

Honors Algebra II: Unit 3B Rational Functions

Date	Topic	Practice
Tuesday January 5	Simplifying Rationals Notes (page 1)	Simplifying Rational Expressions Page 2
Wednesday January 6	Multiplying Rationals Notes (page 3)	Multiplying Rational Expressions Page 4
Thursday January 7	Dividing Rationals Notes (page 3)	Dividing Rational Expressions Page 6
Friday January 8	Mixed Review and Complex Fractions Notes (homework check)	Complex Fractions Pages 7-8
Monday January 11	Adding and Subtracting Rationals Notes (pages 9-11)	Adding and Subtracting Rationals Pages 12
Tuesday January 12	Adding and Subtracting Rationals Simplify the Expression (page 13a and 13b)	Tic Tac Toe Page 15
Wednesday January 13	QUIZ	Get caught up on homework-all unit homework due tomorrow for a grade!!!
Thursday January 14	Rational Expressions and Complex Frations Notes (pages 16-18)	Rational and Complex Fractions Pages 19-21
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Tuesday January 19	Rational Inequalities Notes	Rational Inequalities Page 29
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Thursday January 21	CFA (practice test)	Review Sheet 31-32 Make sure packet is complete
Friday January 22	TEST	☺

Simplifying Rational Expressions Multiplying and Dividing Rational Expressions

Example 1:

State the excluded value of x for each rational expression.

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

b. $\frac{4x}{(x+5)}$

c. $\frac{x+3}{x^2+4x-12}$

Example 2:

Simplify.

a. $\frac{5(3-x)}{5x}$

b. $\frac{2x^2}{x(x+5)}$

c. $\frac{5x+3}{x+3}$

Example 3:

Simplify.

a. $\frac{15x}{5-10x}$

b. $\frac{x^2+6x+9}{x^2-9}$

For what values of the variable is the rational expression undefined?

1. $\frac{3}{4x}$

2. $\frac{2x}{7}$

3. $\frac{5}{x+2}$

4. $\frac{x+2}{x-5}$

5. $\frac{14}{2x+8}$

6. $\frac{x+5}{(x-2)(x+1)}$

7. $\frac{2x+9}{(x-5)(x+9)}$

8. $\frac{5}{x^2-1}$

9. $\frac{x+4}{x^2+x-6}$

Determine whether the rational expression has been simplified correctly.

10. $\frac{3x+7}{7} \stackrel{?}{=} 3x$

11. $\frac{2x}{2x+10} \stackrel{?}{=} \frac{x}{x+5}$

12. $\frac{5+x}{5+2x} \stackrel{?}{=} \frac{1}{2}$

13. $\frac{x^2+7}{x+7} \stackrel{?}{=} x$

14. $\frac{6x}{2x^2+x} \stackrel{?}{=} \frac{6}{2x+1}$

15. $\frac{1+x}{1+x^2} \stackrel{?}{=} \frac{1}{x}$

Simplify the expression if possible.

16. $\frac{4x}{12}$

17. $\frac{18x}{36}$

18. $\frac{15x^2}{10x}$

19. $\frac{18x^2}{60x^3}$

20. $\frac{3x}{10x+x^2}$

21. $\frac{2x^2+x}{2x+1}$

22. $\frac{x^2-16}{3x+12}$

23. $\frac{x^2-25}{x-5}$

24. $\frac{x-3}{x^2-5x+6}$

25. $\frac{9-x^2}{x+3}$

26. $\frac{8-6x+x^2}{16-x^2}$

27. $\frac{(3-x)(5-x)}{(x-3)(x-5)}$

For what values of the variable is the rational expression undefined?

1. $\frac{7}{14x}$

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

3. $\frac{8}{x+4}$

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

5. $\frac{20}{5x+10}$

6. $\frac{5x+2}{(x-6)(x+9)}$

7. $\frac{x-3}{x^2+5x-6}$

8. $\frac{x-7}{x^2-49}$

9. $\frac{x^2-2x-3}{x^2-9}$

Simplify the expression if possible.

