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Simplifying rational algebraic expressions worksheet

Mathworksheetsgo.com is now a part of Mathwarehouse.com. All of your worksheets are now here on Mathwarehouse.com. Please update your bookmarks! Students will practice simplifying rational expressions. II. Directions: Simplify the rational expressions Error : Please Click on "Not a robot", then try downloading again. This is a 4 part worksheet: Part I Model Problems Part II Practice Part III Challenge Problems Part IV Answer Key Error : Please Click on "Not a robot", then try downloading again. This page contains 95+ exclusive printable worksheets on simplifying algebraic expressions covering the topics like algebra/simplifying-expressionss like simplifying linear, polynomial and rational expressions, simplify the expressions containing positive and negative exponents, express the area and perimeter of rectangles in algebraic expressions, factorize the expressions and then simplify and much more. Recommended for students of 6th grade, 7th grade, 8th grade, and high school students. Access our free simplifying algebraic expressions worksheets with just a single click! Missing Terms Determine the missing term in the first section. Find the value of the missing variable in the next section. Area and Perimeter of a Rectangle The dimensions of the rectangles are expressed in algebraic expressions. Use relevant formulae to determine the area and perimeter of the rectangles. By the end of this section, you will be able to: Determine the values for which a rational expression is undefined Simplify rational expressions Multiply rational expressions Divide rational expressions Multiply and divide rational functions Before you get started, take this readiness quiz. Simplify: If you missed this problem, review (Figure). Multiply: If you missed this problem, review (Figure). Divide: If you missed this problem, review (Figure). We previously reviewed the properties of fractions and their operations. We introduced rational numbers, which are just fractions where the numerators and denominators are integers. In this chapter, we will work with fractions whose numerators and denominators are polynomials. We call this kind of expression a rational expression. Rational Expression A rational expression is an expression of the form where p and q are polynomials and Here are some examples of rational expressions: Notice that the first rational expression listed above, , is just a fraction. Since a constant is a polynomial with degree zero, the ratio of two constants is a rational expression, provided the denominator is not zero. We will do the same operations with rational expressions that we did with fractions. We will simplify, add, subtract, multiply, divide and use them in applications. If the denominator is zero, the rational expression is undefined. The numerator of a rational expression may be 0—but not the denominator. When we work with a numerical fraction, it is easy to avoid dividing by zero because we can see the number in the denominator. In order to avoid dividing by zero in a rational expression, we must not allow values of the variable that will make the denominator be zero. So before we begin any operation with a rational expression, we examine it first to find the values that would make the denominator zero. That way, when we solve a rational equation for example, we will know whether the algebraic solutions we find are allowed or not. Determine the values for which a rational expression is undefined. Set the denominator equal to zero. Solve the equation. Determine the value for which each rational expression is undefined: The expression will be undefined when the denominator is zero. Determine the value for which each rational expression is undefined. Determine the value for which each rational expression is undefined. A fraction is considered simplified if there are no common factors, other than 1, in its numerator and denominator. Similarly, a simplified rational expression has no common factors, other than 1, in its numerator and denominator. Simplified Rational Expression A rational expression is considered simplified if there are no common factors in its numerator and denominator. For example, We use the Equivalent Fractions Property to simplify numerical fractions. We restate it here as we will also use it to simplify rational expressions. Equivalent Fractions Property If a, b, and c are numbers where Notice that in the Equivalent Fractions Property, the values that would make the denominators zero are specifically disallowed. We see clearly stated. To simplify rational expressions, we first write the numerator and denominator in factored form. Then we remove the common factors using the Equivalent Fractions Property. Be very careful as you remove common factors. Factors are multiplied to make a product. You can remove a factor from a product. You cannot remove a term from a sum. Removing the x's from would be like cancelling the 2's in the fraction How to Simplify a Rational Expression Simplify: . Simplify: Simplify: We now summarize the steps you should follow to simplify rational expressions. Simplify a rational expression. Factor the numerator and denominator completely. Simplify by dividing out common factors. Usually, we leave the simplified rational expression in factored form. This way, it is easy