

# Week Two Assignment: Tracking Student Learning

---

Frank Jamison  
ITL526: SS Integrated Design  
Dr. Torrence Temple  
February 18, 2024

# Background: Standard & Criteria for Mastery

## Standard

## Criteria

Mathematics

Algebra I (Traditional Pathway)

The Real Number System (N RN)

Mastery of rational exponents and their properties would be demonstrated by a student's ability to explain the rationale behind extending integer exponent rules to rational exponents and consistently apply these properties in simplifying expressions with both exponents and radicals.

A student's mastery of the relationship between exponents and radicals can be demonstrated by their ability to explain and show how exponentiation and radical operations are inverse processes.

Additionally, they should be able to seamlessly convert between radical expressions and expressions with rational exponents in different mathematical situations.

A student's ability to simplify expressions involving exponents and radicals would be demonstrated through consistent application of the properties of exponents to reduce expressions to their simplest form.

This includes efficiently handling radicals and exponents within the same expression and accurately presenting the simplest equivalent form.

A student's mastery in solving equations involving exponents and radicals would be shown by their ability to apply algebraic principles and properties of exponents and radicals accurately.

This includes finding all possible solutions to the equations, even those resulting in irrational or complex numbers, where applicable.

# Background: Rubric

Criteria	Highly Developed (4 points)	Developed (3 points)	Emerging (2 points)	Initial (1 point)
Understanding of Rational Exponents and Their Properties	Exhibits comprehensive understanding and application of rational exponents' properties in various contexts without errors.	Shows a good understanding of rational exponents and their properties, with minor errors in application or explanation.	Exhibits a basic understanding of rational exponents and their properties but struggles with application in different contexts.	Shows limited understanding of rational exponents and their properties, with significant misconceptions or errors in application.
Comprehension of the Relationship Between Exponents and Radicals	Demonstrates a deep comprehension of how exponentiation and radical operations are inverse processes, accurately converting between expressions.	Understands the relationship between radicals and exponents with minor inaccuracies in converting expressions.	Shows basic comprehension but makes errors in converting between radical expressions and expressions with rational exponents.	Struggles to understand the relationship between radicals and exponents, with significant errors in conversions.
Simplifying Expressions Involving Exponents and Radicals	Accurately simplifies expressions involving both exponents and radicals consistently, demonstrating mastery in applying the properties of exponents.	Simplifies expressions involving exponents and radicals correctly in most cases but makes occasional errors.	Can simplify some basic expressions involving exponents and radicals but struggles with more complex expressions.	Has difficulty simplifying expressions involving exponents and radicals, often making significant errors.
Solving Equations Involving Exponents and Radicals	Expertly solves equations involving exponents and radicals, accurately finding all possible solutions and correctly interpreting the results.	Solves most equations involving exponents and radicals correctly but may overlook some solutions or make minor errors in interpretation.	Demonstrates a partial ability to solve equations involving exponents and radicals, struggling with complex equations or missing some solutions.	Has significant difficulty solving equations involving exponents and radicals, often unable to find correct solutions or make appropriate interpretations.

# Pre -Assessment

# Pre -Assessment: Create

Self-Assessment: Rational Exponents and Radicals

Instructions: Rate your current understanding of each topic in the survey. Be honest—this isn't graded, it's just to help us focus our class time where it's needed most.

<https://xx984wvbkfx.typeform.com/to/CfAwKWe0>

# Pre -Assessment

## Justification

The pre-assessment design is based on a clear understanding of the educational standard and the critical concepts and skills it encompasses. The questions are constructed to elicit specific evidence of students' prior knowledge, directly correlating to the mastery criteria outlined in the standard documentation. Each question corresponds to a different aspect of the standard, ensuring a thorough evaluation of the students' current understanding.