10. $\frac{7x}{21}$

11. $\frac{20x}{28}$

12. $\frac{18x^2}{12x}$

13. $\frac{36x^4}{42x^7}$

14. $\frac{5x}{x^2+3x}$

15. $\frac{2x^2+x}{4x}$

16. $\frac{x^2-1}{6x+6}$

17. $\frac{4x-12}{x^2-9}$

18. $\frac{x^2-3x-10}{x^2+5x+6}$

19. $\frac{2x^2+5x+3}{4x^2+4x-3}$

20. $\frac{x^2+10x+24}{x^2-16}$

21. $\frac{x^3-x^2-12x}{x^3-9x}$

Example 4:

Simplify.

a. $\frac{y-5}{3y^2-3y} \cdot \frac{2y^2}{y^2-6y+5}$

b. $\frac{2x+1}{2x^2-x-3} \cdot (2x-3)$

Example 5:

Simplify.

a. $\frac{n-2}{2n} \div \frac{n-2}{n+5}$

b. $\frac{5x^2-20x}{x+5} \div (x-4)$

c. $\frac{\frac{x-2}{4}}{x^2-4}$

Multiplying Rational Expressions

Name:

Date:

Simplify the expression.

1. $\frac{4x}{3} \cdot \frac{2}{x}$
2. $\frac{3x}{5} \cdot \frac{10}{12x}$
3. $\frac{4x^2}{7} \cdot \frac{14}{5x}$
4. $\frac{9}{2x} \cdot \frac{4x}{15}$
5. $\frac{7x^2}{5} \cdot \frac{15}{14x}$
6. $\frac{3x^2}{2x} \cdot \frac{18x^2}{9x}$
7. $\frac{x+4}{3} \cdot \frac{6}{2(x+4)}$
8. $\frac{x-3}{x+3} \cdot \frac{x+3}{x^2-9}$
9. $\frac{x+2}{3x+6} \cdot \frac{6}{x}$
10. $\frac{x^2-25}{12} \cdot \frac{36}{x+5}$
11. $\frac{x+4}{x^2+5x+4} \cdot (3x+3)$
12. $\frac{x+4}{4} \cdot \frac{x-2}{x^2-4}$

Simplify the expression.

1. $\frac{8x}{6} \cdot \frac{6}{x}$
2. $\frac{7x}{5} \cdot \frac{10}{x^2}$
3. $\frac{12x^3}{25} \cdot \frac{40}{9x^2}$
4. $\frac{14x^5}{3x^2} \cdot \frac{9x^3}{28x^8}$
5. $\frac{6-18x}{4x^2} \cdot \frac{x^3}{2-6x}$
6. $\frac{6}{x^2-9x+20} \cdot (5x-25)$
7. $\frac{4x}{x+1} \cdot \frac{x^2-6x-7}{x^3+7x^2}$
8. $\frac{x}{2x^2-7x+3} \cdot (7x-21)$
9. $\frac{2x-6}{x^2-25} \cdot \frac{x^2+6x+5}{x^2-9}$
10. $\frac{x^2-16}{12} \cdot \frac{48}{x+4}$
11. $\frac{x+3}{x^2+5x+6} \cdot (5x+10)$
12. $\frac{x+5}{7} \cdot \frac{x+7}{x^2-25}$

Simplify the expression.

1. $\frac{6x}{5} \cdot \frac{1}{x}$
2. $\frac{8x^2}{3} \cdot \frac{9}{16x}$
3. $\frac{3x^2}{2x} \cdot \frac{12x^2}{6x}$
4. $\frac{5-4x}{4} \cdot \frac{48}{10-8x}$
5. $\frac{4x}{x^2-9} \cdot \frac{x-3}{8x^2+12x}$
6. $\frac{8}{2+3x} \cdot (8+12x)$
7. $\frac{3x}{x^2-2x-24} \cdot \frac{x-6}{6x^2+9x}$
8. $\frac{3x}{2x^2-9x+10} \cdot (2x-5)$
9. $\frac{x^2-3x}{x^2-5x+6} \cdot \frac{(x-2)^2}{2x}$
10. $\frac{16x}{25x^2-5} \cdot \frac{25x^2+30x+9}{8x}$
11. $\frac{1}{x^2+5x-24} \cdot \frac{x^2+6x-16}{3x}$
12. $\frac{x^2+x-6}{x^2-x-2} \cdot \frac{x^2+5x+4}{x^2+2x-3}$

