Radical Yet Rational, Part 3

Extraneous Solutions

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Grade Level	10th – 11th Grade	**Time Frame**	65-80 minutes
Subject	Mathematics	**Duration**	2 class periods
Course	Algebra 2		

Essential Question

How do we know if a solution is extraneous?

Summary

In this lesson, students will recall solving equations with rational exponents and radicals. Using graphs, students will recall evaluating and solving equations with function notation. Students then will learn how to address extraneous solutions and why they exist. Students will apply this new knowledge to mathematical problems.

Snapshot

Engage

Students recall solving equations using rational exponents and/or radicals.

Explore

Students use graphs to evaluate expressions and solve equations with function notation.

Explain

Students complete guided notes with the class and formalize their understanding of extraneous solutions.

Extend

Students apply what they have learned to solve mathematical problems.

Evaluate

Students reflect on their learning and decide what they found easiest and what they found most confusing about solving equations using rational exponents and/or radicals.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

N 605: Apply properties of rational exponents

Oklahoma Academic Standards Mathematics (Algebra 2)

A2.N.1.3: Understand and apply the relationship between rational exponents to integer exponents and radicals to solve problems.
A2.A.1.5: Solve square and cube root equations with one variable, and check for extraneous solutions.

Attachments

- Exploring-Functions-Radical-Yet-Rational-Part-3 - Spanish.docx
- Exploring-Functions-Radical-Yet-Rational-Part-3 - Spanish.pdf
- Exploring-Functions-Radical-Yet-Rational-Part-3.docx
- Exploring-Functions-Radical-Yet-Rational-Part-3.pdf
- Guided-Notes-Radical-Yet-Rational-Part-3 - Spanish.docx
- Guided-Notes-Radical-Yet-Rational-Part-3 - Spanish.pdf
- Guided-Notes-Radical-Yet-Rational-Part-3.docx
- Guided-Notes-Radical-Yet-Rational-Part-3.pdf
- Guided-Notes-Teacher-Guide-and-Model-Notes-Radical-Yet-Rational-Part-3.pdf
- Lesson-Slides-Radical-Yet-Rational-Part-3.pptx
- Looking-for-Extraneous-Solutions-Radical-Yet-Rational-Part-3 - Spanish.docx
- Looking-for-Extraneous-Solutions-Radical-Yet-Rational-Part-3 - Spanish.pdf
- Looking-for-Extraneous-Solutions-Radical-Yet-Rational-Part-3.docx
- Looking-for-Extraneous-Solutions-Radical-Yet-Rational-Part-3.pdf

Materials

- Guided Notes handout (attached; one per student; printed front only)
- Desmos account
- Pencils
- Student devices with internet access

10 minutes

Engage

Teacher's Note: Desmos Activity Preparation

To use this Desmos Classroom activity, select the following link: "Radical Yet Rational, Part 3." Create an account or sign in under the "Activity Sessions" heading. After you log in, the green "Assign" dropdown button will be active. Click the arrow next to the word "Assign," then select "Single Session Code." After making some setting selections, select "Create Invitation Code" and give the session code to students. For more information about previewing and assigning a Desmos Classroom activity, go to https://k20center.ou.edu/externalapps/using-activities/.

For more detailed information about Desmos features and how-to tips, go to https://k20center.ou.edu/externalapps/desmos-home-page/.

To set up the activity's pacing for students, select "View Dashboard" (next to the session code). In the upper-left corner of your screen, select the icon above the word "Pacing." Desmos Classroom should then prompt you to select the first and last screens that you want students to see. When prompted to set a range, select screens 1 and 4. Select "Restrict to Screens 1–4" to confirm your selection. This allows students to access only screens 1–4 at this time. For more information about teacher pacing, go to https://k20center.ou.edu/externalapps/pacing-activities/.

Provide students with your session code. Then, have students go to student.desmos.com and enter the session code.

