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

14.3 Exercises

Concept Check

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

1. The least common multiple (LCM) of two or more whole numbers is the _____ number that is a multiple of each of these numbers.

2. If two or more fractions have the same denominator, add the numerators and _____ the denominator.

3. When finding the LCM, the first step is to find the _____ _____ of each number.

4. To find a rational expression equivalent to a given rational expression $\frac{P}{Q}$, choose R so that $Q\cdot R$ is the desired _____.

5. 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.)

6. When adding fractions with different denominators, add the denominators.

7. The fraction $\frac{R}{R}$ is equivalent to 1.

8. The least common denominator (LCD) is the least common multiple of the denominators.

9. 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

2. 18, 21, 63

3. 16, 24, 27

4. 35, 45, 63

5. 20, 30, 40, 50

6. 44, 55, 121

7. 5, 10, 15, 20, 30

8. 24, 36, 48, 54

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

9. $\frac{5}{17}+\frac{6}{17}$

10. $\frac{3}{25}+\frac{7}{25}$

11. $\frac{5}{8}+\frac{7}{8}$

12. $\frac{5}{6}+\frac{5}{6}+\frac{1}{6}$

13. $\frac{1}{2}+\frac{7}{10}$

14. $\frac{7}{10}+\frac{1}{5}+\frac{3}{10}$

15. $\frac{1}{2}+\frac{1}{10}+\frac{1}{6}$

16. $\frac{2}{15}+\frac{7}{15}+\frac{2}{45}+\frac{1}{30}$

17. $\frac{11}{18}+\frac{13}{54}+\frac{5}{27}$

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. $x^2-25,\quad 7x+35$

20. $x^2-14x+49,\quad 9x-63$

21. $6y-24,\quad 3y-12,\quad 5y-20$

22. $20y+32,\quad 15y+24,\quad 45y+72$

23. $x^2-9,\quad x^2-6x+9$

24. $2x^2-50,\quad x^2-10x+25$

25. $y-3,\quad 3-y$

26. $22-x,\quad x-22$

27. $x^2-144,\quad 24-2x$

28. $30-3y,\quad y^2-20y+100$

29. $x^2+x-12,\quad x^2+9x+20$

30. $x^2-3x+2,\quad x^2-7x+6$

31. $x^2+5x-14,\quad xy-2y+3x-6$

32. $y^2+4y+3,\quad xy+3x-5y-15$

33. $2x^2-72,\quad x^2+9x+18$

34. $5x^2+5x-30,\quad 3x^2-9x+6$

35. $2xy-10y+12x-60,$
$3y^2+21y+18$

36. $8x^2-8y^2,\quad x^2-xy+3x-3y$

37. $x^2-4,\quad x^3-2x^2+4x-8$

38. $x^2-25,\quad x^3-5x^2+x-5$

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

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

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

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

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

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

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

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

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

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

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