

**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.  $9x^2(x+3)$

## 12.3 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.

- |               |                      |
|---------------|----------------------|
| 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. $2xy - 10y + 12x - 60$ ,<br>$3y^2 + 21y + 18$ |
| 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.

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