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Kuta Software - Infinite Algebra 2

Name _____

Adding/Subtracting Rational Expressions

Date _____ Period _____

Simplify each expression.

1) $\frac{u-v}{8v} + \frac{6u-3v}{8v}$ 2) $\frac{m-3n}{6m^2n} - \frac{m+3n}{6m^2n}$

3) $\frac{5}{a^2+3a+2} + \frac{5a+1}{a^2+3a+2}$ 4) $\frac{5}{10b^2+16b+6} + \frac{a-6}{10b^2+16a+6}$

5) $\frac{r+6}{3r-6} + \frac{r+1}{3r-6}$ 6) $\frac{x+2}{2x^2+13x+20} - \frac{x+3}{2x^2+13x+20}$

7) $\frac{6}{x-1} - \frac{5x}{4}$ 8) $6 - \frac{x+5}{(7x-5)(x+4)}$

9) $\frac{3}{x+7} + \frac{4}{x-8}$ 10) $\frac{3}{4v^2+4v} - \frac{7}{2}$

11) $\frac{7}{3} - \frac{8}{12x-8}$ 12) $\frac{5}{n+5} + \frac{4n}{2n+6}$

13) $\frac{2x}{5x+4} + \frac{6v}{2x+3}$ 14) $\frac{2}{3x^2+12x} + \frac{8}{2x}$

-1-

$x+3$ $x+3$. Given two rational expressions, add or subtract them. Factor the numerator and denominator. Find the LCD of the expressions. Multiply the expressions by a form of 1 that changes the denominators to the LCD. Add or subtract the numerators. Simplify. Add the rational expressions: First, we have to find the LCD. In this case, the LCD will be xy . We then multiply each expression by the appropriate form of 1 to obtain xy as the denominator for each fraction. $5x \cdot y + 6y \cdot x$ $5y \cdot xy + 6x \cdot xy$ $5x \cdot y + 6y \cdot x$ $5y \cdot xy + 6x \cdot xy$ Now that the expressions have the same denominator, we simply add the numerators to find the sum. Multiplying by y or x does not change the value of the original expression because any number divided by itself is 1, and multiplying an expression by 1 gives the original expression. Subtract the rational expressions: $6x \cdot 2 + 4x + 4 - 2x \cdot 2 - 4$ $6x \cdot 2 + 4x + 4 - 2x \cdot 2 - 4$ $6(x+2) \cdot 2 - 2(x+2)(x-2)$ Factor. $6(x+2) \cdot 2 - 2(x+2)(x-2)$ $6(x+2) \cdot 2 - 2(x+2)(x-2)$ $x+2$ $x+2$ Multiply each fraction to get LCD as denominator. Multiply. $6x-12-(2x+4)(x+2) \cdot 2(x-2)$ Apply distributive property. $4x-16(x+2) \cdot 2(x-2)$ Subtract. $4(x-4)(x+2) \cdot 2(x-2)$ Simplify. $6(x+2) \cdot 2 - 2(x+2)(x-2)$ Factor. $6(x+2) \cdot 2 - 2(x+2)(x-2)$ $x+2$ $x+2$ Multiply each fraction to get LCD as denominator. $6(x-2)(x+2) \cdot 2(x-2) - 2(x+2)(x+2) \cdot 2(x-2)$ Apply distributive property. $4x-16(x+2) \cdot 2(x-2)$ Subtract. $4(x-4)(x+2) \cdot 2(x-2)$ Simplify. Do we have to use the LCD to add or subtract rational expressions? No. Any common denominator will work, but it is easiest to use the LCD. Subtract the rational expressions: $3x+5 - 1x-3$ $3x+5 - 1x-3$ $3x+5 - 1x-3$. A complex rational expression is a rational expression that contains additional rational expressions in the numerator, the denominator, or both.

We can simplify complex rational expressions by rewriting the numerator and denominator as single rational expressions and dividing. The complex rational expression $\frac{1}{b+c} + \frac{1}{b+c}$ can be simplified by rewriting the numerator as the fraction $\frac{1}{1}$ and combining the expressions in the denominator as $\frac{1}{b+c}$. $\frac{1}{b+c} + \frac{1}{b+c}$. Given a complex rational expression, simplify it. Combine the expressions in the numerator into a single rational expression by adding or subtracting. Combine the expressions in the denominator into a single rational expression by adding or subtracting. Rewrite as the numerator divided by the denominator. Rewrite as multiplication. Multiply. Simplify. $xy + 1 \cdot x \cdot y + 1 \cdot x \cdot y$. Begin by combining the expressions in the numerator into one expression. $y \cdot x + 1 \cdot x$ Multiply by x to get LCD as denominator. $xy + 1 \cdot x \cdot xy + 1 \cdot x$ Add numerators. $y \cdot x + 1 \cdot x$ Multiply by x to get LCD as denominator. $xy + 1 \cdot x \cdot xy + 1 \cdot x$ Add numerators. Now the numerator is a single rational expression and the denominator is a single rational expression. We can rewrite this as division, and then multiplication. $xy + 1 \cdot x \cdot xy + 1 \cdot x \cdot y$ Rewrite as multiplication. $y(xy+1) \cdot x \cdot 2$ Multiply. $xy + 1 \cdot x \cdot xy + 1 \cdot x \cdot y$ Rewrite as multiplication. $y(xy+1) \cdot x \cdot 2$ Multiply. Simplify: $x \cdot y - y \cdot x \cdot y \cdot y - y \cdot x \cdot y$ Can a complex rational expression always be simplified? Yes.