Unit 2: Multiplying and Dividing Rational Expressions

1. $\frac{a^2 - b^2}{a - b}$

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

2. $\frac{3a + 15}{a^2 - 25}$

4. $\frac{3s^2 - 27}{s^2 + 7s + 12}$

5. $\frac{5z^2 + 5z - 30}{7z^2 + 7z - 42}$

6. $\frac{5n + 15}{8n + 4} \cdot \frac{4n + 2}{3n + 9}$

6. $\frac{k^2 - 4}{8k^2 + 3k} \cdot \frac{16k + 6}{k - 2}$

8. $\frac{25 - c^2}{12} \cdot \frac{4}{5 - c}$

9. $\frac{2c^2 - 5c - 3}{c + d} \cdot \frac{c^2 - d^2}{2c + 1}$

10. $\frac{t^2 + 6t + 9}{t^2 - 10t + 25} \cdot \frac{t^2 - t - 20}{t^2 + 7t + 12}$

10. $\frac{x^2 - x - 6}{x^2 + 2x - 15} \div \frac{x^2 - 4x - 5}{x^2 - 25}$

12. $\frac{m^2 + 2m + 1}{10m - 10} \div \frac{m + 1}{20}$

13. $\frac{a^2 + 10a + 25}{a^2 - 9} \div \frac{a + 5}{a^2 - 3a}$

14. $\frac{x^2 - 1}{x^2 - 3x - 10} \div \frac{x^2 + 3x + 2}{x^2 + 4x + 4}$

15. $\frac{6a}{a - 4} \div \frac{a^2 - 7a}{a^2 - 11a + 28}$

Math 1
Unit 2 - Complex fractions

Name _____
Period _____

Simplify the following problems as much as possible. Circle your final answer.

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

2. $\frac{\frac{3}{5}}{-\frac{6}{6}}$

3. $\frac{-18}{\frac{3}{\frac{8}{8}}}$

4. $\frac{\frac{1}{3}}{-3}$

5. $\frac{-\frac{8}{9}}{-2}$

6. $\frac{-\frac{21}{2}}{7}$

$$7. \frac{\frac{12}{5}}{\frac{-8}{15}}$$

$$8. \frac{\frac{x^3}{3xy}}{\frac{y^2}{3x}}$$

$$9. \frac{\frac{x-2}{4}}{x^2-4}$$

$$10. \frac{\frac{y^2-y-6}{y^2-5y-14}}{\frac{y^2+6y+5}{y^2-6y-7}}$$

$$11. \frac{\frac{x}{x-y}}{\frac{x^2}{x^2-y^2}}$$

$$12. \frac{\frac{x^2-x-12}{x^2-2x-15}}{\frac{x^2+8x+12}{x^2-3x-10}}$$

ADD AND SUBTRACT RATIONAL EXPRESSIONS

HOW DO I ADD AND SUBTRACT RATIONAL EXPRESSIONS?

Steps:

- 1. Factor Denominator
- 2. Get a Common Denominator
- 3. Add/Sub Numerator
- 4. Re-write Denominator
- 5. Simplify your answer

EX. ADD OR SUBTRACT.

$$* 1. \frac{5}{6x^2} + \frac{x}{4x^2 - 12x}$$

EX. ADD OR SUBTRACT.

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

EX. ADD OR SUBTRACT.

$$* 3. \frac{2-5x}{x-10} + \frac{1}{3x+2}$$

EX. ADD OR SUBTRACT.

$$* 4. \frac{10x}{3x^2-3} + \frac{4}{x-1} + \frac{5}{6x}$$

Add and Subtract Rational Expressions

Name _____

Perform the indicated operation. Simplify your answer.