Teacher's Note: Sign-in Options

If students sign in with their Google or Desmos accounts, then their progress is saved, and they can resume the activity or view their work later. If students continue without signing in, they can complete the activity, but they must do so in one sitting. It is strongly recommended that students sign in; otherwise, they risk losing their work.

Using the Bell Ringer strategy, have students answer the questions on **screens 1–2**. On these screens, students are asked to solve equations with rational exponents and radicals.

Students receive immediate feedback based on the responses they submit. Use this time to address any misconceptions that remain from the previous lesson(s): "Radical Yet Rational, Part 2" and/or "Radical Yet Rational, Part 1."

Introduce the lesson using **screens 3–4** of the Desmos activity. **Screen 3** displays the lesson's essential question. **Screen 4** identifies the lesson's learning objectives. Review each of these with students to the extent you feel necessary.

5 minutes

Explore

Ask students to find partners or assign student pairs. On the Desmos dashboard, click the orange plus sign twice to allow students to progress to **screens 5–6**.

Have students work with their partners to evaluate expressions and solve equations by using the provided graph. Again, Desmos is designed to provide students with immediate feedback on each response they submit.

Teacher's Note: Purpose

During the Explain portion of the lesson, students are going to see both algebraic and graphical explanations for extraneous solutions. This activity is meant to help students transition their thinking from algebraic work to graphical explanations.

Explain

Provide each student with a copy of the attached **Guided Notes** handout. On the Desmos dashboard, click the orange plus sign three times to allow students to progress to **screens 7–9**. Ask students to use Desmos to complete the handout.

As you watch the dashboard and see that students are done reading screen 9—which explains where the extraneous solution in example 1 came from—have the class come back together for questions and discussion. Ask for volunteers to explain the reason for that extraneous solution in example 1. Then, ask for volunteers to explain why example 1 has no solution. Use student responses to clarify any misunderstandings.

On the dashboard, click the orange plus sign twice to allow students to progress to **screens 10–11**.

As students finish reading screen 11, have the class come back together to discuss example 2. Have students turn to their partners to explain, in their own words, why this example had both a solution and an extraneous solution. Ask for volunteers—preferably different from those who volunteered to explain example 1—to share their explanations for example 2 with the class. Then, ask students if they think every equation with an even root will have an extraneous solution. Consider having students look at their guided notes from previous lessons for a counterexample.

On the dashboard, click the orange plus sign twice to allow students to progress to **screens 12–13**.

As students finish reading screen 13, ask for volunteers to share a key takeaway from what they just learned. In other words, ask students to explain what they just learned in one sentence.

Have students add their completed Guided Notes to their math notebooks if that is a classroom norm.

20 minutes

Extend

On the Desmos dashboard, click the orange "Stop" button to allow students to complete the Desmos activity at their own pace.

On **screens 14–17**, using what they have learned from completing the Guided Notes, students should work with their partners to solve equations with rational exponents that could contain extraneous solutions.

The Desmos activity has a built-in self-check on screens 14–17, so students again receive immediate feedback on their responses.

5 minutes

Evaluate

As students complete screen 17, introduce the Muddiest Point strategy to determine students' confidence in solving equations with radicals and/or rational exponents. On **screen 18**, students use this strategy to reflect on the lesson and their overall understanding of the content.

Use student feedback to determine if remediation is needed or if students are ready for the next topic. If the class is split, consider remediation by grouping students who found something to be crystal clear with students who found that same thing to be most confusing.

Resources

- ElisaRiva. (February 13, 2017). Brain [Illustration]. Pixabay.https://pixabay.com/illustrations/brain-mind-psychology-idea-drawing-2062057/
- K20 Center. (n.d.). Bell Ringers and Exit Tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (n.d.). Muddiest Point. Strategies. https://learn.k20center.ou.edu/strategy/109
- K20 Center. (n.d.). Desmos Classroom. Tech tools. https://learn.k20center.ou.edu/tech-tool/1081