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How to Use This Addendum

Make sure you're ready to teach by noting the **Necessary Materials and Pre-Lesson Prep** you will need to gather or complete prior to the lesson

Find high-leverage instructional moves in the **Lesson Look Fors**. This is what leaders should see when observing your instruction

Note how your lesson objective ties to your state **Standards**

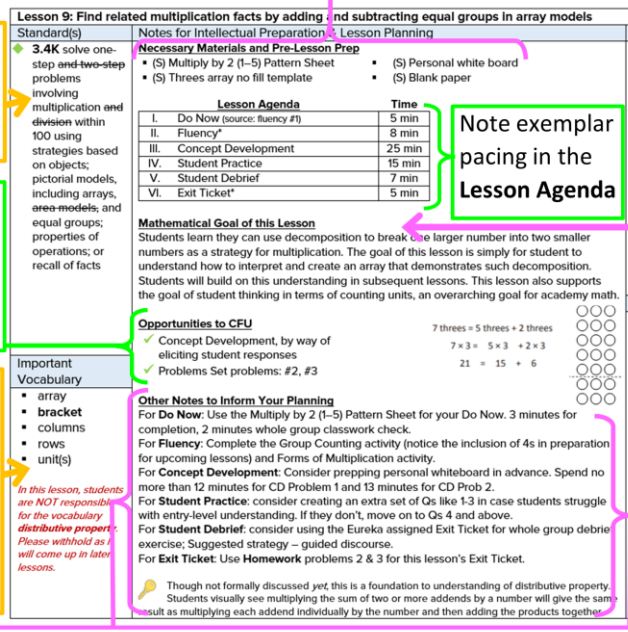
Note exemplar pacing in the **Lesson Agenda**

Use the **Mathematical Goal of the Lesson** to keep you focused on the appropriate student outcome

Plan purposeful questioning and responses using **Opportunities to CFU**

Plan instruction around what students need to Know & Do to be successful on the Exit Ticket using the identified **Student Criteria for Success**

Plan to stress **Important Vocabulary** in the lesson. New vocab for the unit is indicated in bold



Lesson 9: Find related multiplication facts by adding and subtracting equal groups in array models Date: _____

Standard(s)

3.4K solve one-step ~~and two-step~~ problems involving multiplication ~~and~~ division within 100 using strategies based on objects; pictorial models, including arrays, ~~area models,~~ and equal groups; properties of operations; or recall of facts

Important Vocabulary

- array
- **bracket**
- columns
- rows
- unit(s)

In this lesson, students are NOT responsible for the vocabulary ***distributive property.*** *Please withhold as it will come up in later lessons.*

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- (S) Multiply by 2 (1–5) Pattern Sheet
- (S) Threes array no fill template
- (S) Personal white board
- (S) Blank paper

Lesson Agenda		Time
I.	Do Now (source: fluency #1)	5 min
II.	Fluency*	8 min
III.	Concept Development	25 min
IV.	Student Practice	15 min
V.	Student Debrief	7 min
VI.	Exit Ticket*	5 min

Mathematical Goal of this Lesson

Students learn they can use decomposition to break one larger number into two smaller numbers as a strategy for multiplication. The goal of this lesson is simply for student to understand how to interpret and create an array that demonstrates such decomposition. Students will build on this understanding in subsequent lessons. This lesson also supports the goal of student thinking in terms of counting units, an overarching goal for academy math.

Opportunities to CFU

- ✓ Concept Development, by way of eliciting student responses
- ✓ Problems Set problems: #2, #3

7 threes = 5 threes + 2 threes
7 × 3 = 5 × 3 + 2 × 3
21 = 15 + 6

Other Notes to Inform Your Planning

For **Do Now**: Use the Multiply by 2 (1–5) Pattern Sheet for your Do Now. 3 minutes for completion, 2 minutes whole group classwork check.
For **Fluency**: Complete the Group Counting activity (notice the inclusion of 4s in preparation for upcoming lessons) and Forms of Multiplication activity.
For **Concept Development**: Consider prepping personal whiteboard in advance. Spend no more than 12 minutes for CD Problem 1 and 13 minutes for CD Prob 2.
For **Student Practice**: consider creating an extra set of Qs like 1-3 in case students struggle with entry-level understanding. If they don't, move on to Qs 4 and above.
For **Student Debrief**: consider using the Eureka assigned Exit Ticket for whole group debrief exercise; Suggested strategy – guided discourse.
For **Exit Ticket**: Use **Homework** problems 2 & 3 for this lesson's Exit Ticket.

