Adding and subtracting rational algebraic expressions worksheet with answers

Adding and subtracting rational expressions is similar to adding and subtracting fractions. Remember that if the denominator is the same, we can add or subtract the counters and write the result by common denominator. When working with rational expressions, the common denocator will be polynome. In general, given the polynomial P, Q and R, where Q≠0, we have the following: In this section let's say that all the variables in the denomination are not zero. Example 1: Add: 3y+7y. Workaround: Add numerator 3 and 7 and type the result by common de assent, y. Answer: 10y Example 2: Subtract: x−52x−1−12x−1. Workaround: Deselect the meters x-5 and 1 and type the result by common de nosing 2x−1. Answer: example 3: x−62x−1: Subtraction: 2x+7 (x+5)(x−3)−x+10(x+5)(x−3). Solution: We use parentheses to remind us to take away the entire meter second rational expression. Answer: 1x+5 Example 4: Simple: 2x2+10x+3x2−36−x2+6x+5x2−36+x−4x2−36. Workaround: Take away and add counters. Use parentheses and write the result over the common de nosing x2-36. Answer: x−1x−6 Try this! Subtracts: x2+12x2−7x−4−x2−2x2x2-7x−4. Answer: 1x−4 To add rational expressions with disemnity denominator, first find equivalent expressions with common denominator. Do it just as you are with the factions. If the denominator of the fractions is relatively prime, then the least common denominator (LCD) is their product. For example, multiply each fraction with a suitable 1 shape to obtain equivalent fractions with a common de ass. The process of adding and subtraction rational expressions is similar. In general, given the polynomial P, Q, R and S, where Q≠0 and S≠0, we have the following: In this section let's say that all the variables in the denomination are not zero. Example 5: Add: 1x+1y. Workaround: In this example, LCD = xy. To obtain equivalent terms with this common denocry, multiply the first term by yy and second term by xx. Answer: y + xxy Example 6: Subtract: 1y−1y−3. Solution: Since LCD =y(y−3), multiplies the first term by 1 form (y−3) (y−3) and the second term with yy. Answer: −3y(y−3) It is not always the case that lcd is a product based on denominator. Typically, the denominator is not relatively prime; thus setting the LCD requires some thought. First start with factoring of all denominator. LCD is the product of all factors with the highest power. For example, given that the denomina has three base factors: x, (x + 2) and (x−3). The highest powers of these factors are x3, (x+2)2 and (x−3)1. Therefore, the general steps for adding or debasing rational expressions are shown in the following example. Example 7: Subtraction: xx2+4x+3−3x2−4x−5. Solution: Step 1: Factor for all denominator to determine LCD is (x + 1) (x + 3) (x−5). Step 2: Multiplied by the relevant factors to obtain equivalent terms with the common denocator. To do this, multiply the first term by (x−5) (x-5) and the second term with (x+3) (x+3). Step 3: Add or subtract the counters and place the result over the common