Find the sum or difference.

1. $\dfrac{2}{y} + \dfrac{y+1}{y}$

2. $\dfrac{4x+1}{2x-1} - \dfrac{2x-3}{2x-1}$

LEAST COMMON DENOMINATOR The **least common denominator (LCD)** of two or more rational expressions is the product of the factors of the denominators of the rational expressions with each common factor used only once.

EXAMPLE 2 **Find the LCD of rational expressions**

Find the LCD of the rational expressions.

a. $\dfrac{1}{4r}, \dfrac{r+3}{10r^2}$

b. $\dfrac{5}{(x-3)^2}, \dfrac{3x+4}{x^2-x-6}$

c. $\dfrac{3}{c-2}, \dfrac{c+8}{2c+7}$

Solution

a. Find the least common multiple (LCM) of $4r$ and $10r^2$.

$4r = \boxed{2} \cdot 2 \cdot \boxed{r}$ ← **The common factors are circled.**

$10r^2 = \boxed{2} \cdot 5 \cdot \boxed{r} \cdot r$

AVOID ERRORS
When finding the LCD, be sure to use the common factors only once.

➤ LCM $= 2 \cdot r \cdot 2 \cdot 5 \cdot r = 20r^2$

▶ The LCD of $\dfrac{1}{4r}$ and $\dfrac{r+3}{10r^2}$ is $20r^2$.

b. Find the least common multiple (LCM) of $(x-3)^2$ and $x^2 - x - 6$.

$(x-3)^2 = \boxed{(x-3)} \cdot (x-3)$

$x^2 - x - 6 = \boxed{(x-3)} \cdot (x+2)$

LCM $= (x-3) \cdot (x-3) \cdot (x+2) = (x-3)^2(x+2)$

▶ The LCD of $\dfrac{5}{(x-3)^2}$ and $\dfrac{3x+4}{x^2-x-6}$ is $(x-3)^2(x+2)$.

c. Find the least common multiple of $c - 2$ and $2c + 7$.

Because $c - 2$ and $2c + 7$ cannot be factored, they don't have any factors in common. The least common multiple is their product, $(c-2)(2c+7)$.

▶ The LCD of $\dfrac{3}{c-2}$ and $\dfrac{c+8}{2c+7}$ is $(c-2)(2c+7)$.

✓ **GUIDED PRACTICE** for Example 2

Find the LCD of the rational expressions.

3. $\dfrac{1}{28m}, \dfrac{m+1}{7m^3}$

4. $\dfrac{2}{x^2+4x-5}, \dfrac{x^2+2}{x^2+7x+10}$

5. $\dfrac{5a}{a+3}, \dfrac{a+6}{a-4}$

DIFFERENT DENOMINATORS To add or subtract rational expressions that have different denominators, use the LCD to write equivalent rational expressions that have the same denominator just as you would for numerical fractions.