Though not formally discussed *yet*, this is a foundation to understanding of distributive property. Students visually see multiplying the sum of two or more addends by a number will give the same result as multiplying each addend individually by the number and then adding the products together.

Lesson Look Fors

Look for teachers to...

- ❑ Have established a signaling routine for choral response or work show during the respective fluency activities
- ❑ Use a think aloud to describe why they shade what portions of the array, or use a different symbol in the array
- ❑ Make the focus of the lesson understanding the visual representations

Look for students to...

- ❑ Explain what they see in the array and how it relates to a given number sentence.

Student Criteria for Success

Know: Shading, brackets, and/or dotted lines on an array will have mathematical significance
-brackets can identify parts or wholes
-dotted lines and shading represent decompositions

Know: We count units; In an array, counting rows is the same as counting units.

Know: Addition/subtraction and multiplication math facts (up to 4)

Do: Interpret an array
-identify decompositions within an array
-Relate an annotated or labeled array to one or more number sentences

Do: Addition/subtraction (+/- up to 4)
Multiplication (2, 3, and 4)

Find recommended lesson modifications, content knowledge boosters, and/or high-leverage instructional moves that may not be in your Teacher Edition located in **Other Notes to Inform Your Planning**

UNIT SYNOPSIS

This unit focuses on simplifying expressions that contain exponents and/or radicals. In Lessons 1-4, students study the properties of exponents. Instruction should focus on what an exponent means, as well as how the Product of Powers and Quotient of Powers Properties can be used to prove Zero Power Property and to justify the relationships between negative and positive integer exponents.

In Lesson 5, students are introduced to the radical symbol. Building on their understanding of prime factorization from 6th and 7th grade, students learn how to simplify radical expressions.

CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
A.11(B) simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents	**A.11(A)** simplify numerical radical expressions involving square roots

Focus on Disciplinary Literacy 	Mathematical Process Standard (F) – analyze mathematical relationships to connect and communicate mathematical ideas
	Mathematical Process Standard (G) – display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication

LEARNING SUPPORTS BY LESSON

There is a checkmark for the math support if the lesson	Lessons → / Math Supports	L1	L2	L3	L4	L5
makes a connection to prior content or from a previous unit or academic year	Access Prior Knowledge	✓	✓	✓	✓	✓
uses familiar contexts or experiences to make the learning relevant to students	Real-World Connections	✓				
makes use of graphic organizers	Graphic Organizers	✓	✓			
includes tools like rulers, protractors, patty paper, algebra tiles, etc.	Tools or Manipulatives					
incorporates tables, reference charts, displays, pictures, models, or color-coding	Visual Aids	✓				✓
includes definitions, examples vs. nonexamples, cognates, etc.	Vocabulary Supports	✓	✓	✓	✓	✓
includes strategies that support language development	Language Supports					
asks students to discuss with their partner to prepare for whole class discussion	- Turn and Talk	✓	✓	✓		✓
teacher facilitates a whole class discussion to debrief key learnings	- Guided Discussion	✓	✓	✓		✓
asks students to think independently, test their idea with a partner, and share whole group	- Think, Pair, Share					
includes sentence stems to support students with explanations	- Sentence Stems					
provides opportunities for students to work with a partner or a group	Peer Collaboration	✓	✓	✓	✓	✓
uses mnemonics such as SohCahToa	Mnemonics					
includes websites or equipment that enhances the lesson	Technological Support					
content can be presented in different forms	Different Modalities					
uses hands-on tools or manipulatives to represent the math	- Concrete					
uses drawings to represent the math	- Pictorial					✓
uses numbers and number sentences to represent the math	- Abstract	✓	✓	✓	✓	✓