to check that we have removed all the common factors. We'll use the methods we have learned to factor the polynomials in the numerators and denominators in the following examples. Every time we write a rational expression, we should make a statement disallowing values that would make a denominator zero. However, to let us focus on the work at hand, we will omit writing it in the examples. Simplify: . Simplify: . Simplify: . Now we will see how to simplify a rational expression whose numerator and denominator have opposite factors. We previously introduced opposite notation: the opposite of a is and The numerical fraction, say simplifies to . We also recognize that the numerator and denominator are opposites. The fraction , whose numerator and denominator are opposites also simplifies to . This tells us that is the opposite of In general, we could write the opposite of as So the rational expression simplifies to Opposites in a Rational Expression The opposite of is An expression and its opposite divide to We will use this property to simplify rational expressions that contain opposites in their numerators and denominators. Be careful not to treat and as opposites. Recall that in addition, order doesn't matter so . So if , then Simplify: Factor the numerator and the denominator. Recognize the factors that are opposites. Simplify. Simplify: Simplify: To multiply rational expressions, we do just what we did with numerical fractions. We multiply the numerators and multiply the denominators. Then, if there are any common factors, we remove them to simplify the result. Multiplication of Rational Expressions If p, q, r, and s are polynomials where then To multiply rational expressions, multiply the numerators and multiply the denominators. Remember, throughout this chapter, we will assume that all numerical values that would make the denominator be zero are excluded. We will not write the restrictions for each rational expression, but keep in mind that the denominator can never be zero. So in this next example, and How to Multiply Rational Expressions Simplify: Simplify: Simplify: Multiply rational expressions. Factor each numerator and denominator completely. Multiply the numerators and denominators. Simplify by dividing out common factors. Multiply: Simplify: Simplify: Just like we did for numerical fractions, to divide rational expressions, we multiply the first fraction by the reciprocal of the second. Division of Rational Expressions If p, q, r, and s are polynomials where then To divide rational expressions, multiply the first fraction by the reciprocal of the second. Once we rewrite the division as multiplication of the first expression by the reciprocal of the second, we then factor everything and look for common factors. How to Divide Rational Expressions Divide: Simplify: Simplify: Divide rational expressions. Rewrite the division as the product of the first rational expression and the reciprocal of the second. Factor the numerators and denominators completely. Multiply the numerators and denominators together. Simplify by dividing out common factors. Recall from Use the Language of Algebra that a complex fraction is a fraction that contains a fraction in the numerator, the denominator or both. Also, remember a fraction bar means division. A complex fraction is another way of writing division of two fractions. Divide: Simplify: Simplify: If we have more than two rational expressions to work with, we still follow the same procedure. The first step will be to rewrite any division as multiplication by the reciprocal. Then, we factor and multiply. Perform the indicated operations: Rewrite the division as multiplication by the reciprocal. Factor the numerators and the denominators. Multiply the fractions. Bringing the constants to the front will help when removing common factors. Simplify by dividing out common factors. Simplify. Perform the indicated operations: Perform the indicated operations: We started this section stating that a rational expression is an expression of the form where p and q are polynomials and Similarly, we define a rational function as a function of the form where and are polynomial functions and is not zero. Rational Function A rational function is a function of the form where and are polynomial functions and is not zero. The domain of a rational function is all real numbers except for those values that would cause division by zero. We must eliminate any values that make Determine the domain of a rational function. Set the denominator equal to zero. Solve the equation. The domain is all real numbers excluding the values found in Step 2. Find the domain of The domain will be all real numbers except those values that make the denominator zero. We will set the denominator equal to zero , solve that equation, and then exclude those values from the domain. Find the domain of The domain of is all real numbers where and Find the domain of The domain of is all real numbers where and To multiply rational functions, we multiply the resulting rational expressions on the right side of the equation using the same techniques we used to multiply rational expressions. Find where and Find where and Find where and To divide rational functions, we divide the resulting rational expressions on the right side of the equation using the same techniques we used to divide rational expressions. Find where and Find