1. $\frac{3a+2}{a+b} + \frac{4}{2a+2b}$

2. $\frac{3}{4a} - \frac{2}{5a} - \frac{1}{2a}$

3. $\frac{7}{y-8} - \frac{6}{8-y}$

4. $\frac{x}{x+3} - \frac{6x}{x^2-9}$

5. $\frac{3}{a-2} + \frac{2}{a-3}$

6. $\frac{8}{2y-16} - \frac{y}{8-y}$

7. $\frac{5}{x^2-3x-28} + \frac{7}{2x-14}$

8. $\frac{w+12}{4w-16} - \frac{w+4}{2w-8}$

9. $\frac{x}{x-y} - \frac{2x}{x^2-y^2}$

10. $\frac{3}{x^2+3x+2} - \frac{4}{x^2+4x+4}$

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

12. $\frac{2x+1}{x^2+2x-15} - \frac{x}{x^2+x-20}$

$$13. \frac{2x}{5x+20} + \frac{5x}{x+4}$$

$$14. \frac{8}{x+7} - \frac{5}{x-3}$$

$$15. \frac{2x}{x-2} + \frac{x+9}{5x-10}$$

$$16. \frac{x-2}{x+2} + \frac{x-2}{x^2+4x+4}$$

$$17. \frac{15x+2}{x^2+6x} - \frac{x+1}{x+6}$$

$$18. \frac{5}{x+5} - \frac{2x-5}{x^2+9x+20}$$

$$19. \frac{x}{4} + \frac{x-2}{8} - \frac{x-4}{16}$$

$$20. \frac{4+3a}{6} - \frac{5a}{8} + \frac{3-a}{12}$$

Math 1
Add and Subtract Rational Expressions

Name: _____
Period: _____

Simplify each expression. Circle your final answer.

1. $\frac{7}{m} + \frac{3}{m}$

2. $\frac{2a}{a+5} + \frac{a}{a+5}$

3. $\frac{5}{9a} + \frac{4}{9a}$

4. $\frac{a}{5a-20} + \frac{-4}{5a-20}$

5. $\frac{-10}{a^2+7a} + \frac{a+17}{a^2+7a}$

6. $\frac{2x^2-5x}{x^2-5x-14} + \frac{x^2-2x+5}{x^2-5x-14}$

7. $\frac{x^2+6x}{x+4} - \frac{3x+5}{x+4} + \frac{1}{x+4}$

8. $\frac{2y-3}{7} - \frac{3y+1}{14}$

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

10. $\frac{6}{x+3} + \frac{4}{x}$

11. $\frac{2}{x} + \frac{5}{x^2}$

12. $\frac{m+1}{3m} + \frac{m+4}{4m}$

Math 1

Operations on Rational Expressions

Name: _____

Simplify the expression

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

7. $\frac{12x}{5} \div \frac{6x}{7}$

2. $\frac{5x}{2} + \frac{1}{x}$

8. $\frac{8}{2 + 3x} \cdot (8 + 12x)$

3. $\frac{x - 3}{x + 1} \div \frac{x^2 - 3x}{5x - 5}$

9. $\frac{5x}{x - 3} - \frac{2x + 1}{x - 3}$

4. $\frac{4}{5x} - \frac{3}{x}$

10. $\frac{2 + 3x}{5} \cdot \frac{15}{4 + 6x}$

5. $\frac{14}{3x} + \frac{x + 5}{3x}$

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

6. $\frac{x + 3}{x^2 + 8x + 15}$

12. $\frac{x^2 + 3x}{x^2 + 5x + 6} + \frac{4}{x + 2}$

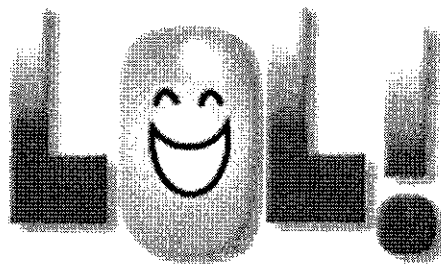
Directions: This game is very similar to traditional Tic Tac Toe. Instead of the playing board being 3 blocks wide and 3 blocks tall, this one is 5 squares in each direction. To "win" this game, you must get 5 problems **COMPLETELY** correct in either the **HORIZONTAL** or **VERTICAL** direction. Diagonal doesn't count in this game! Once you think you have the correct answers for your row or column, have the teacher check their accuracy. If YOU are completely correct, you get a circle and win the square. If you are not completely correct, the teacher gets to block you with an X. When you have won the game, your teacher will keep this sheet, and you will be able to start on the next task. Take your time, be careful, and good luck!!

