

LESSON 29: Rational Expressions and Equations part 2

Weekly Focus: rational expressions

Weekly Skill: application

Lesson Summary: For the warm-up, students will solve a problem about yard work. In Activities 1 and 2, students will practice varied rational expressions problems. In Activity 3, they will review algebra concepts they learned in lessons 18-29. There are work-related work problems for homework. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 29:

- Video (length 3:11) on time word problems using rational expressions. The video is required for teachers and optional for students.
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book (pages 62 – 63)*
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Workbook (pages 82 – 85)*
- 1 Worksheet (29.1) with answers (attached)

Objectives: Students will be able to:

- Solve the yard work problem
- Practice computation with rational expressions
- Solve word problems with rational equations
- Do a mid-unit review of algebra concepts learned thus far

ACES Skills Addressed: N, CT, LS

CCRS Mathematical Practices Addressed: Building Solution Pathways, Use Appropriate Tools strategically

Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, and Application

Notes:

You can add more examples if you feel students need them before they work. Any ideas that concretely relate to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 29 Warm-up: Solve the yard work problem

Time: 5-10 Minutes

Write on the board: Lauren and Jaime cleaned a yard for \$80.

Basic Questions:

- If Lauren worked 3 times as many hours as Jaime, how much of the money should she get?
 - *This problem can be solved by dividing 80 into 4 parts of \$20 each with 3 parts going to Lauren and one to Jaime. Lauren gets \$60 and Jaime \$20.*

Extension Questions:

- Write an equation to solve the problem.
 - If $x =$ portion earned by Jaime, the equation is $3x + x = \$80$, $4x = 80$, $x = \$20$ earned by Jaime and $3x = \$60$ earned by Lauren.
 - It can also be solved with x for money earned by Lauren and as a proportion: $\frac{\text{Jaime}}{\text{Lauren}} = \frac{1}{3} = \frac{80-x}{x}$. $x = 3(80 - x)$, $x = 240 - 3x$, $4x = 240$, $x = \$60$ earned by Lauren.
 - Students may have other ways of solving the problem.

Lesson 29 Activity 1: Rational Expressions Practice

Time: 15 Minutes

1. Work on **pages 66-67 of the student book** together.
2. Do the examples on page 66 to review what students learned last class.
3. Have volunteers do 1-2 problems on the board.

Lesson 29 Activity 2: Independent Practice

Time: 40 Minutes

1. Let students work independently in the **workbook pages 90-93**.
2. Circulate to help.
3. Have volunteers do some of the more challenging problems on the board.
4. Make sure to leave enough time to explain the difficult problems.

Lesson 29 Activity 3: Review

Time: 35 Minutes

1. This lesson is the midpoint of the algebra section and a good time to review the concepts learned so far.
2. Have students do some **problems in the student book pages 84-87**. Do Questions 1-34 but skip questions 7-10, 22, 25, 28-31. You will do those later.
3. Circulate to help. Review any questions that students found challenging.
4. Choose a few problems to have volunteer students do on the board and explain if they want.

Lesson 29 Activity 4 or Homework: Work Problems

Time: 20 Minutes

1. There are 3 common types of problems that use rational expressions:
 - a. Work problems (like in video for lesson) in which each person does a fraction of the work. Basically, you write a fraction for how much of the total work each person does times x , add them together to equal 1, which represents the total work.
 - b. Give **Worksheet 29.1** as homework. Do the first one together.
 - i. *Set up the equation as $\frac{1}{5}x + \frac{1}{6}x = 1$. Then solve.*
 - ii. *Note the extra unnecessary information about the size of the hole.*
 - c. Distance problems. The site algebra2go has notes with examples.
 - d. Mixture problems like workbook problem #24 on page 93.
2. A Google search for any of these will give you many links for examples and practice. Also, the website kutasoftware has practice problems for each type.

Worksheet 29.1 Work Problems

Solve each question. Round your answer to the nearest hundredth.

- 1) Working alone, Ryan can dig a 10 ft by 10 ft hole in five hours. Castel can dig the same hole in six hours. How long would it take them if they worked together?
- 2) Shawna can pour a large concrete driveway in six hours. Dan can pour the same driveway in seven hours. Find how long it would take them if they worked together.
- 3) It takes Trevon ten hours to clean an attic. Cody can clean the same attic in seven hours. Find how long it would take them if they worked together.
- 4) Working alone, Carlos can oil the lanes in a bowling alley in five hours. Jenny can oil the same lanes in nine hours. If they worked together how long would it take them?
- 5) Working together, Paul and Daniel can pick forty bushels of apples in 4.95 hours. Had he done it alone it would have taken Daniel 9 hours. Find how long it would take Paul to do it alone.
- 6) Working together, Jenny and Natalie can mop a warehouse in 5.14 hours. Had she done it alone it would have taken Natalie 12 hours. How long would it take Jenny to do it alone?

Worksheet 29.1 Work Problems Answers

Solve each question. Round your answer to the nearest hundredth.

- 1) Working alone, Ryan can dig a 10 ft by 10 ft hole in five hours. Castel can dig the same hole in six hours. How long would it take them if they worked together?

2.73 hours

- 2) Shawna can pour a large concrete driveway in six hours. Dan can pour the same driveway in seven hours. Find how long it would take them if they worked together.

3.23 hours

- 3) It takes Trevon ten hours to clean an attic. Cody can clean the same attic in seven hours. Find how long it would take them if they worked together.

4.12 hours

- 4) Working alone, Carlos can oil the lanes in a bowling alley in five hours. Jenny can oil the same lanes in nine hours. If they worked together how long would it take them?

3.21 hours

- 5) Working together, Paul and Daniel can pick forty bushels of apples in 4.95 hours. Had he done it alone it would have taken Daniel 9 hours. Find how long it would take Paul to do it alone.

11 hours

- 6) Working together, Jenny and Natalie can mop a warehouse in 5.14 hours. Had she done it alone it would have taken Natalie 12 hours. How long would it take Jenny to do it alone?

8.99 hours