Barnett

Algebra 2 Honors

Packets 22 - 31

Instructional Packet # 22

Adding and Subtracting Rational Expressions with
Like Denominators

1. Watch the instructional video that I have
   created. It should be in a message in
   Livegrades.

2. Complete the problems that are at the end of
   the video.

3. ~~If needed~~ Search for the topic and find another video that
   provides instruction and/or examples. Watch
   that video.

4. Message me with questions.

5. You will not submit anything
   for this packet.

What Might You Say About a Purple Plaid Shirt With Pink, Orange and Green Stripes?

Simplify the expression, then find your answer. Write the letter of the answer in each box with the exercise number. If the answer has a ●, shade in the box instead of writing a letter in it.

(1) $\dfrac{2}{3n} + \dfrac{1}{3n} + \dfrac{7}{3n}$

(2) $\dfrac{8}{5n} + \dfrac{8}{5n} - \dfrac{1}{5n}$

(3) $\dfrac{6n}{n+4} + \dfrac{3n}{n+4}$

(4) $\dfrac{n^2}{n-3} - \dfrac{9}{n-3}$

(5) $\dfrac{n^2}{2n+16} - \dfrac{64}{2n+16}$

(6) $\dfrac{n^2}{5n+30} + \dfrac{6n}{5n+30}$

(7) $\dfrac{n+4}{10} + \dfrac{3n+8}{10}$

(8) $\dfrac{7t+2}{6t} + \dfrac{2t-11}{6t}$

(9) $\dfrac{t}{t^2+2t-15} + \dfrac{5}{t^2+2t-15}$

(10) $\dfrac{t^2}{t^2-11t+18} - \dfrac{2t}{t^2-11t+18}$

(11) $\dfrac{3t}{t^2+7t+10} + \dfrac{15}{t^2+7t+10}$

(12) $\dfrac{5t^2}{t^2-5t-24} - \dfrac{40t}{t^2-5t-24}$

(13) $\dfrac{t^2-8t}{t^2-1} + \dfrac{7}{t^2-1}$

(14) $\dfrac{2t^2+5t}{t^2+8t+16} - \dfrac{12}{t^2+8t+16}$

Answers 1-7

(K) $\dfrac{n+8}{4}$ (F) $\dfrac{2(n+3)}{5}$ (E) $\dfrac{3}{n}$

(A) $n+3$ (N) $\dfrac{10}{3n}$ ● $\dfrac{n}{8}$

(P) $\dfrac{3}{n+4}$ (U) $\dfrac{3(n+4)}{10}$ (H) $\dfrac{n-8}{2}$

● $\dfrac{n}{5}$ (B) $\dfrac{9n}{n+4}$ (V) $\dfrac{n-3}{3}$

Answers 8-14

(C) $\dfrac{t}{t-9}$ (G) $\dfrac{2(t-1)}{3t}$ ● $\dfrac{5t}{t+3}$

(D) $\dfrac{5t^2}{t+8}$ (S) $\dfrac{2t-3}{t+4}$ (Y) $\dfrac{1}{t-3}$

● $\dfrac{3t}{t-2}$ (T) $\dfrac{3(t-1)}{2t}$ (O) $\dfrac{t+7}{t-1}$

(L) $\dfrac{t-7}{t+1}$ (R) $\dfrac{2t+1}{t+4}$ (I) $\dfrac{3}{t+2}$

11	8	14	12	11	1	6	4	12	10	13	4	14	5	12	3	9	6	11	8	14	2	13	7

NAME ___Packet #24___ DATE ___

Practice ✳ Odds Only ✳

Rational Expressions with Like Denominators

Find each sum or difference. Express in simplest form.