The EFFL Model

Experience First, Formalize Later (EFFL) Model

Opening

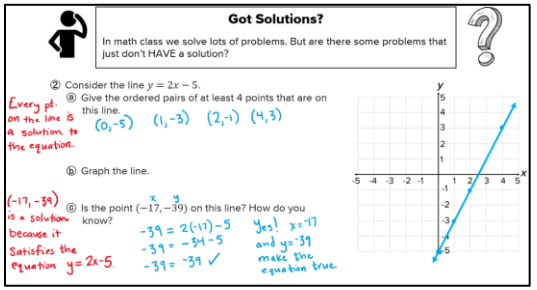
For every new lesson, the teacher begins by making the goals of the lesson crystal clear. The teacher does more than simply read the objective to the class. They make connections to previous learning, share how this learning fits into a bigger picture, or explain why this learning is important for future learning.

Activity / Interaction With New Material (INM)

For this part of the lesson, students work in pairs or groups of four to experience new content through an activity. Students might be discussing a proposed scenario, working with other groups, or doing a simulation. The student activity is designed for students to be able to do without the help of the teacher. Of course, the teacher is watching and listening in to conversations in order to formatively assess student understanding. The teacher provides questions, cues, and prompts (not answers!) to help push groups forward when they are stuck or have made a mistake. As students begin to finish the activity, the teacher identifies students to write their work on the board. Most often, the teacher selects student work that will easily allow them to connect the experience to formal learning. Students write their work on the whiteboard in a single-color marker.

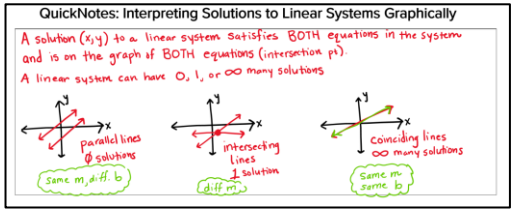
Debrief Activity

Once students have recorded their responses in their workbook (see blue writing to the right), the teacher calls the whole group back together for a debrief. It is in this discussion that the teacher will help students formalize the learning. The teacher connects the student activity experience to new vocabulary, definitions, formulas, and algorithms. The formal learning is attached specifically to the experiences of the activity so that students can enhance their constructed understanding of the new content. The teacher writes all of the formal learning in a different color in the margins of the activity **(see red writing to the right).** The students add these ideas in the margins on their activity page and often think of this as the formal "notes" of the lesson. In all of the answer keys we provide on Math Medic, the teacher formal learning points are provided in the margins in a **different color.**



QuickNotes

In this part of the lesson, the teacher uses the whole experience of the activity and the formalization in the debrief to summarize the learning from the lesson. Notice that we use the box to constrain the amount of formal "notes" that the teacher can provide.



Student Practice

Now that students have arrived at some new learning, they need to be able to apply it in new contexts. Most often we have students complete these questions in pairs and occasionally we select one question to use as an exit ticket. If we have time, we have students write solutions on the whiteboard.

Extra Practice

We typically give students around 3-5 "Extra Practice" problems for each lesson. We choose problems that are closely aligned with the Learning Objectives of the lesson. It is our belief that "less is more" here. We would rather students spend their Extra Practice time thinking deeply about just a few problems, rather than surface level thinking on many problems. When possible, we provide the answers at the bottom of the page, so they can immediately assess their understanding.

Slightly modified version of: https://www.calc-medic.com/post/experience-first-formalize-later#:~:text=%E2%80%9CExperience%20First%2C%20Formalize%20Later%E2%80%9D,at%20formal%20definitions%20and%20formulas.

Before You EFFL!

Here are helpful resources that you guide you in the right direction before your first EFFL lesson!

Why Should We EFFL?

The article advocates for the Experience First, Formalize Later (EFFL) teaching model, emphasizing its effectiveness in fostering deep understanding and flexible thinking in students. The author compares traditional teaching to a game of "Simon Says," where students merely mimic instructions without grasping underlying concepts. In contrast, EFFL encourages students to engage actively with problems, enhancing their ability to understand and apply calculus concepts creatively.

Tips for Lesson Planning

The article offers practical advice for effective lesson planning beyond the exhaustive and overly detailed approaches often emphasized during teacher training. It underscores the importance of thoughtful preparation but rejects the notion that teachers need to script every minute or detail of a class session.