Factor: $2x^2 + 8x + 6$	Simplify: $\frac{55x^6y^3}{70x^5y^7}$	Multiply: $\frac{9x^2}{4} \cdot \frac{8}{18x}$	Divide: $\frac{5x+15}{3x} \div \frac{x+3}{9x}$	Multiply: $\frac{4x}{x+1} \cdot \frac{x^2-6x-7}{x^3+7x^2}$
Multiply: $\frac{7x^4}{14x} \cdot \frac{8y}{5y^6}$	Factor: $5x^2 + 5x + 10$	Simplify: $\frac{90x^3yz^2}{180y^4z}$	Multiply: $\frac{4x}{x^2-25} \cdot \frac{x-5}{8x^2+12x}$	Divide: $\frac{6x-14}{x^2-1} \div \frac{3x-7}{5x+1}$
Divide: $\frac{x+4}{x^2+5x+4} \div \frac{1}{3x+3}$	Simplify: $\frac{16x^9y^3z}{30x^4y^5z}$	Factor: $4x^2 - 36$	Simplify: $\frac{x^2+4x+4}{x^2-4}$	Multiply: $\frac{x+9}{x^2-81} \cdot \frac{x-9}{3x}$
Multiply: $\frac{3x}{8x^2} \cdot \frac{4x^4}{3x^8}$	Divide: $\frac{x^2-8x+15}{x^2-3x} \div (3x-15)$	Factor: $2x^3 + 12x^2 + 18x$	Factor: $2x^2 - 8$	Simplify: $\frac{2x^2+6x}{8x^2+24x}$
Simplify: $\frac{4x^2-9}{10x+15}$	Multiply: $\frac{4x-8}{x^2-4x+4} \cdot (6x-12)$	Divide: $\frac{x^2-4x+3}{2x} \div \frac{x-1}{2}$	Divide: $\frac{36x}{10y} \div \frac{12x^4}{15xy^3}$	Factor: $x^2 - 12x - 28$

Rational Expressions and Complex Fractions

Factor!

- Factor!
- Factor!
- Factor!
- Factor!
- Factor!
- Factor!
- Factor!
- Factor!
- And oh, yeah... Factor!



Ex. Simplify.

1.
$$\frac{x^3 + 3x^2 - 2x - 6}{x^3 + 27}$$

2.
$$\frac{x^2 + 11x}{x - 2} \div (3x^2 + 6x) \cdot \frac{x^2 - 4}{x + 11}$$

$$3. \frac{\frac{1}{x} - \frac{x}{x^{-1} + 1}}{\frac{3}{x}}$$

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

Rational Expressions and Complex Fractions

Name _____

1. $\frac{x^3 - 64}{4x^2 - 64}$

2. $\frac{c^2 + 3c}{25 - c^2} \cdot \frac{c^2 + 4c - 5}{c^2 + 4c + 3}$

3. $\frac{\frac{x^2 - y^2}{y}}{\frac{y^2 - xy}{y^3}}$

4. $\frac{x^2 + 4x}{x^3 + 10x^2} \div \frac{x - 3}{9 - x^2} \cdot \frac{x + 10}{x^2 + 7x + 12}$