1. $\dfrac{2x}{5} + \dfrac{4x}{5}$

2. $\dfrac{5a}{y} - \dfrac{a}{y}$

3. $\dfrac{3n}{10} - \dfrac{7n}{10}$

4. $\dfrac{3}{x} - \dfrac{9}{x}$

5. $\dfrac{m}{13} + \dfrac{3m}{13}$

6. $\dfrac{9z}{z} - \dfrac{8z}{z}$

7. $\dfrac{t}{3} + \dfrac{t-5}{3}$

8. $\dfrac{b+3}{7} - \dfrac{b}{7}$

9. $\dfrac{w+9}{9} + \dfrac{w+4}{9}$

10. $\dfrac{6r-5}{8} + \dfrac{4r+2}{8}$

11. $\dfrac{c+8}{4} - \dfrac{c+6}{4}$

12. $\dfrac{3}{x+2} + \dfrac{2x}{x+2}$

13. $\dfrac{s+14}{5} - \dfrac{s-14}{5}$

14. $\dfrac{n-6}{4} - \dfrac{n+2}{4}$

15. $\dfrac{w}{y-2} - \dfrac{w}{y-2}$

16. $\dfrac{r}{r-5} - \dfrac{5}{r-5}$

17. $\dfrac{u+t}{r-6} - \dfrac{u+t}{6-r}$

18. $\dfrac{u+t}{r-6} + \dfrac{u+t}{6-r}$

19. $\dfrac{r^2}{r+s} - \dfrac{s^2}{r+s}$

20. $\dfrac{4n^2}{2n-3} + \dfrac{9}{3-2n}$

21. $\dfrac{81}{9+e} - \dfrac{e^2}{9+e}$

22. $\dfrac{3k}{k+h} + \dfrac{3h}{k+h}$

23. $\dfrac{2x+3t}{4x-2t} - \dfrac{t-2x}{4x-2t}$

24. $\dfrac{1}{c-d} + \dfrac{1}{d-c}$

✳ Odds Only ✳

Algebra 2

Name Packet #25

Rational Expression Review

Simplify each and state the excluded values.

1) $\dfrac{5n^3 - 15n^2}{2n - 6}$

2) $\dfrac{r^2 - 14r + 49}{8r^3 - 56r^2}$

Simplify each expression.

3) $\dfrac{x^2 + 5x - 50}{10x - 50} \cdot \dfrac{x + 8}{7x + 56}$

4) $\dfrac{8m^3 + 40m^2}{4m + 20} \cdot \dfrac{2m + 2}{8m^2}$

5) $\dfrac{a^2 + 2a - 80}{6a + 60} \div \dfrac{a^2 - 10a + 16}{10a^2 - 20a}$

6) $\dfrac{k^2 - 9k + 20}{k^2 + 2k - 63} \div \dfrac{k^2 - 10k + 24}{k^2 - 13k + 42}$

7) $\dfrac{r + 6}{25r + 15} + \dfrac{6}{25r + 15}$

8) $\dfrac{x - 4}{x^2 - 2x - 8} + \dfrac{2x - 3}{x^2 - 2x - 8}$

Algebra 2   Name_____

Rational Expressions Assessment

Simplify each expression.

1) $\dfrac{m^2 + 11m + 30}{4m^3 + 24m^2}$

2) $\dfrac{x^2 + 7x - 30}{x^2 + 14x + 40}$

3) $\dfrac{v^2 + 5v - 36}{v + 10} \cdot \dfrac{v^2 + 19v + 90}{v^2 + 18v + 81}$

4) $\dfrac{6x^2 - 48x}{x^2 - 11x + 24} \cdot \dfrac{x + 9}{x^2 + 10x + 9}$

5) $\dfrac{27a^2}{a + 6} \div \dfrac{a^2 + 11a + 24}{a^2 + 9a + 18}$

6) $\dfrac{x - 9}{x^2 - 8x - 9} \div \dfrac{21}{x^2 - 7x - 8}$

7) $\dfrac{x + 4y}{10x} + \dfrac{5x - 5y}{10x}$

8) $\dfrac{6v - 6}{5v + 20} + \dfrac{v + 3}{5v + 20}$

Packet #27.

Name _____ Date _____

Solving Linear Equations

To determine whether a value is a solution of an equation, substitute the value into the equation and simplify.

Example 1 Determine whether (a) $x = 1$ or (b) $x = -2$ is a solution of $5x - 1 = 4$.

a. $5x - 1 = -2x + 6$

$5(1) - 1 \overset{?}{=} -2(1) + 6$ Substitute.

$\qquad 4 = 4 \checkmark$ Simplify.

▶ So, $x = 1$ is a solution.

b. $5x - 1 = -2x + 6$

$5(-2) - 1 \overset{?}{=} -2(-2) + 6$ Substitute.

$\qquad -11 \neq 10 \; ✗$ Simplify.

▶ So, $x = -2$ is *not* a solution.

To solve a linear equation, isolate the variable.

Example 2 Solve each equation. Check your solution.

a. $4x - 3 = 13$

$4x - 3 + 3 = 13 + 3$ Add 3.

$\qquad 4x = 16$ Simplify.

$\qquad \dfrac{4x}{4} = \dfrac{16}{4}$ Divide by 4.

$\qquad x = 4$ Simplify.

b. $2(y - 8) = y + 6$

$2y - 16 = y + 6$ Distributive Property

$2y - y - 16 = y - y + 6$ Subtract y.

$\qquad y - 16 = 6$ Simplify.

$y - 16 + 16 = 6 + 16$ Add 16.

$\qquad y = 22$ Simplify.

Practice EVEN problems only.

Check your answers at BigIdeasMath.com.