Making the Most of Your EFFL Lesson Debrief

The article discusses the significance of the debriefing phase in the Experience First, Formalize Later (EFFL) lesson model, emphasizing its role in reinforcing learning and highlighting student contributions. The debrief session is seen as crucial for integrating academic vocabulary, emphasizing key lesson understandings, and valuing students' mathematical insights.

While You EFFL!

While each lesson may be unique in context and skills, all lessons benefit from the following practices:

Teacher Look Fors:

- ❑ Utilizing the Do Now to spark students' interest in the Activity.
- ❑ Use questioning to promote small group discussion and exploration, guided by monitoring questions.
- ❑ Connects Experience First to formal concepts using a colored pencil/pen to take notes along the margin during the Debrief.
- ❑ Facilitates whole-class discussions for students to reflect, share insights, and provides feedback that reinforces key concepts.
- ❑ Tracks time to adapt lesson pacing and support based on student response and engagement.

Students Look Fors:

- ❑ In the Activity, students engage in group work and discourse.
- ❑ Exploring the activity, testing hypotheses and approaches (trial & error).
- ❑ Take notes on key ideas and concepts using different colored pencil/pen to take notes along the margin.
- ❑ Share thoughts and ideas that demonstrate their approach to their work.

Other considerations

- During the **Experience First** phase, if most of your students seem stuck or disengaged, take a moment to pause, reset, and provide clear instructions. Some problems of the Activity are more suitable to do a whole-class discussion as a means to save some instructional time for Student Practice or the Exit Ticket. You are encouraged to adapt the EFFL (Experience First, Formalize Later) process to meet your students' needs while maintaining a focus on student-centered instruction.

ROADMAP

AT A GLANCE: Unit 7 – Simplifying Exponential and Radical Expressions			
Day	Date	Lesson	Lesson Title
There are 2 flexible Success Days that you can use anywhere in the unit. • Consider using 1 day to review before the Unit 7 Exam. • Consider using the other two days to help students further develop their conceptual understanding of Unit 7 topics and any topics from Units 1 – 6 that Semester Exam data conversations indicated you should revisit.			
1		1	Product of a Power and Quotient of a Power Rule
2		2	Negative and Zero Power Rules
3		3	Power of a Power Rule
4		4	Simplifying Exponential Expressions
5		5	Simplifying Radical Expressions
6			Success Day
7			Unit 7 Exam
8			Success Day

Lesson 1: Product of a Power and Quotient of a Power Rule Date: _____

Standard(s)

- **A.11(B)** simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents

Important Vocabulary

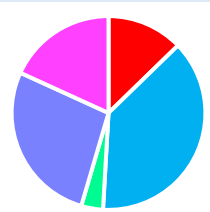
- **base**
- **exponent**
- **expanded form**
- **Product of a Power Property**
- **Quotient of a Power Property**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 7.1 Student Workbook Pages
- Class set of red pens

Lesson Structure:



Mathematical Goal of this Lesson

By the end of this lesson, students should be able to develop and use the product of powers and the quotient of powers to simplify exponential expressions. They will learn two more power properties in the next lesson and will learn how to use all four properties together.

Opportunities to CFU

✓ INM: 4, 7 ✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now should not be skipped or replaced; it activates prior knowledge students need to make sense of the INM. While debriefing the Do Now, you should review the terms "base," "exponent," and "expanded form." Students first encountered these terms in 6th grade and may remember them.

For **INM:** When students work on INM #2 and #5, they get the opportunity to see WHY each property works. It is essential that students understand the WHY, or they are more likely to misapply these properties.

Focus on Disciplinary Literacy

Debrief

For **INM #s 9-10:** This part of the INM includes "mild," "medium," and "spicy" problem sets. It is okay if students do not have time to complete every problem. Encourage them to complete the "mild" set before the "medium" and the "medium" before the "spicy." Consider leaving answer keys at each table so students can self-check and determine if they're ready to move on to the next level.