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

6. $\frac{2x}{x + 2} - \frac{8}{x^2 + 2x} + \frac{3}{x}$

7. $\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}}$

8. $\frac{\frac{2x}{3} - 2}{1 + \frac{12}{x}}$

9. $\frac{7x^2}{9x^2 - 25} - \frac{2}{6x + 10}$

10. $\frac{y}{y - 9} + \frac{9}{9 - y}$

$$11. \frac{\frac{2}{x} + \frac{3}{xy}}{\frac{3}{x^2} - \frac{1}{y}}$$

$$12. \frac{\frac{a}{b} - 1 - \frac{6b}{a}}{\frac{a}{b} + 4 + \frac{4b}{a}}$$

$$13. \frac{x^{-2} - y^{-2}}{x^4 - y^4}$$

$$14. \frac{1 - \frac{6}{x} + \frac{5}{x^2}}{1 - \frac{3}{x} - \frac{10}{x^2}}$$

$$15. \frac{\frac{2x}{x^2-9} + \frac{4}{x+3}}{\frac{2}{x-3} + \frac{4x}{x^2-9}}$$

$$16. \frac{\frac{2}{x-1}}{\frac{4}{x-1} + \frac{1}{x}}$$

$$17. \frac{x^3 - xy^2}{x^4 + 2x^3y + x^2y^2}$$

Math 1
Unit 2: Complex Fractions

Name _____

Simplify each of the following. Make sure your answers are in simplest form.

1.
$$\frac{\frac{x^2 + 3x - 10}{x^2 - 5x + 6}}{x^2 - 4x - 5}$$

2.
$$\frac{\frac{a^2 - b^2}{ab}}{\frac{1}{a} + \frac{1}{b}}$$

3.
$$\frac{\frac{\frac{1}{x} + \frac{1}{y}}{1 - \frac{1}{x}}}{x - y}$$

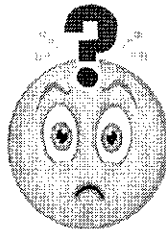
4.
$$\frac{\frac{x^2 - 16}{x^2 - 6x + 9}}{x^2 - 3x - 4}$$

5.
$$\frac{\frac{x^2 + 5x - 6}{x^2 + 8x + 12}}{x^2 + 2x - 15}$$

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

Solving Rational Equations

How do I solve rational equations?



1. Multiply WHOLE equation by LCD.
2. Solve the equation. (You might need to solve by factoring, completing the square or using the quadratic formula.)
3. Check for extraneous solutions.

Solve for x.

1. $\frac{3x}{2} + \frac{1}{4}(x-2) = 10$

Solve for x.

2. $\frac{1}{x-2} + \frac{3}{x+3} = \frac{4}{x^2+x-6}$

Solve for x.

$$3. \frac{4x+1}{x+1} = \frac{12}{x^2-1} + 3$$

Solving Rational Equations

Solve each equation. Remember to check for extraneous solutions.

