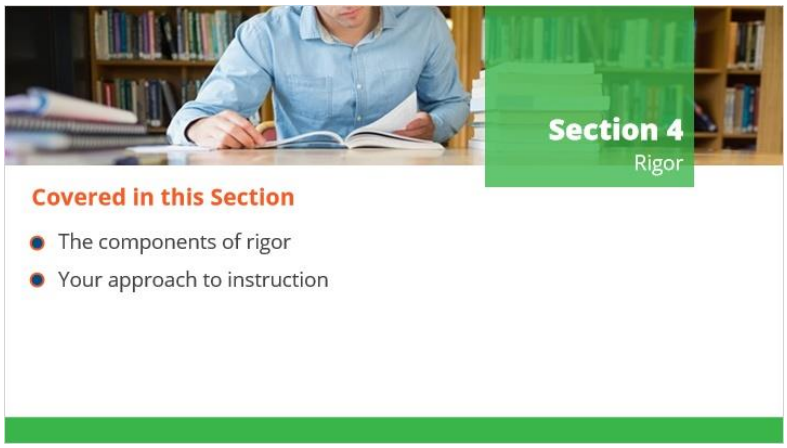


Notes:

Congratulations, you've reached the end of this section. Please advance to the next section to continue the module.

6. Rigor

6.1 Rigor



Notes:

While focus has more to do with curriculum or scope and sequence, and coherence is about making connections between math content, rigor really addresses your approach to instruction. The components of rigor are procedural skills and fluency,

conceptual understanding, and application.

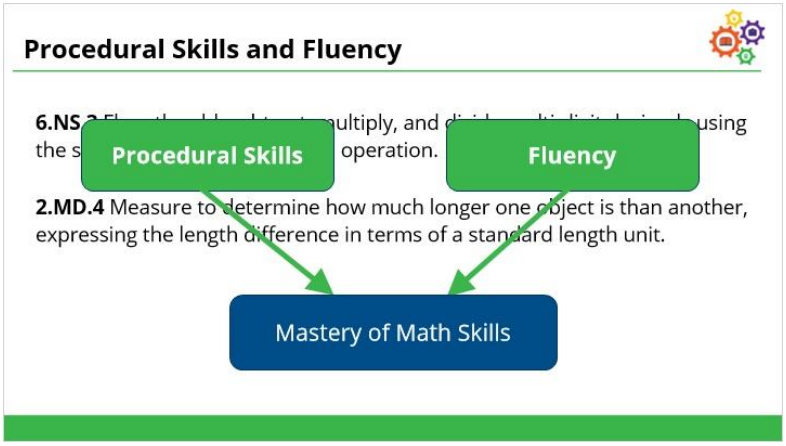
Click Next to continue.

6.2 Rigor Components

Notes:

The three components of rigor include procedural skills and fluency, conceptual understanding, and application. We'll look at each component separately, but all three should be included in instruction. You will see an overview of each component, an example of how each component is included in the standards and strategies for addressing the components of rigor in your instruction.

6.3 Procedural Skills and Fluency



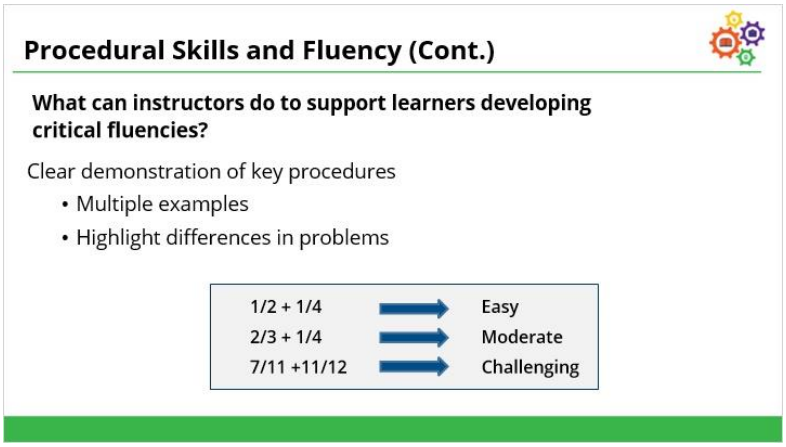
Notes:

Procedural skills and fluency refers to learners' mastery of math skills. The focus is on demonstrating a procedure and practicing those procedures.