Lesson Look Fors

Look for teachers to…

- ❑ take advantage of the Do Now to help students recall what they learned about exponents, bases, and expanded form in 6th / 7th grade
- ❑ ensure students write expanded forms of exponents in #2 and 4 to see WHY the properties work; otherwise, students are more likely to make errors like $2^3 * 2^2 = 2^6$

Look for students to…

- ❑ be able to explain why the Product of Powers Property and Quotient of Powers Property make sense.
- ❑ apply the Product of Powers and Quotient of Powers properties individually and together.

Student Know/Do Chart

Do: Students can apply the Product of a Power Property and/or the Quotient of a Power Property to multiply and/or divide two terms.

Know: When two exponents with the same base are multiplied, their product has the same base and a power equal to the sum of the powers of the factors. For example, $a^m * a^n = a^{m+n}$.

Know: When two exponents with the same base are divided, their product has the same base and a power equal to the difference of the powers of the dividend and divisor. For example, $\frac{a^m}{a^n} = a^{m-n}$.

Lesson 2: Negative and Zero Power Rules Date: _____

Standard(s)

- **A.11(B)** simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents

Important Vocabulary

- exponent
- expanded form
- **Zero Exponent Property**
- **Negative Power Property**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 7.2 Student Workbook Pages
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (20 min)
- Debrief (2 min)
- Student Practice (16 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to develop and use negative power and zero power properties to simplify exponential expressions. This lesson spirals in the two properties students encountered in Lesson 7.1.

Opportunities to CFU

✓ INM: 4 ✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in what students learned in Lesson 7.1. It should not be skipped, as students will combine what they learned in Lesson 7.1 with new information in Lesson 7.2.

For **INM:** Ensure students get the opportunity to identify the patterns they notice in INM #s 1 and 3. Students will use the patterns to discover the Zero Power Property and Negative Power Property, and students will have a much better chance of understanding these properties if they're allowed to see the patterns for themselves.

On **scaffolding:** If students struggle to complete the tables, encourage them to rewrite the exponent in expanded form. For example, if they struggle to see that $2^3 = 8$, have them write out $2 * 2 * 2$ instead.

Focus on Disciplinary Literacy

Debrief of 1 and 3

Lesson Look Fors

Look for teachers to…

- ❑ allow students to share the patterns they notice in 1a and3a BEFORE telling students what the patterns are.
- ❑ actively monitor while students engage in the INM, preselecting who to call on to share their conjectures in 1b and 3b.

Look for students to…

- ❑ be able to explain why the Negative and Zero Power Properties make sense.
- ❑ apply the Product of Powers, Quotient of Powers, Negative Powers, and Zero Power properties individually and together.

Student Know/Do Chart

Do: Students can apply the negative, product, and quotient power rules to identify equivalent expressions containing exponents.

Do: Students can apply the negative, zero, product, and quotient power rules to simplify an expression containing exponents.

Know: The Zero-Exponent Property states that $a^0 = 1$ when $a \neq 0$.

Know: The Negative Power Property states that $\frac{1}{a^n} = a^{-n}$ when $a \neq 0$.

Know: The Product of a Power Property states that $a^m * a^n = a^{m+n}$.

Know: The Quotient of a Power Property states that $\frac{a^m}{a^n} = a^{m-n}$.

Lesson 3: Power of a Power Rule Date: _____

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors

Standard(s)

- **A.11(B)** simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents

Important Vocabulary

- exponent
- expanded form
- **Power of a Power Rule**

Necessary Materials and Pre-Lesson Prep

- Lesson 7.3 Student Workbook Pages
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (20 min)
- Debrief (3 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to develop and use the power of a power rule to simplify exponential expressions. This lesson spirals in the four properties students encountered in Lessons 7.1 and 7.2.

Opportunities to CFU

✓ INM: 1b, 1c, 1e, 1j ✓ Student Practice: 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in what students learned in Lessons 7.1 and 7.2. While it can be skipped or replaced, it is useful for activating students' prior knowledge.

For **INM:** The INM is relatively short. Allow students to think through #1a - #1k with a partner before pulling the class back together to talk about the pattern they notice. Students might make errors, and that is okay. The Debrief is a time to ensure that students' misconceptions are addressed before releasing them to Student Practice.