The assessment focuses on the following areas:

- Rational Exponents and Their Properties: Students must demonstrate their ability to explain and apply these properties, which is essential for high-level algebraic manipulation.
- Relationship Between Exponents and Radicals: Students are assessed on their understanding that these are inverse operations, which is critical for simplifying expressions and solving equations.
- Simplifying Expressions Involving Exponents and Radicals: Mastery here indicates a student's readiness to handle algebraic expressions in their simplest form, a skill necessary for success in algebra and beyond.
- Solving Equations Involving Exponents and Radicals: This skill is vital for working with algebraic equations, a foundational component of algebra I and subsequent mathematics courses.

In a real-world classroom application, the information gained from this preassessment allows informed instructional planning. If a significant number of students show mastery in one area, the teacher can allocate less time to that topic or provide enrichment activities. In addition, more time can be devoted to areas where understanding is weak. This targeted approach ensures classroom time is used efficiently, and instruction is differentiated to meet all learners' needs.

Moreover, in a classroom environment that increasingly values data-driven instruction, this pre-assessment serves as a quantifiable measure of student readiness that can be used to track progress over time. It can also foster a growth mindset among students, as they can clearly see the areas they need to focus on. They can measure their improvement throughout the unit.

By identifying their starting point relative to the expected learning outcomes, the pre-assessment empowers students to take charge of their learning.

## Next-Steps

The data collected from the pre-assessment will be analyzed through multiple layers to design effective instruction.

**Individual Assessment:** The scores of each student will be reviewed to identify their strengths and weaknesses in understanding rational exponents, their properties, and their interplay with radicals. This analysis will help in providing personalized feedback and support, designing individualized practice problems, and possibly adjusting instruction pace for certain students.

**Group Trends:** By aggregating data, I can identify trends that show the areas where the majority of the class is strong or weak. This information is essential for planning whole-class instruction, determining if certain topics need more attention, and if so, incorporating additional resources or instructional strategies to address those needs.

**Skill-Specific Focus:** The preassessment data will allow me to focus on specific skills when planning lessons. For instance, if the data shows that most students struggle with simplifying expressions involving exponents and radicals, I can allocate more time to practicing this skill. I can also use manipulatives or visual aids to reinforce understanding.

**Differentiation:** The pre-assessment will inform how to differentiate instruction to meet all students' needs. For example, students who demonstrate a high level of understanding might be given extension activities that challenge their application skills. In contrast, those who are emerging in understanding might work on foundational exercises in smaller, teacher-guided groups.

**Lesson Delivery:** The mode of lesson delivery can be adjusted based on pre-assessment data. For students who need a basic understanding, direct instruction might be most effective. However, for those who are developing, or highly developed, inquiry-based or collaborative learning might be more appropriate to deepen their understanding.

**Real-World Application:** Connecting algebraic concepts to real-world situations can be tailored based on student familiarity with the content. For example, students with an advanced grasp of the content can explore how these concepts apply in fields like engineering or data science. In contrast, those still developing their understanding might look at simpler, more concrete applications.

The pre-assessment provides a detailed analysis of students' starting points and serves as a roadmap for instructional planning. This targeted approach demonstrates a depth of knowledge about course content. It also demonstrates the ability to respond to a variety of learning needs, and the application of educational strategies in real-world classroom situations.

# Formative Assessment

# Formative Assessment: Create

## Formative Assessment: Rational Exponents and Radicals Quiz

Instructions: Complete the linked 4question quiz to test your understanding of rational exponents and radicals. This isn't a graded assessment, it's just to help us focus our effort where it's needed most.

<https://www.flexiquiz.com/SC/N/642f6d9c-411b-4589-9f73-5580520136c9>

# Formative Assessment

## Justification

The formative assessment I created is designed to elicit responses that will inform me about individual students' progress and collective understanding within the classroom. This assessment directly reflects the concepts and skills outlined in the selected Algebra I standard. This includes understanding rational exponents and their properties, the relationship between exponents and radicals, and the ability to simplify expressions and solve equations involving these concepts.

