Name _____ Date _____ Class _____

**Practice C**
**Solving Rational Equations and Inequalities**

**Solve each equation.**

**1.** $\dfrac{12r}{r+2} = \dfrac{4}{r+2} - 6$

**2.** $\dfrac{4x}{x-4} = \dfrac{2x+8}{x-4}$

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**3.** $-\dfrac{6}{x} + 1 = \dfrac{7}{x^2}$

**4.** $\dfrac{2}{d+2} + \dfrac{8}{d-2} = \dfrac{14}{d^2-4}$

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**Solve each inequality by using a graphing calculator and a table.**

**5.** $\dfrac{x-1}{x} < 2$

**6.** $\dfrac{3x}{x+5} \le -4$

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**7.** $\dfrac{2-x}{x+3} \ge 4$

**8.** $\dfrac{x}{4-x} < 3$

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**Solve each inequality algebraically.**

**9.** $\dfrac{14}{m} \le \dfrac{7}{2}$

**10.** $\dfrac{12}{s-5} > 3$

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**11.** $\dfrac{7z}{z-4} \ge 6$

**12.** $\dfrac{-9x}{x+12} < -5$

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**Solve.**

**13.** An artist is designing a picture frame whose length, $l$, and width, $w$, satisfy the Golden Ratio, which is $\dfrac{w}{l} = \dfrac{l}{l+w}$. If the length of the frame is 24 inches, what is the width of the frame?

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**14.** Team A can wash all the windows in the school in $x$ hours. It takes Team B 3 hours longer to do the same job. If the teams work together, they can complete the job in 8.5 hours. How long does it take Team B to do the job alone?

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## Practice A
### 8-5 Solving Rational Equations and Inequalities

**Find the least common denominator (LCD) for each pair.**

1. $x$ and $\frac{3}{x}$

$$x$$

2. $\frac{3}{x-6}$ and $\frac{x}{4}$

$$4(x-6)$$

3. $x^2$ and $x^3$

$$x^3$$

**Solve each equation.**

4. $2 + \frac{1}{x} = 4$

$$x = \frac{1}{2}$$

5. $\frac{12}{x} + 4 = 3$

$$x = -12$$

6. $x + 2 = \frac{3}{x}$

$$x = -3,\ x = 1$$

7. $\frac{5}{6} + \frac{4}{x} = 3$

$$x = \frac{24}{13}$$

**Solve each inequality.**

8. $\frac{8}{x+2} < 2$

$$x < -2 \text{ or } x > 2$$

9. $\frac{10}{x-5} \geq 2$

$$5 < x \leq 10$$

10. $\frac{3}{x-1} < 3$

$$x < 1 \text{ or } x > 2$$

11. $\frac{6}{x+4} > 2$

$$-4 < x \leq -1$$

**Solve.**

12. List all of the extraneous solutions for the equation $\frac{2x}{x+4} = \frac{x}{x-1}$.

$$x = -4 \text{ and } 1 \text{ because they make the denominators of the original equation equal to } 0$$

13. Virat and Ari are washing the family car. When Virat washes the car by himself it takes him 3 hours, but with Ari helping it takes only 2 hours.

a. In the equation $\frac{1}{3}(2) + \frac{1}{m}(2) = 1$, what does $m$ represent?

$$\text{The length of time it would take Ari to wash the car himself}$$

b. Find the value of $m$.

$$m = 6$$

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## Practice B
### 8-5 Solving Rational Equations and Inequalities

**Solve each equation.**

1. $x - \frac{6}{x} = 5$

$$x = -1 \text{ or } x = 6$$

2. $\frac{15}{4} = \frac{6}{x} + 3$

$$x = 8$$

3. $x = \frac{3}{x} + 2$

$$x = 3 \text{ or } x = -1$$

4. $\frac{4}{x^2-4} = \frac{1}{x-2}$

$$\text{no solution.}$$

**Solve each inequality by using a graphing calculator and a table.**

5. $\frac{6}{x+1} < -3$

$$-3 < x < -1$$

6. $\frac{x}{x-2} \geq 0$

$$x \leq 0 \text{ or } x > 2$$

7. $\frac{2x}{x+5} \leq 0$

$$-5 < x \leq 0$$

8. $\frac{-x}{x-3} \geq 0$

$$0 \leq x < 3$$

**Solve each inequality algebraically.**

9. $\frac{12}{x+4} \leq 4$

$$x < -4 \text{ or } x \geq -1$$

10. $\frac{7}{x+3} < -5$

$$-\frac{22}{5} < x < -3$$

11. $\frac{x}{x-2} > 9$

$$2 < x < \frac{9}{4}$$

12. $\frac{2x}{x-5} \geq 3$

$$5 < x \leq 15$$

**Solve.**

13. The time required to deliver and install a computer at a customer's location is $t = 4 + \frac{d}{r}$, where $t$ is time in hours, $d$ is the distance, in miles, from the warehouse to the customer's location, and $r$ is the average speed of the delivery truck. If it takes 6.2 hours for the employee to deliver and install a computer for a customer located 100 miles from the warehouse, what is the average speed of the delivery truck?