Focus on Disciplinary Literacy

Debrief

For **Disciplinary Literacy:** When debriefing INM #1, you'll likely spend quite a bit of time talking about 1*k* and referring back to what students saw in 1*a* – 1*j*. It is important to let students share what they believe the pattern is before you simply tell them what it is. Allowing them to share their thoughts first can alert you to misconceptions they might be forming.

Lesson Look Fors

Look for teachers to…

- ❑ circulate and monitor, listening in as students work on INM #1, preselecting who to call on when it's time to debrief.
- ❑ debrief INM#1 before releasing students to try INM#2.

Look for students to…

- ❑ be able to explain why the Power of a Power Rule makes sense.
- ❑ apply the Product of Powers, Quotient of Powers, Negative Powers, Zero Power properties, and Power of a Power rule individually and together (during INM #2 and SP).

Student Know/Do Chart

Do — Students can apply the power of a power property of exponents.

Know — The Power of a Power Property states that $(a^m)^n = a^{m \cdot n}$

Lesson 4: Simplifying Exponential Expressions Date: _____

Standard(s)

- **A.11(B)** simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents

Important Vocabulary

- Product of a Power Property
- Quotient of a Power Property
- Zero Exponent Property
- Negative Power Property
- Power of a Power Rule

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 7.4 Student Workbook Pages
- Scavenger Hunt Cards (can be found behind TE 7.4, or here)

Lesson Structure:

- Do Now (7 min)
- INM (15 min)
- Debrief (0 min)
- Student Practice (23 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to apply exponential properties, alone or in various combinations, to simplify exponential expressions with more than one variable.

Opportunities to CFU

- ✓ INM: 2B, 2C
- ✓ Student Practice: select any 2-3 problems from the Scavenger Hunt to prioritize checking

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in previous Unit 7 understandings. If students have been very successful the last three days, you could replace the Do Now with spiraled review from an entirely different TEKS. However, this Do Now exists to activate students' prior knowledge for today's lesson in which students will work with all previous properties of exponents.

For **INM:** INM 2a gives you the opportunity to model simplifying exponential expressions that require the application of several properties. Additionally, there are two additional problems in the INM you can use to model, going step-by-step through the exponent rules if necessary. Depending on how the previous three lessons went, you might want to let students work through them without you. What is most important is that you tailor this review opportunity to meet students' needs.

Focus on Disciplinary Literacy

INM #2a

Lesson Look Fors

Look for teachers to...

- ❑ lead the class through a quick review of each property (see more details provided in the pink box in the TE in the Do Now section).
- ❑ give clear directions and set clear expectations for the scavenger hunt activity; hold students accountable for meeting these expectations

Look for students to...

- ❑ apply the Product of Powers, Quotient of Powers, Negative Powers, Zero Power properties, and Power of a Power rule individually and together.

Student Know/Do Chart

Know: The Power of a Power Property states that $(a^m)^n = a^{m \cdot n}$

Know: The Zero-Exponent Property states that $a^0 = 1$ when $a \neq 0$.

Know: The Negative Power Property states that $\frac{1}{a^n} = a^{-n}$ when $a \neq 0$.

Know: The Product of a Power Property states that $a^m * a^n = a^{m+n}$.

Know: The Quotient of a Power Property states that $\frac{a^m}{a^n} = a^{m-n}$.

Do: Students can apply the Product of Powers Property, the Quotient of Powers Property, the Negative Power Property, the Zero Power Property, and the Power of a Power Rule to simplify expressions.

Lesson 5: Simplifying Radical Expressions Date: _____

Standard(s)

◆ **A.11(A)** simplify numerical radical expressions involving square roots

Important Vocabulary

- **cube root**
- **perfect square**
- **perfect cube**
- **radical**
- **radicand**
- **square root**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 7.5 Student Workbook Pages
- Class set of red pens
- 12x12 times tables for students

Lesson Structure:

- Do Now (7 min)
- INM (20 min)
- Debrief (3 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to simplify radical expressions, including those expressed by rational exponents. On the STAAR test, released questions indicate that students have not been assessed on anything more than simplifying a numerical expression (e.g. "Which expression is equivalent to $\sqrt{96}$?") However, most Algebra 2 coursework expects that students are fluent in simplifying radical expressions like $\sqrt{96x^3y^6}$.

