

Solution

The denominator on the right is already factored and we see that we need to multiply by

$1 = \frac{x(x-1)}{x(x-1)}$ to get the equivalent expression with the desired denominator.

$$\frac{2x}{x^2-9} = \frac{2x}{(x+3)(x-3)} \cdot \frac{x(x-1)}{x(x-1)} = \frac{2x^2(x-1)}{x(x+3)(x-3)(x-1)}$$

Now work margin exercise 7.**Margin Exercise Answers**

1. 200 2. $\frac{5}{6}$ 3. $\frac{21}{20}$ 4. $5(x^2-9)$ 5. $4y(2y+1)^2(2y-1)$ 6. $-6x$ 7. $9x^2(x+3)$

8.3 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

- The least common multiple (LCM) of two or more whole numbers is the _____ number that is a multiple of each of these numbers.
- If two or more fractions have the same denominator, add the numerators and _____ the denominator.
- When finding the LCM, the first step is to find the _____ of each number.
- To find a rational expression equivalent to a given rational expression $\frac{P}{Q}$, choose R so that $Q \cdot R$ is the desired _____.
- When adding fractions with different denominators, you need to change each fraction into a/an _____ fraction with the denominator equal to the LCD of the fractions.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

- When adding fractions with different denominators, add the denominators.
- The fraction $\frac{R}{R}$ is equivalent to 1.
- The least common denominator (LCD) is the least common multiple of the denominators.
- When finding the LCM of a set of polynomials, you only find the factors of any numerical terms.

Practice

Find the least common multiple (LCM) of each set of numbers. See Example 1.

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|---------------|----------------------|
| 1. 15, 25, 30 | 5. 20, 30, 40, 50 |
| 2. 18, 21, 63 | 6. 44, 55, 121 |
| 3. 16, 24, 27 | 7. 5, 10, 15, 20, 30 |
| 4. 35, 45, 63 | 8. 24, 36, 48, 54 |

Find the indicated sums and reduce, if possible. See Examples 2 and 3.

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|---|---|
| 9. $\frac{5}{17} + \frac{6}{17}$ | 14. $\frac{7}{10} + \frac{1}{5} + \frac{3}{10}$ |
| 10. $\frac{3}{25} + \frac{7}{25}$ | 15. $\frac{1}{2} + \frac{1}{10} + \frac{1}{6}$ |
| 11. $\frac{5}{8} + \frac{7}{8}$ | 16. $\frac{2}{15} + \frac{7}{15} + \frac{2}{45} + \frac{1}{30}$ |
| 12. $\frac{5}{6} + \frac{5}{6} + \frac{1}{6}$ | 17. $\frac{11}{18} + \frac{13}{54} + \frac{5}{27}$ |
| 13. $\frac{1}{2} + \frac{7}{10}$ | 18. $\frac{3}{4} + \frac{9}{10} + \frac{7}{20} + \frac{1}{2}$ |

Find the least common multiple (LCM) of each set of polynomials. See Examples 4 and 5.

- | | |
|--|---|
| 19. $x^2 - 25$, $7x + 35$ | 29. $x^2 + x - 12$, $x^2 + 9x + 20$ |
| 20. $x^2 - 14x + 49$, $9x - 63$ | 30. $x^2 - 3x + 2$, $x^2 - 7x + 6$ |
| 21. $6y - 24$, $3y - 12$, $5y - 20$ | 31. $x^2 + 5x - 14$, $xy - 2y + 3x - 6$ |
| 22. $20y + 32$, $15y + 24$, $45y + 72$ | 32. $y^2 + 4y + 3$, $xy + 3x - 5y - 15$ |
| 23. $x^2 - 9$, $x^2 - 6x + 9$ | 33. $2x^2 - 72$, $x^2 + 9x + 18$ |
| 24. $2x^2 - 50$, $x^2 - 10x + 25$ | 34. $5x^2 + 5x - 30$, $3x^2 - 9x + 6$ |
| 25. $y - 3$, $3 - y$ | 35. $2xy - 10y + 12x - 60$,
$3y^2 + 21y + 18$ |
| 26. $22 - x$, $x - 22$ | 36. $8x^2 - 8y^2$, $x^2 - xy + 3x - 3y$ |
| 27. $x^2 - 144$, $24 - 2x$ | 37. $x^2 - 4$, $x^3 - 2x^2 + 4x - 8$ |
| 28. $30 - 3y$, $y^2 - 20y + 100$ | 38. $x^2 - 25$, $x^3 - 5x^2 + x - 5$ |

Write a rational expression on the right equivalent to the given rational expression on the left. See Examples 6 and 7.

$$39. \frac{7}{2x+3} = \frac{?}{4(2x+3)}$$

$$40. \frac{2x}{x^2-4x} = \frac{?}{2x^2(x-4)}$$

$$41. \frac{11}{2x+6} = \frac{?}{6(x+3)(x-3)}$$

$$42. \frac{5}{7(x-10)} = \frac{?}{35(x-10)(x+10)}$$

$$43. \frac{3x}{4-x} = \frac{?}{x(x-4)}$$

$$44. \frac{4}{5x-x^2} = \frac{?}{x(x-5)(x+5)}$$

$$45. \frac{y-1}{y^2+5y} = \frac{?}{2y(y+3)(y+5)}$$

$$46. \frac{x+3}{2x^2-x-1} = \frac{?}{(2x+1)(x-1)(3x-2)}$$

$$47. \frac{x+1}{x^2+1} = \frac{?}{(x^2+1)(x+3)}$$

$$48. \frac{x+5}{x^2+6} = \frac{?}{(x^2+6)(x-5)}$$