DIGITAL

NAME ______________________ DATE ______________

Module 16 Solving Rational Equations
Lesson 1 Solving Rational Equations

independent practice

Solve the following rational equations.

1. $\frac{m}{12} = \frac{1}{3}$ ______
2. $\frac{p}{9} = \frac{4}{3}$ ______
3. $\frac{4}{x} = \frac{1}{2} + \frac{3}{x}$ ______
4. $\frac{3}{a} = \frac{1}{6} + \frac{2}{a}$ ______
5. $\frac{r}{5} = \frac{3}{5} + \frac{r}{2}$ ______
6. $\frac{y}{7} + \frac{3}{4} = \frac{y}{4}$ ______
7. $\frac{2}{5s} = \frac{1}{5}$ ______
8. $\frac{4}{m} = \frac{-2}{7}$ ______
9. $\frac{2x}{3} - \frac{5}{4} = \frac{x}{2}$ ______
10. $\frac{3}{a} = \frac{1}{6a} - 2$ ______
11. $\frac{2m}{7} + \frac{3}{5} = \frac{m}{5}$ ______
12. $\frac{2}{3} - \frac{3b}{4} = \frac{2b}{6}$ ______
13. $\frac{3}{2r} - \frac{5}{4} = \frac{6}{3r}$ ______
14. $\frac{7}{2t} + \frac{3}{t} = 4$ ______
15. $\frac{4d}{d-2} - \frac{3}{d-2} = 5$ ______
16. $\frac{3g}{g+1} + \frac{2g-1}{g+1} = 3$ ______
17. $\frac{3}{x-4} + \frac{2x+1}{x-4} = 6$ ______
18. $\frac{2x}{x+3} - \frac{4x-2}{x+3} = 4$ ______
19. $\frac{4b}{b-6} - \frac{2b+1}{b-6} = 3$ ______
20. $\frac{m-6}{2m+1} + \frac{3}{2m+1} = 7$ ______

Journal

1. Michael says that the equation $\frac{1}{x} + \frac{3}{5} = \frac{1}{4}$ is solved by first subtracting $\frac{3}{5}$ from both sides of the equation. Describe another way to solve this equation.
2. Explain why the equation $\frac{2}{4x} + \frac{1}{3x} = \frac{8}{x}$ has no solution.
3. Sandeep claims that the only way to solve the equation $6x + \frac{3}{4} = \frac{1}{6}$ is to first multiply both sides of the equation by the LCD, 12. He is incorrect. Give two alternative methods to solve this equation.
4. Explain how to solve the equation $\frac{2}{x-6} + \frac{4x+1}{x-6} = 3$.

Cumulative Review

Perform the indicated operations. Assume that the domains of the rational expressions contain no value for which any denominator is zero.

1. $\frac{3y}{y-4} - \frac{7}{y-4}$ ____________________

2. $\frac{3m}{m+4} \cdot \frac{4m+16}{6}$ ____________________

3. $\frac{2n-1}{n+3} \div \frac{n-1}{6n+18}$ ____________________

4. $\frac{3b+2}{b+1} + \frac{12}{b-1}$ ____________________

5. $\frac{y^2+5y+6}{y^2-7y+12} \div \frac{2y^2+7y+3}{y^2-7y+12}$ ____________________

6. $\frac{2}{t^2} \cdot \left(\frac{t^3}{4t}\right)^2$ ____________________

Challenge

Example: Solve.

$\frac{3}{x-1} + \frac{4x}{3} = \frac{4}{x-1}$	Given
$3(x-1)\left(\frac{3}{x-1} + \frac{4x}{3}\right) = 3(x-1)\left(\frac{4}{x-1}\right)$	Multiply by the LCD
$9 + 4x(x-1) = 12$	Distributive Property
$9 + 4x^2 - 4x = 12$	Distributive Property
$4x^2 - 4x - 3 = 0$	Subtraction
$(2x+1)(2x-3) = 0$	Factor
$2x + 1 = 0$ or $2x - 3 = 0$	Solve each factor for 0
$2x = -1$ or $2x = 3$	
$x = \frac{-1}{2}$ or $x = \frac{3}{2}$	

Checking the answer of $-\frac{1}{2}$ gives

$$\frac{3}{x-1} + \frac{4x}{3} = \frac{4}{x-1}$$

$$\frac{3}{\left(-\frac{1}{2}\right)-1} + \frac{4\cdot\left(-\frac{1}{2}\right)}{3} \stackrel{?}{=} \frac{4}{\left(-\frac{1}{2}\right)-1}$$

$$3\left(-\frac{2}{3}\right) + \left(-\frac{2}{3}\right) \stackrel{?}{=} 4\left(-\frac{2}{3}\right)$$

$$-\frac{8}{3} = -\frac{8}{3}$$

Checking the answer of $\frac{3}{2}$ gives

$$\frac{3}{x-1} + \frac{4x}{3} = \frac{4}{x-1}$$

$$\frac{3}{\left(\frac{3}{2}\right)-1} + \frac{4\cdot\left(\frac{3}{2}\right)}{3} \stackrel{?}{=} \frac{4}{\left(\frac{3}{2}\right)-1}$$

$$3(2) + \frac{6}{3} \stackrel{?}{=} 4(2)$$

$$8 = 8$$

The solution set to this equation is $x = -\frac{1}{2}$ and $x = \frac{3}{2}$.

Solve.

1. $\frac{3}{x} = \frac{x}{12}$ ____________________

2. $\frac{3}{x} - 4 = \frac{4x}{3-x}$ ____________________

3. $\frac{3}{4m} + \frac{2m}{m-2} = 2$ ____________________

4. $\frac{1}{6y} + \frac{3y}{2y+4} = \frac{4}{2y+4}$ ____________________

5. $\frac{s-3}{s} + \frac{s-4}{s-6} = \frac{1}{s}$ ____________________