1) $\frac{1}{6k^2} = \frac{1}{3k^2} - \frac{1}{k}$

2) $\frac{1}{n^2} + \frac{1}{n} = \frac{1}{2n^2}$

3) $\frac{1}{6b^2} + \frac{1}{6b} = \frac{1}{b^2}$

4) $\frac{b+6}{4b^2} + \frac{3}{2b^2} = \frac{b+4}{2b^2}$

5) $\frac{1}{x} = \frac{6}{5x} + 1$

6) $\frac{1}{6x^2} = \frac{1}{2x} + \frac{7}{6x^2}$

7) $\frac{1}{v} + \frac{3v+12}{v^2-5v} = \frac{7v-56}{v^2-5v}$

8) $\frac{1}{m^2-m} + \frac{1}{m} = \frac{5}{m^2-m}$

9) $\frac{1}{n-8} - 1 = \frac{7}{n-8}$

10) $\frac{1}{r-2} + \frac{1}{r^2-7r+10} = \frac{6}{r-2}$

$$11) 1 = \frac{v+2}{v-4} + \frac{7v-42}{v-4}$$

$$12) \frac{r-4}{5r} = \frac{1}{5r} + 1$$

$$13) 1 + \frac{x^2 - 5x - 24}{3x} = \frac{x-6}{3x}$$

$$14) 1 = \frac{1}{x^2 + 2x} + \frac{x-1}{x}$$

$$15) \frac{n+5}{n+8} = 1 + \frac{6}{n+1}$$

$$16) \frac{r+5}{r^2-2r} - 1 = \frac{1}{r^2-2r}$$

$$17) \frac{1}{x^2-5x} = \frac{x+7}{x} - 1$$

$$18) \frac{a-2}{a+3} - 1 = \frac{3}{a+2}$$

$$19) \frac{p+5}{p^2+p} = \frac{1}{p^2+p} - \frac{p-6}{p+1}$$

$$20) \frac{5}{n^3+5n^2} = \frac{4}{n+5} + \frac{1}{n^2}$$

Solving Rational Equations 1

Name _____

Solve each equation. Check your solutions.

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

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

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

4.
$$\frac{12}{x^2-16} - \frac{24}{x-4} = 3$$

5.
$$\frac{6}{x-7} = \frac{x-49}{x^2-7x} + \frac{1}{x}$$

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

7.
$$x^2 + \frac{17x}{6} = \frac{1}{2}$$

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

9.
$$\frac{x+4}{x} + \frac{3}{x-4} = \frac{-16}{x^2-4x}$$

10.
$$\frac{y+3}{y+2} = 2 - \frac{3}{y^2+5y+6}$$

11.
$$\frac{t}{t^2-1} + \frac{2}{t+1} = \frac{1}{2t-2}$$

12.
$$\frac{a+2 + \frac{2}{a+5}}{a+6 + \frac{6}{a+1}} = \frac{a+5 + \frac{3}{a+1}}{a-1 - \frac{3}{a+1}}$$

Solving Rational Equations 2

Name _____

Solve.

$$1. \frac{7}{7-x} = \frac{7}{7-x} + 1$$

$$2. \frac{x+3}{x-1} + 2 = \frac{(x+3)^2}{(x-1)^2}$$

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

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

$$5. \frac{3}{y-2} + \frac{2y}{4-y^2} = \frac{5}{y+2}$$

$$6. \frac{x+4}{x} + \frac{3}{x-4} = \frac{-16}{x^2-4x}$$

$$7. \frac{k-3}{8} - \frac{k+2}{6} = \frac{5}{12}$$

$$8. \frac{x}{x+1} + \frac{3}{x-3} + 1 = 0$$

Solve:

1. $\frac{5}{x-2} < 0$

2. $\frac{x-5}{x+3} > 1$

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

4. $\frac{10}{x+2} > 0$

5. $\frac{-2x-3}{x-4} > 0$

6. $\frac{x^2-4x+8}{x-1} < x$

7. $-\frac{4}{x+5} < 0$

8. $\frac{4}{x-3} < 0$

9. $\frac{8}{x^2+1} \geq 4$

10. $\frac{20}{x^2+1} < 2$

11. $\frac{3x+2}{x-1} < -2$

12. $\frac{3x+2}{x-1} > x$

13. $\frac{3}{x+2} > 0$

14. $-\frac{1}{x+5} \leq -2$

15. $\frac{2}{x+2} > \frac{1}{x+3}$

16. $\frac{5}{x-4} < \frac{1}{x+4}$

17. $\frac{5}{x+3} \geq \frac{4}{x+2}$

18. $\frac{2}{x+6} > \frac{-3}{x-3}$

Solve the following. Write your answer in interval notation.

1. $\frac{x-5}{x^2-5x+6} > 0$

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

3. $\frac{2x+1}{3x+1} < \frac{x-1}{3x+1}$

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

5. $\frac{2x-7}{x-5} \leq 3$

6. $\frac{5}{x+2} \geq \frac{5}{x} + \frac{2}{3x}$

7. $\frac{x^2-16}{x^2-4x-5} > 0$

8. $1 - \frac{2x}{x-3} \leq \frac{1}{x+3}$

Answers: 1. $(2,3) \cup (5,\infty)$ 2. $\left(-\infty, -\frac{4}{3}\right] \cup (0,\infty)$ 3. $\left(-2, -\frac{1}{3}\right)$

