**SUPPLEMENTAL INSTRUCTION ACTIVITY**

**TOPIC: Solving Rational Equations**

**APPLICABLE COURSES:** All math courses starting from Math 060 and other courses in other disciplines.

**LEARNING OUTCOME:** (What will students be able to do by the end of the workshop?)

After completing this workshop, students should be able to solve rational equations.

**CONTENT:** (What do students need to know to accomplish the outcome?)

1. Solving rational equations.

2. Solving proportions.

**METHOD:** (How will the instructor deliver content? Short lecture, handouts, Powerpoint, other audio-visual presentation)

Short lecture followed by active learning exercise and worksheet (40 minutes)

* Teach 1 and Practice 1 (25 minutes)
* Teach 2 and Practice 2 (15 minutes)

The lesson is divided into segments composed of lecture and examples followed by student practice and sharing.

* First, the instructor distributes the exercise worksheet and any supporting handouts.
* Then the instructor presents segments 1(5min). After this brief lecture with examples, students individually think about how they will solve the set of problems for these segments (2 min for each problem), and then complete them (5 min for each problem). Next, in pairs, students each take a turn to explain to their partner how they solved one of the problems (3 min). At the end of this 25-minute segment, the instructor posts the solutions/answers on the screen for students to check their work.
* Follow the same lecture/practice procedure for Segment 2.

Note: If time is short, only one student explains his/her process to the partner for each segment of the lesson, taking turns for each segment.

Next students complete a quiz where they are asked to solve rational equations. After completing the quiz, the instructor posts the solutions/answers on the screen. Students check their results.

Then they complete the self-reflection activity. The instructor can also look over the quizzes while the students are completing the self-reflection activity to give feedback to students.

**ACTIVE LEARNING STRATEGIES:** (How will students apply their knowledge, solve a problem, create a project, analyze a case, and explain a process?)

Students reflect on the exercises and teach each other by verbalizing the steps they took to reach their conclusions.

**ASSESSMENT METHOD:** (How will the instructor know that the students met the outcome? Check for understanding. )

(20 minutes)

Students complete a quiz where they are asked to solve rational equations. After completing the quiz, the instructor posts the solutions/answers on the screen. Students check their results. The instructor can also look over the quizzes while the students are completing the self-reflection activity to give feedback to students.  
If students do not successfully complete the worksheet quiz, they may be referred to individual tutoring or a guided learning activity.

**SELF-REFLECTION ACTIVITY:** (What will the instructor do to get students to reflect on how they learned the content, what they learned, how they learned it, and how they will apply it in their coursework?)

(5 minutes)

-Which segment of solving rational equations was most challenging for you?

-What steps are you going to take to learn this subject?

|  |  |
| --- | --- |
| *Solving Rational Equations*  **Handout** | **Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

**Objective: To study how to solve rational equations.**

**Segment 1**: Solving Rational Equations.

Rational equations are equations with fractions.

Here is an example



How to Solve Rational Equations

* To solve a rational equation, remember a few key things.

1. Our goal is find the value(s) of the variable that makes the equation true.
2. The key to solving equations with fractions is to find the least common denominator (LCD) and multiply both sides of the equation by the LCD in order to eliminate the fractions.
3. Since we cannot have zero in the denominator of fractions, we will need to check our possible answers very carefully and make sure they make sense (i.e. they don’t make the denominators zero.)

Example 1: Solve the following equation and check your answer.



The solution is below:

* Find the LCD of all fractions (10x) and multiply

both sides of the equation by that.

* Simplify the fractions and eliminate the denominators.
* Bring variable terms to one side, non-variable terms to the other.
* Isolate the variable.

Checking the solution to Example 1



* It is very important to check the answer.

Does -20 make the equation true?

* Plug in -20 for x.
* By getting a common denominator and

adding the fractions we see the two sides of the equation are equal.

* So -20 is the solution!!

Example 2: Solve the following equation and check your answer.



(a)



(b)

**Segment 2**: Solving Proportions.

* A proportion is two fractions that are equal to each other. This is another type of rational equation.
* An easy way to eliminate the fractions in a proportion is to set the “cross products” equal (i.e. “cross-multiply”).



Example 3: Solve the following equation and check your answer.

(a)



(b)

|  |  |
| --- | --- |
| *Solving Rational Equations*  **Handout-KEY** | **Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

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Example 2: Solve the following equation and check your answer.



(a)

Answer: x= - 8/3



(b)

Answer: w= - 1 (Note 0 is an extraneous solution.)

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Example 3: Solve the following equation and check your answer.

|  |  |
| --- | --- |
| (a) | Answer: x= - ½, 2 |
| (b) | Answer: y=5 |

**Worksheet Quiz for Solving Rational Equations**

Solve:

1.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**SELF-REFLECTION ACTIVITY**

- Which segment of solving rational equations was most challenging for you?

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**Worksheet Quiz for Solving Rational Equations-KEY**

Solve:

1.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answer: No solution

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answer: -45/7

3.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answer: 24