where and Find where and Key Concepts Determine the values for which a rational expression is undefined. Set the denominator equal to zero. Solve the equation. Equivalent Fractions Property If a, b, and c are numbers where then and How to simplify a rational expression. Factor the numerator and denominator completely. Simplify by dividing out common factors. Opposites in a Rational Expression The opposite of is An expression and its opposite divide to Multiplication of Rational Expressions If p, q, r, and s are polynomials where then How to multiply rational expressions. Factor each numerator and denominator completely. Multiply the numerators and denominators. Simplify by dividing out common factors. Division of Rational Expressions If p, q, r, and s are polynomials where then How to divide rational expressions. Rewrite the division as the product of the first rational expression and the reciprocal of the second. Factor the numerators and denominators completely. Multiply the numerators and denominators together. Simplify by dividing out common factors. How to determine the domain of a rational function. Set the denominator equal to zero. Solve the equation. The domain is all real numbers excluding the values found in Step 2. Determine the Values for Which a Rational Expression is Undefined In the following exercises, determine the values for which the rational expression is undefined. Simplify Rational Expressions In the following exercises, simplify each rational expression. Multiply Rational Expressions In the following exercises, multiply the rational expressions. Divide Rational Expressions In the following exercises, divide the rational expressions. For the following exercises, perform the indicated operations. Multiply and Divide Rational Functions In the following exercises, find the domain of each function. and and For the following exercises, find where and are given. For the following exercises, find where and are given. Explain how you find the values of x for which the rational expression is undefined. Explain all the steps you take to simplify the rational expression Multiply and explain all your steps. Multiply and explain all your steps. Evaluate your answer to part when . Did you get the same answer you got in part ? Why or why not? Divide and explain all your steps. Divide and explain all your steps. Evaluate your answer to part when Did you get the same answer you got in part ? Why or why not? After completing the exercises, use this checklist to evaluate your mastery of the objectives of this section. If most of your checks were: …confidently. Congratulations! You have achieved your goals in this section! Reflect on the study skills you used so that you can continue to use them. What did you do to become confident of your ability to do these things? Be specific! …with some help. This must be addressed quickly as topics you do not master become potholes in your road to success. Math is sequential – every topic builds upon previous work. It is important to make sure you have a strong foundation before you move on. Who can you ask for help? Your fellow classmates and instructor are good resources. Is there a place on campus where math tutors are available? Can your study skills be improved? …no – I don't get it! This is critical and you must not ignore it. You need to get help immediately or you will quickly be overwhelmed. See your instructor as soon as possible to discuss your situation. Together you can come up with a plan to get you the help you need. rational expression A rational expression is an expression of the form where p and q are polynomials and simplified rational expression A simplified rational expression has no common factors, other than 1, in its numerator and denominator. rational function A rational function is a function of the form where and are polynomial functions and is not zero. A fraction with polynomials as the numerator and denominator is known as a rational expression. Never can the denominator of a rational expression be zero. In other words, an algebraic expression that can be represented as the ratio of two polynomial expressions is what is meant by the term "rational expression." It is important to remove the common factors from the numerator and denominator of a rational expression, as well as to identify the factor's GCF, in order to simplify it. If you are struggling with problems of simplifying rational expressions, please don't be worried. On this website, we have prepared numerous simplifying rational expressions worksheets for extra practice. These number worksheets will give students a chance to practice a variety of problems and activities to help students dive deeper into the topic. If you're seeking a way to reteach and offer further help when it comes to this topic, try our simplifying rational expressions worksheets now. We're sure that it would be an excellent reinforcement resource. Mathworksheetsgo.com is now a part of Mathwarehouse.com. All of your worksheets are now here on Mathwarehouse.com. Please update your bookmarks! Enjoy these free printable sheets focusing on rational expressions, typically covered unit in Algebra 2. Each worksheet has model problems worked out step by step, practice problems, as well as challenge questions at the sheets end. Plus each one comes with an answer key. 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