4. $\left(-\infty, -\frac{1}{2}\right) \cup (1,\infty)$ 5. $(-\infty, 5) \cup [8,\infty)$ 6. $(-\infty, -17] \cup (-2, 0)$

7. $(-\infty, -4) \cup (-1, 4) \cup (5,\infty)$ 8. $(-\infty, -6] \cup (-3, -1] \cup (3,\infty)$

Unit 3B Review Sheet**Factor Completely.**

1. $2x^2 - 8$

2. $-3x^4 + 21x^3$

3. $18x^6 - 6x^2 + 3x$

4. $x^2 + 4x - 12$

5. $x^2 - 10x + 25$

6. $x^2 - 3x - 10$

7. $2x^2 + 32x + 30$

8. $3y^2 - 9y - 54$

9. $2t^2 - 20t + 42$

10. $4x^2 + 32x - 36$

Simplify.

1. $\frac{3x}{10x + x^2}$

2. $\frac{3x^2 - 6xy}{x^2 - 4y^2}$

3. $\frac{8 + 6x + x^2}{16 + x^2}$

4. $\frac{x^3 - x^2 - 12x}{x^3 - 9x}$

Perform the indicated operation and simplify.

5. $\frac{x+4}{3} \cdot \frac{6}{2x+8}$

6. $\frac{x^2 + 5x - 24}{x^2 + 9x + 8} \div \frac{x^2}{6x - 18}$

9. $\frac{4x}{x^2 - x - 12} \div \frac{1}{x - 4}$

10. $\frac{x+2}{x-3} \cdot \frac{x^2 - 4x + 3}{x^2 + 6x + 8}$

11. $\frac{2x+9}{x+1} - \frac{7}{x+1}$

12. $\frac{x+1}{x^2 + 5x + 6} - \frac{x-4}{x^2 - 9}$

13. $\frac{x-1}{x^2 - 2x - 24} + \frac{4}{x^2 - 5x - 6}$

14. $\frac{x+2}{x^2 + 2x - 15} - \frac{x-6}{x^2 + 4x - 21}$

$$15. \frac{x+6}{x^2+10x+24} - \frac{x+1}{x^2+2x-15}$$

$$16. \frac{x-2}{x^2+10x+24} + \frac{4x}{x+1} \cdot \frac{5}{x+6}$$

17. John is having grass put in his backyard. The landscape company needs to know the area and perimeter of John's yard. The length of his yard is $\frac{x^4}{x^4+5x^3}$ and the width is $x+5$. Find the area and perimeter for the landscape company.

For what values is the rational expression undefined?

$$31. \frac{x+3}{x-6}$$

$$32. \frac{x-3}{x^2+5x-6}$$

$$33. \frac{x^2-1}{6x+6}$$

$$34. \frac{x^2-3x-10}{x^2+5x+6}$$

Simplify the following complex fractions.

$$35. \frac{\frac{2x-14}{x^2-4x-21}}{x+3}$$

$$36. \frac{\frac{x^3}{3xy}}{\frac{y^2}{3x}}$$

$$37. \frac{\frac{\frac{x+2}{3x-3}}{x^2+11x+18}}{x-1}$$

$$38. \frac{\frac{x^2+8x+15}{x^2+7x+10}}{\frac{3x^2+9x}{x^2-2x-8}}$$

Summary of Rational Expressions	
Simplify/Multiply/Divide: <ul style="list-style-type: none"> • factor • simplify (cancel) 	Add/Subtract: <ul style="list-style-type: none"> • factor denominators • create a C.D. in each fraction • simplify numerators • simplify (cancel)
Solve Inequalities: <ul style="list-style-type: none"> • set inequality to zero • add/subtract • find zeros • find undefined values • mark on a number line • test intervals • write answer in interval notation 	Solve Equations: <ul style="list-style-type: none"> • factor denominators • multiply equation by CD to clear denominators • solve equation • check for extraneous solutions
Partial Fraction Decomposition: <ul style="list-style-type: none"> • factor denominator & create rational equation • clear denominators (multiply equation by CD) • create and solve system of linear equations • write answer as sum of partial fractions 	

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