**Problem 1** assesses students' ability to apply rational exponent properties to simplify expressions, a key skill outlined in the standard. The inclusion of distractors checks for common errors, such as miscalculating the exponent rules or misunderstanding the squaring process.

**Problem 2** addresses the standard's requirement that students understand and articulate the relationship between exponents and radicals. By asking students to convert between radical and exponential forms, the assessment checks for conceptual understanding and fluency in moving between different expression formats.

**Problem 3** evaluates students' proficiency in reducing complex expressions involving exponents and radicals. The ability to simplify such expressions is a clear objective within the standard. This question also checks for common misconceptions, such as confusing the rules for simplifying the numerator and denominator.

**Problem 4** targets the standard's goal of solving equations involving exponents and radicals. By providing distractors along with the real solution, the assessment differentiates between students who can accurately apply their knowledge to solve the equation and those who may still harbor misconceptions.

In my classroom, the data collected from this formative assessment would directly inform my subsequent instruction. For example, if most students select incorrect distractors that suggest a specific misunderstanding, I can address this in future lessons. If individual students struggle, I can provide targeted interventions. Moreover, for students who consistently select the correct answers, I might offer more challenging problems to encourage deeper engagement with the content.

The assessment's design demonstrates a depth of knowledge about Algebra I content. It provides actionable data for real-world classroom situations, allowing for dynamic, responsive teaching that meets all students' needs.

## Next-Steps

I will use the information gathered from the formative assessment to analyze each student's progress and understanding. This analysis will help me adjust my instructional strategies to better meet the needs of all learners in my classroom.

For students who meet the mastery criteria, I will acknowledge their success and understanding of the content. This will reinforce their confidence in the subject matter. I will provide these students with enrichment opportunities that challenge them further. These opportunities include exploring more complex problems or real-world applications of rational exponents and radicals.

I will offer additional support through targeted instruction for students who did not meet the mastery criteria. This may include reteaching concepts in a different way, providing visual aids, or using manipulatives to enhance conceptual understanding. I will also organize tutoring sessions, either peer-led or with myself, to give students more one-on-one time to grasp the concepts. Additionally, I will create differentiated assignments that cater to their current level of understanding. This will allow them to practice and improve on specific skills they struggled with on the assessment.

For the entire class, I will review topics that the formative assessment indicated were broadly misunderstood or not mastered by most of the class. I will employ varied instructional methods, like cooperative learning and inquiry-based activities, to cater to different learning styles and needs. Additionally, I will continuously use informal assessments, such as exit tickets and quick checks for understanding, to monitor progress and adjust lessons accordingly.

By using this data, I can ensure that my instruction responds to the needs of my students and provides a supportive learning environment that encourages growth and mastery of the content. This approach allows concise planning and execution of differentiated instruction and reflects a deep understanding of the course content and the real-world application of teaching strategies in my content area.

# Summative Assessment

# Summative Assessment: Create

## Summative Assessment: Digital Portfolio on Rational Exponents and Radicals

Please create a digital portfolio that demonstrates your understanding of rational exponents and radicals. Your portfolio should include the following components:

1. Conceptual Explanation: Write a brief explanation of what rational exponents and radicals are and describe their relationship. Use diagrams or visual aids to enhance your explanation.
2. Simplification Examples: Include three examples of simplifying expressions involving rational exponents and radicals. Show each step of your simplification process and explain why each step is necessary.
3. Application Problems: Solve two real-world problems that involve rational exponents or radicals. Explain how you set up and solved each problem and discuss the significance of your solution in the context of the problem.
4. Reflection: Reflect on your learning journey in this unit. Discuss what concepts were challenging for you, how you overcame those challenges, and how you plan to apply what you've learned in future mathematical contexts.