de nosing. Step 4: Simplify the resulting algebraic fraction. Answer: (x−9) (x + 3) (x−5) Example 8: Subtract: x2−9x + 18x2−13x + 36−xx−4. Solution: The best thing is not to factor in the meter, x2−9x +18, because we most likely need to simplify after we take away. Answer: 18 (x−4) (x−9) Example 9: Subtract: 1x2−4−12−x. Solution: First, factor the denominator and fix the LCD. Pay attention to the way the opposite binomial property is applied to get more employable authors. LCD is (x + 2) (x−2). Multiplies the second term by 1 form (x +2) (x + 2). Now that we have equivalent terms with common de ass de ass, add counters and write the result by common de nosing. Answer: x+3(x+2)(x−2) Example 10: Simplify: y−1y+1−y-1y−1y−1+y2−5y2−1. Solution: First factoring denominator. We can see that the LCD is (y + 1) (y−1). Find equivalent fractions with this denominator. Then take away and add the counters and place the result over the common demator. Complete by simplifying the resulting rational expression. Answer: y−5y−1 Try this! Simplify: −2x2−1+x1+x−51−x. Answer: x+3x−1 Lean expressions are sometimes expressed by using negative exponents. In this case, the rules on negative exponents apply before you simplify the expression. Example 11: Simplify: y−2+(y−1)−1. Solution: Remember that x−n=1xn. We begin by overwriting the negative exponent as rational expressions. Answer: y2 + y−1y2 (y−1) We can simplify the amount or differences of rational functions using the methods learned in this section. Result constraints consist of domain restrictions for each function. Example 12: Calculate (f+g)(x) based on f(x)=1x+3 and g(x)=1x−2, and specify the limits. Workaround: Here f domain consists of all real numbers except -3, and g domain consists of all real numbers except 2. Therefore, the f + g domain consists of all real numbers except -3 and 2. Answer: 2x+1(x+3)(x−2), where x≠−3, example 13: calculate (f-g)(x), taking into account f(x)=x(x−1)x2−25 and g(x)=x−3x−5, and specify domain restrictions. Workaround: (f) the domain consists of all real numbers except 5 and -5, and the g domain consists of all real numbers except 5. Therefore, the f − g domain consists of all the real numbers except -5 and 5. Answer: −3x+5, where x≠±5 Key Takeaways Adding or subtracting rational expressions with common de assent, add or subtract the expressions in the counter and write the result by common de nosing. To find rational expressions with the common denominator, the first factor for all denominator and determine the least common divisible. Then multiply the counter and denominator of each term by an appropriate factor to obtain the common denominator. Finally, count or deselect the expressions in the counter, and type the result by common de nosing. Restrictions on the amount of rational functions or differences in domains include domain restrictions for each function. Part A: Adding and subtracting the simplification of the common de ass. (Let's say that all denominator is not zero.) 1. 3x+7x 2. 9x−10x 3. xy−3y 4. 4x−3+6x−3 5. 72x−1−x2x−1 6. 83x−8−3x3x−8 7. 