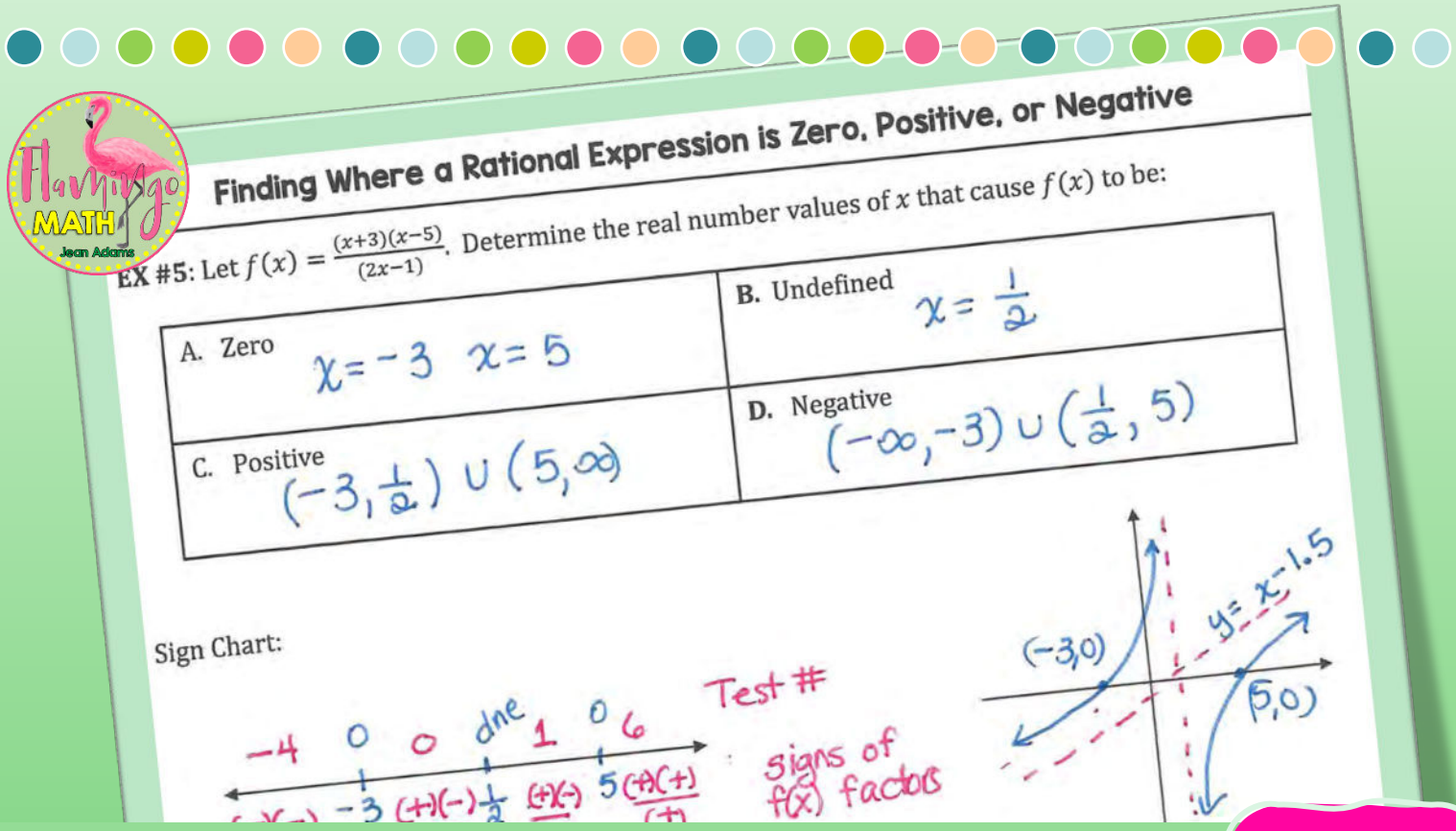
Precalculus Honors

Solving Rational Equations & Inequalities



Completely Editable

2.8

Lesson 8: Solving Rational Equations & Inequalities

Rational Equations

Every rational equation can be written in the form:

If _____ and _____ are polynomial functions with no common factors, then the

_____ of the numerator are the solutions of the equation.

Clearing Fractions Procedure

1. _____
2. _____

Extraneous Solutions

When we ***multiply*** or ***divide*** an equation by an expression containing ***variables***, the resulting equation may have solutions that are **not solutions** of the ***original equation***. For this reason, we must ***check each solution*** of the resulting equation in the ***original*** equation.

Polynomial Inequalities

You will be able to solve inequalities involving polynomials and rational functions using both algebraic and graphical techniques. Let's explore some common connections between inequalities and the positive and negative sign of the expression.

To solve $f(x) > 0$ is to find the values of x that make $f(x)$ positive.