Please note:

- You can use any digital tool of your choice (e.g., Google Slides, Microsoft PowerPoint, Adobe Spark) to create your portfolio.
- Your portfolio should be well-organized and visually appealing.
- The due date for your submission is [insert due date here].

# Summative Assessment

## Justification

The assessment I created is a digital portfolio on rational exponents and radicals, aligned with the Algebra I standard. It evaluates students' mastery of the standard's criteria and caters to diverse learners through its structure and format.

For conceptual understanding, students must explain rational exponents and radicals. This section assesses their deep understanding of the concepts, which is crucial for mastery. Diagrams or visual aids allow students to express their understanding in different ways, catering to multiple learning styles.

The procedural skills section requires students to demonstrate their ability to apply rational exponents and radical properties step-by-step. This aligns with the standard's emphasis on consistently applying these properties to simplify expressions.

The application section assesses students' ability to apply their knowledge in practical situations. This allows students to showcase their problem-solving skills and ability to connect mathematical concepts to real-world contexts.

The reflective component encourages students to evaluate their own learning process, promoting metacognition. This not only helps them consolidate their understanding but also fosters a growth mindset, which benefits their overall mathematical development.

Digital portfolios are suitable for diverse learners, as they provide flexibility in how students express their mastery. Students can choose a digital tool that suits their preferences and use various modes of expression (text, visuals, audio, etc.) to communicate their understanding. This flexibility ensures that all students, regardless of their learning preferences or abilities, have equal opportunity to demonstrate their mastery of the content.

Furthermore, a digital portfolio allows for a more comprehensive assessment of student learning, capturing a range of skills and understandings over time. This approach aligns with high-quality assessment practices, providing a more holistic view of student learning. It also allows for a more nuanced interpretation of their mastery of the standard's criteria.

This summative assessment's design is rooted in a deep understanding of course content and diverse learners' needs. It provides a clear, detailed, and concise measure of students' mastery of the standard's criteria. Furthermore, it is flexible and accessible to accommodate all students' varied needs and preferences in the real-world classroom setting.

## Next-Steps

I understand that for students who did not demonstrate mastery across all criteria in the summative assessment, I will need to implement a multifaceted support plan to address their specific needs and help them achieve proficiency.

Here's how I plan to do it:

- Individualized Feedback: I will provide detailed feedback on their digital portfolio, highlighting their strengths and identifying areas for improvement. This feedback will be specific and actionable, guiding students to enhance their understanding and skills.
- Targeted Remediation: Based on the analysis of summative assessment data, I will design targeted remediation sessions for students who need additional support. These sessions will focus on the specific concepts or skills where the student showed a lack of proficiency, ensuring that instruction directly addresses their needs.
- Differentiated Assignments: I will create differentiated assignments that cater to each student's individual learning needs. These assignments will be designed to reinforce concepts and skills that were not mastered, providing students with additional practice and opportunities to demonstrate their understanding.
- Peer Tutoring: I will pair students who did not demonstrate mastery with peers who have a strong understanding of the concepts. Peer tutoring can be an effective way for students to receive support in a collaborative and non-threatening environment.
- Progress Monitoring: I will continuously monitor the progress of students receiving remedial support. This will involve regular check-ins, additional formative assessments, and adjustments to the support plan as needed to ensure students are making progress towards mastery.
- Parent/Guardian Involvement: I will communicate with the parents or guardians of students who require additional support, providing them with updates on their child's progress and suggesting ways they can support their child's learning at home.
- Reflective Practice: I will encourage students to engage in reflective practice, asking them to reflect on their learning process, identify their own areas of difficulty, and set goals for improvement. Self-reflection can empower students to take ownership of their learning and develop strategies for overcoming their challenges.

By implementing these support strategies, my goal is to provide a comprehensive and responsive approach to remediation that meets the individual needs of each student. This approach is rooted in a deep understanding of the course content, the principles of effective instruction, and the realities of real-world classroom situations, ensuring that all students can master the selected standard's concepts and skills.