A key part of this is the concept of fluency. This is a combination of accuracy and efficiency in performing computations or other procedures.

Many standards that involve procedural skills and fluency actually use the word "fluently." The first standard shown on this slide is an example of that. The second doesn't use the word "fluently," but does require learners to perform a procedure to compare the lengths of two objects.

6.4 Procedural Skills and Fluency (Cont.)



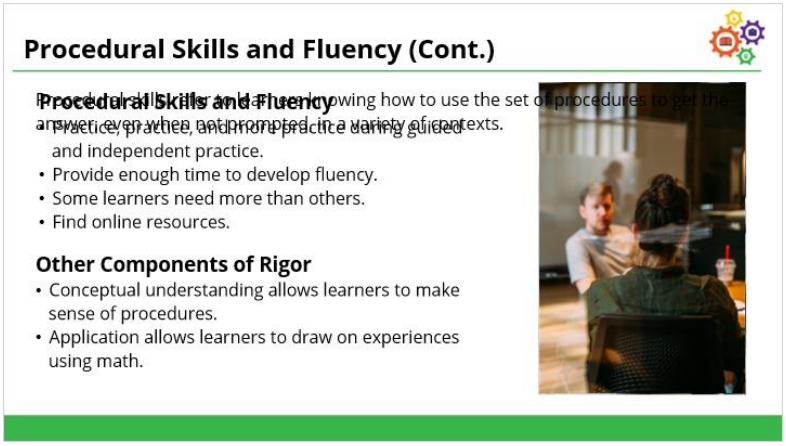
Notes:

What can instructors do to support learners in developing critical fluencies?

Be thoughtful about demonstration of procedures. Be clear and use multiple examples that highlight how the procedure applies to different problems. For example, the problems listed here are all examples of adding fractions with unlike denominators. The sum of 1/2 and 1/4 will be very basic, as they are both common fractions. The sum of 2/3 and 1/4 is a little more challenging. 7/11 + 11/12 will require learners to think through the calculations to find equivalent fractions with common denominators and will also yield an improper fraction.

Despite the fact that the problems are more or less challenging, learners will use the same or similar procedure for all of them. Providing a variety of examples supports procedural skill and fluency.

6.5 Procedural Skills and Fluency (Cont.)



Notes:

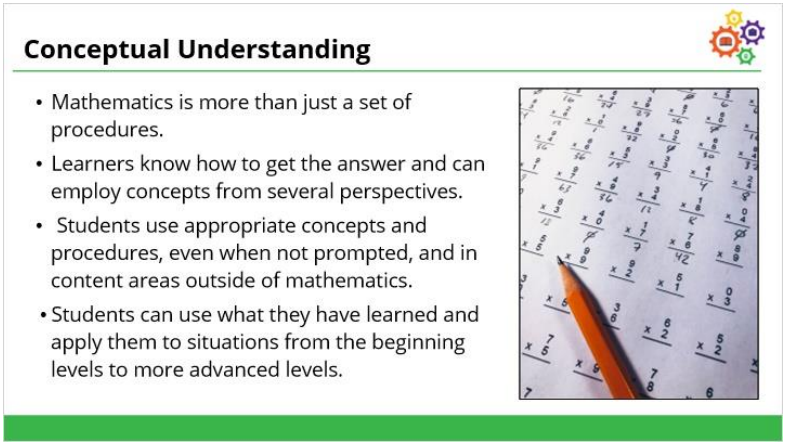
Procedural skills refer to learners knowing how to use the set of procedures to get the answer, even when not prompted, in a variety of contexts. (CCRS pg. 45)

The key for developing fluency is practice. Make sure learners get enough practice to develop fluency in their work. Keep in mind, this may vary among learners. There are online resources that provide practice problems. Many resources provide problems until learners reach a certain level, meaning they continue to practice until they demonstrate proficiency.

If learners struggle to develop critical fluencies, you might consider reviewing concepts or applications to allow them to understand the procedures they are working to master. Instructors and textbooks often focus on procedures first and foremost, but many learners benefit from working on conceptual understanding before developing procedural fluency. This allows them to make sense of the procedures they are trying to master. Also, many learners benefit from drawing on their life experiences using math, so discussing how they have already applied the math they are learning can help them internalize math procedures.