To solve $f(x) < 0$ is to find the values of x that make $f(x)$ negative.

Using Sign Charts

EX #3: Let $f(x) = (x+3)(x-4)^2$. Determine the real number values of x that cause $f(x)$ to be:

A. Zero _____ **B. Positive** _____ **C. Negative** _____

Show work here:

Finding Where a Rational Expression is Zero, Positive, or Negative

EX #5: Let $f(x) = \frac{(x+3)(x-5)}{(2x-1)}$. Determine the real number values of x that cause $f(x)$ to be:

A. Zero	**B.** Undefined
C. Positive	**D.** Negative

Sign Chart:

Solving a Rational Inequality

EX #6: Solve, express your answer using set interval notation.

$$\frac{x-3}{x+2} > 0$$

EX #7: Write the inequality in standard form. Solve, express your answer using set interval notation.

$$\frac{x-2}{x+2} \geq 5$$

Solving Rational Inequalities

Other Inequalities

EX #9: Solve and graph:

$$\frac{x+1}{|x-4|} \geq 0$$

EX #10: Solve $(x-2)\sqrt{x+1} \leq 0$

EX #11 (Challenging): Solve and graph

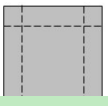
$$\frac{x^2-3x-10}{1-x} \geq 2$$

Applications

EX #12:

A. A ball is thrown vertically upward from the top of a 190-foot building. The distance above the ground can be modeled by $s(t) = -16t^2 + 96t + 190$, where t is measured in seconds. During what time period will the ball's height exceed that of the tower? (Solve using algebra)

B. Florida Paper Products has a contract to design a box with a volume of not more than 200 in^3. Squares are to be cut from the corners of a 15-in. by 18-in. piece of cardboard with the flaps folded up to make an open box. What size squares should be cut from the cardboard?



NOTES

2.8 **Solving Rational Equations & Inequalities Homework**

Name _____

Date _____ Period _____

Problems 1 – 4, Solve the equation algebraically. Check for extraneous solutions.

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

2. $\frac{3}{x+4}-\frac{1}{x-2}=\frac{5}{2x+8}$

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

4. $\frac{5x}{x+1}+\frac{3}{x-2}=\frac{15}{x^2-x-2}$

Problems 5 – 12, Solve each of the following inequalities. Express the solution sets in interval notation.

5. $x^2-2x-15\geq 0$

6. $3x^2+11x-4<0$

7. $4x^2+4x+1\geq 0$

8. x^3-2x

9. $\frac{x-5}{|x+2|}<0$

10. $2x^3-5$

11. $\frac{x+3}{x^2-16}<0$

12. $(4x-3)\sqrt{2x+1}\geq 0$

Problems 13-15, Set up an equation/inequality and solve each of the problems.

13. The ratio of male to female students at the University of Central Florida is 11 to 20. In 2014, there was a total of 51,269 students. Find the number of male and the number of female students.

14. When a hobby rocket is fired from ground level, the distance above the ground can be found by $s(t)=48t-16t^2$, where t is measured in seconds. During what time interval is the rocket at least 20 feet above the ground?

15. A person's IQ (Intelligence Quotient) can be found using the formula $IQ=100\frac{M}{C}$. Divide your mental age M, found by standardized tests, by the chronological age C, and then multiply the ratio by 100. If the IQ range for 16-year-olds is given by $82\leq IQ\leq 143$, find the mental age range of this group.

Practice Sets

Lesson Warm-Ups

Name _____ Date _____ Period _____

Lesson 2.8: Solving Rational Equations/Inequalities **Warm-Up # 1**

1. Solve: $x - 1 = \frac{12}{x}$	**2.** Given $2x^2 - 5x - 3 \geq 0$. Factor the inequality.
3. Analyze the inequality with a sign chart.	**4.** Write the solution in interval notation.

Name _____ Date _____ Period _____

Lesson 2.8: Solving Rational Equations/Inequalities **Warm-Up # 2**

1. Solve: $x + 7 = \frac{8}{x}$	**2.** Given $3x^2 + 8x - 3 \geq 0$. Factor the inequality.
3. Analyze the inequality with a sign chart.	**4.** Write the solution in interval notation.

2.8 Solving Rational Equations/Inequalities **Form A**

Name _____

Date _____ Period _____

1. Solve $x + 2 = \frac{15}{x}$

For 2 – 4: Given $2x^2 - 9x - 5 \geq 0$

2. Factor the inequality

3. Analyze using a sign chart

4. Write the solution in interval notation.

Grade:

2.8 Solving Rational Equations/Inequalities **Form B**

Name _____

Date _____ Period _____

1. Solve $x - 5 = \frac{14}{x}$

For 2 – 4: Given $2x^2 + 7x - 4 \leq 0$

2. Factor the inequality

3. Analyze using a sign chart

4. Write the solution in interval notation.

Grade:

Daily Lesson Quiz