Opportunities to CFU

✓ INM: 5, 6 ✓ Student Practice: 7, 8, 9

Other Notes to Inform Your Planning

For **Do Now**: This Do Now activates students' prior knowledge of prime factorization and exists to prime students for simplifying radical expressions. It look very similar to what students have seen in 6th and 7th grade.

For **INM #3:** Students will probably get frustrated with parts d and e, and that is okay. It is good for them to see that not all numbers are squares, and it's also there to show them examples and non-examples of what a "square" number is.

For **INM #s 7-9:** Students might not be able to make it through every single mild / medium / spicy problem. That is okay! Encourage them to get as far as they can. Based on the released STAAR questions we have access to, questions 7a, 7b, 8a, and 8b most closely resemble the radical expressions students are asked to simplify.

Focus on Disciplinary Literacy

Debrief

Lesson Look Fors

Look for teachers to…

- ❑ show "perfect squares" on the 12*12 (e.g. 4, 9, 16, 25…). Consider having students highlight them and show how they are one vertex of a square on the 12*12 (see example to the left)
- ❑ emphasize the 'inverse' relationship between squaring a value and taking the square root of a value.
- ❑ stamp that $x^{\frac{m}{n}} = \sqrt[n]{x^m}$ (see TE p48)

Look for students to…

- ❑ use their prime factorization skills to simplify radicals completely.
- ❑ explain why there is a principal root and a negative root when you take the square root of a number [e.g., $3 * 3 = 9$ and $(-3) * (-3) = 9$]

Student Know/Do Chart

Do: Students can identify equivalent expressions containing the radical sign.

Know: The inverse of raising an expression to a power is to take the root of an expression. For example, $\sqrt{16} = \sqrt{4^2} = \sqrt{4 * 4} = 4$.

Know: To simplify a radical expression, rewrite the radicand as a product of its factors and remove the perfect squares (or perfect cutes) from under the radical symbol. For example, $\sqrt{90} = \sqrt{3 * 3 * 10} = 3\sqrt{10}$

Recommended Success Day Materials and Resources

A.11(A): Simplify radical expressions

- ☐ Mathopolis: Squares and Square Roots
- ☐ Kuta: Simplifying Radical Expressions
- ☐ General review packet: Numbers, Operations, and Expressions (NOTE: only some problems of this packet are relevant to Unit 7 – they are scattered throughout each page. Be careful about which problems you select.)

A.11(B): Simplify expressions involving exponents

- ☐ Imagine Math: Simplify Exponential Expressions
- ☐ Kuta: Exponent and Radical Expressions
- ☐ Mathopolis: Simplifying Expressions
- ☐ That Quiz: Exponents
- ☐ Rags to Riches Game: Adding Positive Exponents
- ☐ Laws of Exponents Matching: Quotients, Zero, and Negative
- ☐ Virtual Nerd Video: Power of a Quotient
- ☐ Virtual Nerd Video: What Do you Do with a Zero Exponent?
- ☐ Virtual Nerd Video: What Do you Do with a Neg. Exponent?

Unit 7 Tech Enhanced Question Practice

This problem set offers multiple opportunities to practice tech-enhanced question types relevant to A.11(A) and A.11(B). It is not mandatory, and it can be retaken as many times as the student wishes to take it. You'll need to click "copy assignment" to be able to assign it to your students.

If student data indicates a pause point is not necessary, you can opt to move forward and reserve a Success Day to use at a later date.

Unit 7 Exam	Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning
◆ **A.11(B)** simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents ◆ **A.11(A)** simplify numerical radical expressions involving square roots	**Necessary Materials and Pre-Lesson Prep** ▪ Ensure you can access UE7 on EdCite. **Notes to Inform Your Planning** Review the Unit 7 Exam on Curriculum Corner. Internalize and create an exemplar for the assessment prior to teaching the unit as part of unpacking the unit. Use your exemplar to spar with the solutions provided in the Assessment Companion on Curriculum Corner. The scanning deadline for the Unit 7 Exam is January 22nd, 2026. For any test items that are not multiple choice, verify that student responses marked incorrect by Edcite truly are incorrect. (Edcite occasionally does not recognize all possible equivalent correct responses.)

