Name _____ Date _____ Class _____

LESSON 8-5

Practice B

Solving Rational Equations and Inequalities

Solve each equation.

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

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

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

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

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

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

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

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

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

Solve each inequality algebraically.

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

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

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

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

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?

LESSON 8-5

Practice A

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. $\frac{8}{x+2}<2$ — $x<-2$ or $x>2$
9. $\frac{10}{x-5}\geq 2$ — $5<x\leq 10$
10. $\frac{3}{x-1}<3$ — $x<1$ or $x>2$
11. $\frac{6}{x+4}>2$ — $-4<x\leq -1$

Solve.

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

$x=-4$ and 1 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?

The length of time it would take Ari to wash the car himself

b. Find the value of m.

$m=6$

LESSON 8-5

Practice B

Solving Rational Equations and Inequalities

Solve each equation.

1. $x-\frac{6}{x}=5$ — $x=-1$ or $x=6$
2. $\frac{15}{4}=\frac{6}{x}+3$ — $x=8$
3. $x=\frac{3}{x}+2$ — $x=3$ or $x=-1$
4. $\frac{4}{x^2-4}=\frac{1}{x-2}$ — no solution.

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

5. $\frac{6}{x+1}<-3$ — $-3<x<-1$
6. $\frac{x}{x-2}\geq 0$ — $x\leq 0$ 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. $\frac{12}{x+4}\leq 4$ — $x<-4$ 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?

About 45.5 miles per hour

LESSON 8-5

Practice C

Solving Rational Equations and Inequalities

Solve each equation.

1. $\frac{12r}{r+2}=\frac{4}{r+2}-6$ — $r=-\frac{4}{9}$
2. $\frac{4x}{x-4}=\frac{2x+8}{x-4}$ — no solution.
3. $-\frac{6}{x}+1=\frac{7}{x^2}$ — $x=7$ 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. $\frac{x-1}{x}<2$ — $x<-1$ 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. $\frac{x}{4-x}<3$ — $x<3$ OR $x>4$

Solve each inequality algebraically.

9. $\frac{14}{m}\leq\frac{7}{2}$ — $m<0$ or $m\geq 4$
10. $\frac{12}{s-5}>3$ — $5<s<9$
11. $\frac{7z}{z-4}\geq 6$ — $z\leq -24$ or $z>4$
12. $\frac{-9x}{x+12}<-5$ — $x<-12$ 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?

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?

About 18.6 h

LESSON 8-5

Review for Mastery

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.
$x(x)+\frac{12}{x}(x)=7(x)$

Step 2 Simplify.
$x^2+12=7x$
This makes the equation a quadratic equation.

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.
$x-3=0$ $\quad x-4=0$

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

Check $x+\frac{12}{x}=7$
Always check the solutions to rational equations.

$x=3$: $3+\frac{12}{3}=3+4=7\surd$

$x=4$: $4+\frac{12}{4}=4+3=7\surd$

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