2x−9+x−11x−9 8. y+22y+3−y+32y+3 9. 2x−34x−1−x−44x−1 10. 2xx−1−3x+4x−1+x−2x−1 11. 13y−2y−93y−13−5y3y 12. -3y+25y−10+y+75y−10−3y+45y−10 13. x(x+1)(x−3)−3(x+1)(x−3) 14. 3x+5(2x−1)(x−6)−x+6(2x−1)(x−6) 15. xx2−36+6x2−36 16. xx2−81−9x2−81 17. x2+2x2+3x−28+x−22x2+3x−28 18. x2x2−x−3−3−x2x2−x−3 B daļa : Addition and subtraction with Unlike Denominator Simplify. (Let's say that all denominator is not zero.) 19. 12 +13x 20. 15x2−1x 21. 112y2+310y3 22. 1x−12y 23. 1y−2 24. 3y+2−4 25. 2x+2 26. 2y−1y2 27. 3x+1+1x 28. 1x−1−2x 29. 1x−3+1x+5 30. 1x+2−1x−3 31. xx+1−2x−2 32. 2x−3x+5−xx−3 333. y+1y−1+y−1y+1 34. 3y−13y−y+4y−2 35. 2x−52x+5−2x+52x−5 36. 22x−1−2x+11−2x 37. 3x+4x−8−28−x 38. 1y−1+11−y 39. 2x2x2−9+x+159−x2 40. xx+3+1x−3−15−x(x+3)(x−3) 41. 2x3x−1−13x+1+2(x−1)(3x−1)(3x+1) 42. 4x2x+1−xx−5+16x−3(2x+1)(x−5) 43. x3x+2x−2+43x(x−2) 44. -2xx+6−3x6−x−18(x−2)(x+6)(x−6) 45. xx+5−1x−7−25−7x(x+5)(x−7) 46. xx2−2x−3+2x−3 47. 1x+5−x2x2−25 48. 5x−2x2−4−2x−2 49. 1x+1−6x−3x2−7x−8 50. 3x9x2−16−13x+4 51. 2xx2−1+1x2+x 52. x(4x−1)2x2+7x−4−x4+x 53. 3x23x2+5x−2−2x3x−1 54. 2xx−4−11x+4x2−2x−8 55. x2x+1+6x−242x2−7x−4 56. 1x2−x−6+1x2−3x−10 57. xx2+4x+3−3x2−4x−5 58. y+12y2+5y−3−y4y2−1 59. y−1y2−25−2y2−10y+25 60. 3x2+24x2−2x−8−12x−4 61. 4x2+28x2−6x−7−28x−7 62. a4−a+ a2−9a+18a2−13a+36 63. 3a−12a2−8a+16−a+24−a 64. a2−142a2−7a−4−51+2a 65. 1x+3−xx2−6x+9+3x2−9 66. 3xx+7−2xx−2+23x−10x2+5x−14 67. x+3x−1+x−1x+2−x(x+11)x2+x−2 68. -2x3x+1−4x−2+4(x+5)3x2−5x−2 69. x−14x−1−x+32x+3−3(x+5)8x2+10x−3 70. 3x2x-3−22x+3−6x2−5x−94x2−9 71. 1y+1+1y+2y2−1 72. 1y−1y+1+1y−1 73. 5−2+2−1 74. 6−1+4−2 75. x−1+y−1 76. x−2−y−1 77. (2x−1)−1−x−2 78. (x−4)−1−(x+1)−1 79. 3x2(x−1)−1−2x 80. 2(y−1)−2−(y−1)−1 Part C: Rational addition and subtraction of functions Calculate (f+g)(x) and (f−g)(x) and specify domain restrictions. 81. f(x)=13x 81f (x) = 13x g(x)=1x−2 82f(x)=1x−1 and g(x)=1x+5 83f(x)=xx−4 and g(x)=14−x 84. f(x)=xx−5 and g(x)=12x−3 85f(x)=x−1x2−4 and g(x)=4x2−6x−16 86.f(x)=5x+2 and g(x)=3x+4 87. f (x) = 1x 88. f(x) = 12x 89f(x)=x2x−1 90. f(x)=1x+2 Part D: Discussion board 91. Explain to your classmate why this is not right: 1x2+2x2=32x2. 92. Explain to your classmate how to find the common de assent by adding algebraic expressions. Give an example. 1: 10x 3: x−3y 5: 7−x2x−1 7: 1 9: x+14x−1 11: y−1y 13: 13: 1 x+1 15: 1x−6 17: x+5x+7 19: 3x+26x 21: 5y+1860y3 23: 1x +15x 21: 5y+1860y3 23: 1 −2yy 25: 2(x+5)x+4 27: 4x+1x(x+1) 29: 2(x+1)(x−3)(x+1) 29: 2 (x+1) (x−3) (x+ 31) 31: x2−4x−2(x−2)(x+1) 33: 2(y2+1)(y+1)(y−1) 35 − 40x(2x+5)(2x−5) 37: 3(x+2) x−8 39: 2x+5x+3 41: 2x+13x+1 43: x2 +4x+43x(x−2) 45: x−6x−7 47: −x2+x−5(x+5) (x−5) 49: −5x−x 8 51: 2x−1x(x−1) 53: x(x−4)(x+2)(3x−1) 55 : x+62x+1 57: x−9(x−5)(x+3) 59: y2−8y−5(y+5)(y−5)2 61: 4xx+1 63: a+5a−4 65 − 6x(x+3)(x−3)2 67: x−7x+2 69 −: x−54x−1 71: 2y−1y(y−1) 73: 2750 75: x+yxy 77: (x−1)1 2x2(2x−1) 79: x(x+2)x−1 81: (f+g) (x) =2(2x−1)3x(x−2); (f−g) (f−g) (x)=−2(x+1)3x(x−2); x≠0, 2 83: (f+g)(x)=x−1x−4; (f−g) (f−g) (x)=x+1x−4; x≠4 85: (f+g)(x)=x(x−5)(x+2)(x−2)(x−8); (f−g) (f−g) (x)=x2−13x+16(x+2)(x−2)(x−8); x≠−2, 2.8 87: (f+f)(x)=2x; x≠0 89: (f+f)(x)=2x2x−1; x≠12 x≠12