CCRS Key Shifts for Mathematics

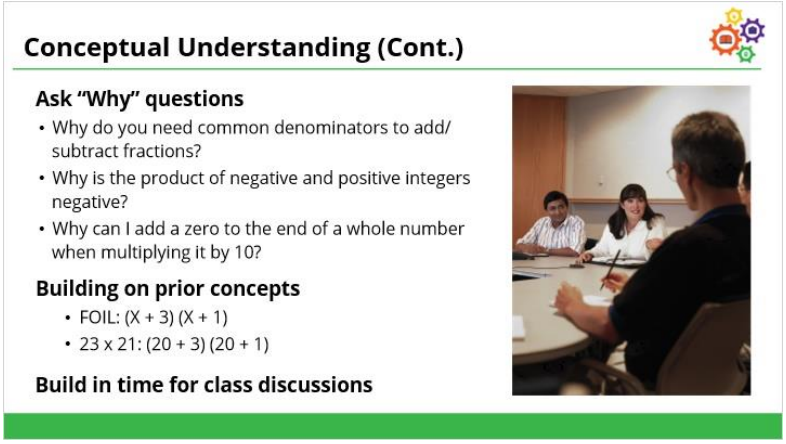
6.6 Conceptual Understanding



Notes:

According to the College and Career Readiness Standards, it is important to develop conceptual understanding. The standards say "Instead of each standard signaling a new concept or idea, standards at higher levels become extensions of previous learning. The focus on understanding numbers and their properties through the levels also exemplifies the progression from number to expressions and equations and then to algebraic thinking." (CCRS Pg. 44-45)

6.7 Conceptual Understanding



Notes:

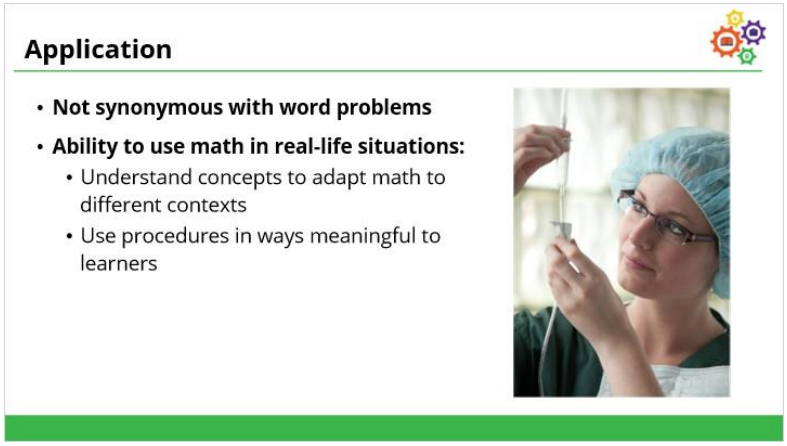
What learning supports can help your learners with conceptual understanding?

A simple thing you can do in class is to ask learners “why” questions. “Why” questions promote discussion about math and encourage learners to think about why math works the way it does. The first two questions on this slide are examples of questions about specific procedures learners are mastering. The third question is a little more general, in that it involves multiplication but also gets learners thinking about place value.

Building on prior concepts allows learners to connect their learning to things they understand, strengthening their understanding of new concepts. For example, when teaching learners about the FOIL method for multiplying binomials, you could help learners see the similarities to multiplying two-digit numbers.

Class discussions are one way to assess for conceptual understanding. It is important to write specific questions in lesson plans to prompt critical thinking around math concepts. Activities around Math Practice 3 can support students in using “math talk” MP 3, in Construct viable arguments and critique the reasoning of others.