$$\text{About 45.5 miles per hour}$$

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## Practice C
### 8-5 Solving Rational Equations and Inequalities

**Solve each equation.**

1. $\frac{12r}{r+2} = \frac{4}{r+2} - 6$

$$r = -\frac{4}{9}$$

2. $\frac{4x}{x-4} = \frac{2x+8}{x-4}$

$$\text{no solution.}$$

3. $-\frac{6}{x} + 1 = \frac{7}{x^2}$

$$x = 7 \text{ and } x = -1$$

4. $\frac{2}{d+2} + \frac{8}{d-2} = \frac{14}{d^2-4}$

$$d = \frac{1}{5}$$

**Solve each inequality by using a graphing calculator and a table.**

5. $\frac{x-1}{x} < 2$

$$x < -1 \text{ or } x > 0$$

6. $\frac{3x}{x+5} \leq -4$

$$-5 < x \leq -3$$

7. $\frac{2-x}{x+3} \geq 4$

$$-3 < x \leq -2$$

8. $\frac{x}{4-x} < 3$

$$x < 3 \text{ OR } x > 4$$

**Solve each inequality algebraically.**

9. $\frac{14}{m} \leq \frac{7}{2}$

$$m < 0 \text{ or } m \geq 4$$

10. $\frac{12}{s-5} > 3$

$$5 < s < 9$$

11. $\frac{7z}{z-4} \geq 6$

$$z \leq -24 \text{ or } z > 4$$

12. $\frac{-9x}{x+12} < -5$

$$x < -12 \text{ or } x > 15$$

**Solve.**

13. An artist is designing a picture frame whose length, $l$, and width, $w$, satisfy the Golden Ratio, which is $\frac{w}{l} = \frac{l}{l+w}$. If the length of the frame is 24 inches, what is the width of the frame?

$$\text{About 14.83 in.}$$

14. Team A can wash all the windows in the school in $x$ hours. It takes Team B 3 hours longer to do the same job. If the teams work together, they can complete the job in 8.5 hours. How long does it take Team B to do the job alone?

$$\text{About 18.6 h}$$

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## Reteach
### 8-5 Solving Rational Equations and Inequalities

To solve a rational equation, clear any denominators by multiplying each term on both sides of the equation by the least common denominator, LCD.

Solve: $x + \frac{12}{x} = 7$.

**Step 1** The LCD is $x$. Multiply each term by $x$.
$$x(x) + \frac{12}{x}(x) = 7(x)$$

*This makes the equation a quadratic equation.*

**Step 2** Simplify.
$$x^2 + 12 = 7x$$

**Step 3** Write in standard form.
$$x^2 - 7x + 12 = 0$$

*Set one side equal to 0 to solve a quadratic equation.*

**Step 4** Factor the quadratic equation.
$$(x-3)(x-4) = 0$$

**Step 5** Set each factor equal to 0.
$$x - 3 = 0 \qquad x - 4 = 0$$

**Step 6** Solve each equation.
$$x = 3 \qquad\qquad x = 4$$

*Always check the solutions to rational equations.*

**Check** $x + \frac{12}{x} = 7$

$x = 3$ $\qquad\qquad$ $x = 4$

$3 + \frac{12}{3} = 3 + 4 = 7\checkmark$ $\qquad$ $4 + \frac{12}{4} = 4 + 3 = 7\checkmark$

**Solve each equation.**

1. $\frac{x}{2} + 1 = \frac{4}{x}$

$$\frac{x}{2}(2x) + 1(2x) = \frac{4}{x}(2x)$$
$$x^2 + 2x = 8$$
$$x^2 + 2x - 8 = 0$$
$$(x+4)(x-2) = 0$$
$$x = -4,\ x = 2$$

2. $x - \frac{6}{x} = 1$

$$x(x) - \frac{6}{x}(x) = 1(x)$$
$$x^2 - 6 = x$$
$$x^2 - x - 6 = 0$$
$$(x-3)(x+2) = 0$$
$$x = 3,\ x = -2$$

3. $x = 4 + \frac{5}{x}$

$$x(x) = 4(x) + \frac{5}{x}$$
$$x^2 = 4x + 5$$
$$x^2 - 4x - 5 = 0$$
$$(x-5)(x+1) = 0$$
$$x = 5,\ x = -1$$

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