We can always rewrite a complex rational expression as a simplified rational expression. 1.6 Section Exercises 1. How can you use factoring to simplify rational expressions? 2. How do you use the LCD to combine two rational expressions? 3. Tell whether the following statement is true or false and explain why: You only need to find the LCD when adding or subtracting rational expressions. For the following exercises, simplify the rational expressions. 4. $x^2 - 16x + 2 - 5x + 4x^2 - 16x + 2 - 5x + 4$ 5. $y^2 + 10y + 25$ 6. $2 + 11y + 30$ 7. $2 + 10y + 25$ 8. $6a^2 - 24a + 24$ 9. $2 - 24a + 24$ 10. $2 - 24a + 24$ 11. $2 - 24a + 24$ 12. $2 - 24a + 24$ 13. $12n^2 - 29n - 8$ 14. $2 - 29n - 8$ 15. $2 - 29n - 8$ 16. $2 - 29n - 8$ 17. $2 - 29n - 8$ 18. $2 - 29n - 8$ 19. $2 - 29n - 8$ 20. $2 - 29n - 8$ 21. $2 - 29n - 8$ 22. $2 - 29n - 8$ 23. $2 - 29n - 8$ 24. $2 - 29n - 8$ 25. $2 - 29n - 8$ 26. $2 - 29n - 8$ 27. $2 - 29n - 8$ 28. $2 - 29n - 8$ 29. $2 - 29n - 8$ 30. $2 - 29n - 8$ 31. $2 - 29n - 8$ 32. $2 - 29n - 8$ 33. $2 - 29n - 8$ 34. $2 - 29n - 8$ 35. $2 - 29n - 8$ 36. $2 - 29n - 8$ 37. $2 - 29n - 8$ 38. $2 - 29n - 8$ 39. $2 - 29n - 8$ 40. $2 - 29n - 8$ 41. $2 - 29n - 8$ 42. $2 - 29n - 8$ 43. $2 - 29n - 8$ 44. $2 - 29n - 8$ 45. $2 - 29n - 8$ 46. $2 - 29n - 8$ 47. $2 - 29n - 8$ 48. $2 - 29n - 8$ 49. $2 - 29n - 8$ 50. $2 - 29n - 8$ 51. $2 - 29n - 8$ 52. $2 - 29n - 8$ 53. $2 - 29n - 8$ 54. $2 - 29n - 8$ 55. $2 - 29n - 8$ 56. $2 - 29n - 8$ 57. $2 - 29n - 8$ 58. $2 - 29n - 8$ 59. $2 - 29n - 8$ 60. $2 - 29n - 8$ 61. $2 - 29n - 8$ 62. $2 - 29n - 8$ 63. $2 - 29n - 8$ 64. $2 - 29n - 8$ 65. $2 - 29n - 8$ 66. $2 - 29n - 8$ 67. $2 - 29n - 8$ 68. $2 - 29n - 8$ 69. $2 - 29n - 8$ 70. $2 - 29n - 8$ 71. $2 - 29n - 8$ 72. $2 - 29n - 8$ 73. $2 - 29n - 8$ 74. $2 - 29n - 8$ 75. $2 - 29n - 8$ 76. $2 - 29n - 8$ 77. $2 - 29n - 8$ 78. $2 - 29n - 8$ 79. $2 - 29n - 8$ 80. $2 - 29n - 8$ 81. $2 - 29n - 8$ 82. $2 - 29n - 8$ 83. $2 - 29n - 8$ 84. $2 - 29n - 8$ 85. $2 - 29n - 8$ 86. $2 - 29n - 8$ 87. $2 - 29n - 8$ 88. $2 - 29n - 8$ 89. $2 - 29n - 8$ 90. $2 - 29n - 8$ 91. $2 - 29n - 8$ 92. $2 - 29n - 8$ 93. $2 - 29n - 8$ 94. $2 - 29n - 8$ 95. $2 - 29n - 8$ 96. $2 - 29n - 8$ 97. $2 - 29n - 8$ 98. $2 - 29n - 8$ 99. $2 - 29n - 8$ 100. $2 - 29n - 8$