6.8 Application



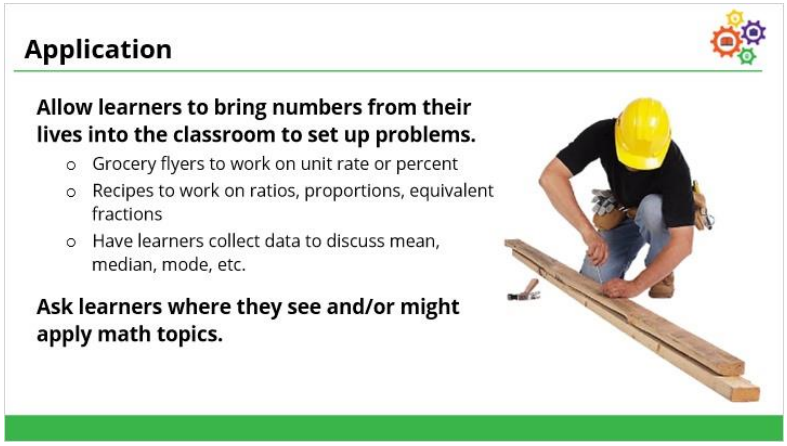
Notes:

Application tasks involve situations learners may encounter in their lives. Conceptual understanding allows learners to apply math they have already learned to new contexts. Developing procedural fluencies helps learners feel more confident in applying math and makes application tasks more meaningful.

The way adult learners approach the often unrealistic contexts in math class contrast greatly when compared to the approaches adults use when they face mathematics in real life contexts. In fact, they often don’t recognize they are using

math skills and techniques.

6.9 Application



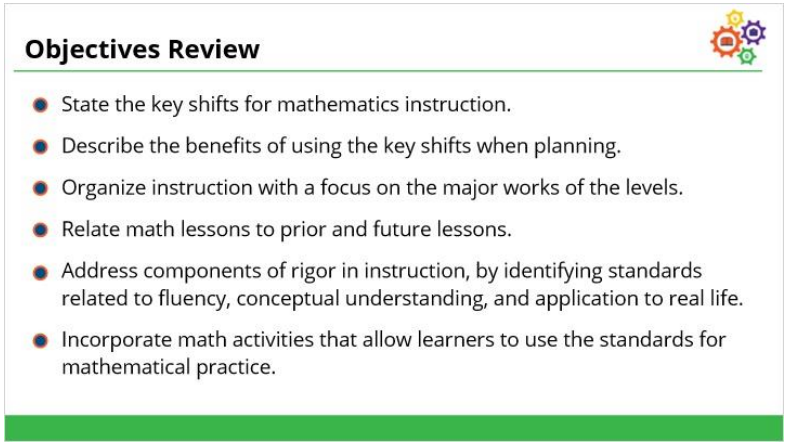
Notes:

One way instructors help learners apply math is to use numbers they see in their everyday lives. Instructors may ask learners to bring grocery flyers to work on unit rate or percent. Recipes can be used to work on fractions, ratios, and proportions. Learners may bring data **that is** meaningful to them to apply mean, median, mode, or other topics related to statistics and probability.

It is also helpful to ask learners where in their lives they might see or use the math they learn.

7. Conclusion

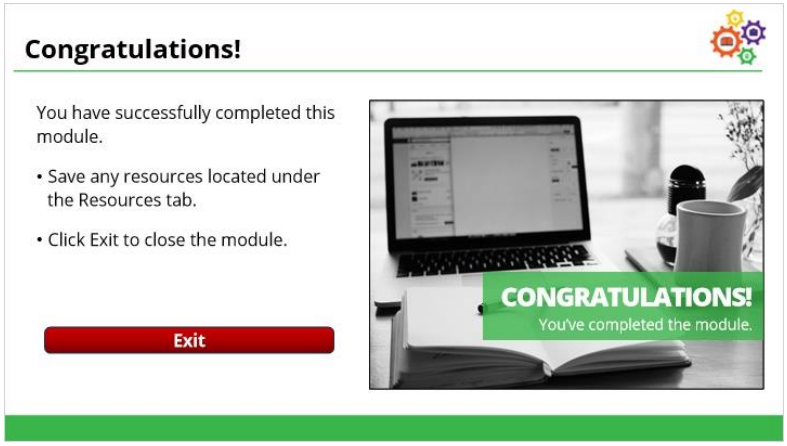
7.1 Objectives



Notes:

Please take a moment to review the module objectives shown here. How comfortable do you feel with each of the objectives?

7.2 Exit



Notes:

Congratulations! You have completed this module. Be sure to download any resources you want to save by clicking on the Resources tab. Click on the Exit button below to close the module.