UNPACKED STANDARDS

Focus standards for this unit.

Standard Breakdown		
Standard	**Specificity**	**STAAR Alignment**
A.11(B) simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents	**Concepts** - Numeric Expressions - Algebraic Expressions - Laws of Exponents - Integral Exponents - Rational Exponents **Skills** - Simplify **Clarifications (Including, but not limited to):** • students' understanding of exponents is extended to include zero and negative exponents • variables can appear either as the base or the exponent, but in either case must be rational numbers **Limitations:** • exponents are limited to rational numbers	**2025 – Q28** In the expression shown, x is a positive real number. $\frac{2x^{12}}{6x^{-3}}$ What is an equivalent form of this expression? Move the correct answer to each box. Each answer may be used more than once. Not all answers will be used. −15 −9 −4 $\frac{1}{3}$ $\frac{1}{4}$ 3 4 9 15 [ ] x [ ] **2025 – Q48** Which expression is equivalent to $\frac{(6y^3)^{-2}}{y}$ for all values of y where the expression is defined? Ⓐ $\frac{1}{36y^7}$ Ⓑ $\frac{1}{36y^6}$ Ⓒ $\frac{1}{12y^7}$ Ⓓ $\frac{1}{12y^6}$ **2024 – Q6** Which expression is equivalent to $\frac{1}{3}(6x^2y)^2(2x^3y^4)$ for all values of x and y where the expression is defined? Ⓐ $4x^7y^6$ Ⓑ $24x^7y^6$ Ⓒ $4x^{12}y^8$ Ⓓ $24x^{12}y^8$

A.11(A) simplify numerical radical expressions involving square roots	**Concepts** - numerical radical expressions -square roots **Skills** - simplify **Clarifications (Including, but not limited to):** - the original radical expression may or may not contain a coefficient. **Limitations:** • limited to square roots; students will not see cube roots on the STAAR	**2025 – Q3** Which expression is equivalent to $\sqrt{50}$? Ⓐ $2\sqrt{5}$ Ⓑ $5\sqrt{2}$ Ⓒ 12.5 Ⓓ 25 **2024 – Q1** Which expression is equivalent to $7\sqrt{45}$? Ⓐ $12\sqrt{3}$ Ⓑ $35\sqrt{3}$ Ⓒ $10\sqrt{5}$ Ⓓ $21\sqrt{5}$ **2023 – Q20** Which expression is equivalent to $\sqrt{600}$? Ⓐ $6\sqrt{10}$ Ⓑ $10\sqrt{6}$ Ⓒ $24\sqrt{25}$ Ⓓ $25\sqrt{24}$

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6th / 7th Grade	Algebra I	Algebra II
6.3(D) add, subtract, multiply, and divide integers fluently 6.3(E) multiply and divide positive rational numbers fluently 6.7(A) generate equivalent numerical expressions using order of operations, including whole number exponents and prime factorization 7.3(A) add, subtract, multiply, and divide rational numbers fluently 7.3(B) apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers	A.11(B) simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents A.11(A) simplify numerical radical expressions involving square roots	A2.2(A) graph the functions $f(x) = b^x$ and $f(x) = log_b(x)$ where b is 2, 10, and e, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval A2.2(C) describe and analyze the relationship between a function and its inverse (logarithmic and exponential), including the restriction(s) on domain, which will restrict its range A2.5(A) determine the effects on the key attributes on the graphs of $f(x) = b^x$ and $f(x) = log_b(x)$ where b is 2, 10, and e when $f(x)$ is replaced by $af(x)$, $f(x) + d$, and $f(x - c)$ for specific positive and negative values of a, c, d A2.5(B) formulate exponential and logarithmic equations that model real-world situations, including exponential relationships written in recursive notation A2.5(C) rewrite exponential equations as corresponding logarithmic equations and logarithmic equations as corresponding exponential equations A2.5(D) solve exponential equations of the form $y = ab^x$ where a is a nonzero real number and b is greater than zero and not equal to one and single logarithmic equations having real solutions A2.7(F) determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two A2.7(G) rewrite radical expressions that contain variables to equivalent forms A2.7(H) solve equations involving rational exponents