Determine whether (a) $x = -1$ or (b) $x = 3$ is a solution of the equation.

1. $5x + 7 = 2$

2. $-4x + 8 = -4$

3. $2x - 1 = 3x - 4$

Solve the equation. Check your solution.

4. $x - 9 = 24$

5. $n + 14 = 0$

6. $-16 = 4y$

7. $-\frac{5}{6}t = -15$

8. $81 = 46 - x$

9. $4x + 5 = 1$

10. $x + 5 = 11x$

11. $9(y - 3) = 45$

12. $6 = 7k + 8 - k$

13. $6n + 3 = -4n + 7$

14. $2c + 5 = 3(c - 8)$

15. $18m + 3(2m + 8) = 0$

16. $\dfrac{w - 6}{5} = 8$

17. $\dfrac{15 + h}{3} = 10$

18. $\dfrac{8 - 3x}{5} = x$

19. $(8r + 6) + (4r - 1) = 14$

20. $\frac{2}{3}y - 3 = 9$

21. $\frac{1}{2}x - \frac{3}{10} = \frac{5}{2}x + \frac{7}{10}$

22. **MONEY** You have a total of $3.25 in change made up of 25 pennies, 6 nickels, 2 dimes, and x quarters. How many quarters do you have?

Name _____ Date _____

Rewriting Literal Equations

An equation that has two or more variables is called a **literal equation**. To rewrite a literal equation, solve for one variable in terms of the other variable(s).

Example 1   Solve each literal equation for y.

a. $3x + 5y = 45$

$3x - 3x + 5y = 45 - 3x$	Subtract 3x from each side.
$5y = 45 - 3x$	Simplify.
$\dfrac{5y}{5} = \dfrac{45 - 3x}{5}$	Divide each side by 5.
$y = 9 - \dfrac{3}{5}x$	Simplify.

▶ The rewritten literal equation is $y = 9 - \frac{3}{5}x$.

b. $2xy + 5y = 7$

$y(2x + 5) = 7$	Distributive Property
$\dfrac{y(2x + 5)}{2x + 5} = \dfrac{7}{2x + 5}$	Divide each side by 2x + 5.
$y = \dfrac{7}{2x + 5}$	Simplify.

▶ The rewritten literal equation is $y = \dfrac{7}{2x + 5}$.

c. $2x = \dfrac{3 + y}{y}$

$2x \cdot y = \dfrac{3 + y}{y} \cdot y$	Multiply each side by y.
$2xy = 3 + y$	Simplify.
$2xy - y = 3 + y - y$	Subtract y from each side.
$2xy - y = 3$	Simplify.
$y(2x - 1) = 3$	Distributive Property
$\dfrac{y(2x - 1)}{2x - 1} = \dfrac{3}{2x - 1}$	Divide each side by 2x - 1.
$y = \dfrac{3}{2x - 1}$	Simplify.

▶ The rewritten literal equation is $y = \dfrac{3}{2x - 1}$.

Practice

Check your answers at BigIdeasMath.com.

Solve the literal equation for y.

1. $x + 3y = 9$

2. $4x - 2y = 16$

3. $2x + 7y = 5$

4. $2x + 3y = 6$

5. $5x - 4y = 10$

6. $x - 2y = 8$

7. $2xy - 6 = 8x$

8. $4x = 9y + xy$

9. $4yz = 3y - 8x$

10. $2xy = 3z + 4y$

11. $\dfrac{2 + 7y}{y} = x$

12. $3x = \dfrac{5 + y}{y}$

Name _____ Date _____

Solving Linear Inequalities

Addition Property of Inequality

When you add the same number to each side of an inequality, the inequality remains true.

Multiplication and Division Properties of Inequality (Case 1)

When you multiply or divide each side of an inequality by the same *positive* number, the inequality remains true.

Subtraction Property of Inequality

When you subtract the same number from each side of an inequality, the inequality remains true.

Multiplication and Division Properties of Inequality (Case 2)

When you multiply or divide each side of an inequality by the same *negative* number, the direction of the inequality symbol must be reversed for the inequality to remain true.

To solve an inequality, isolate the variable.

Example 1 Solve each inequality. Graph the solution.

a. $x + 1 > 3$
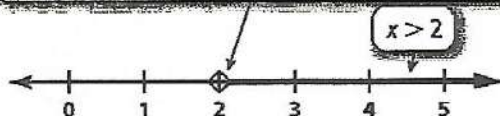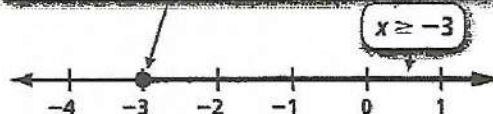
$\underline{-1 \quad -1}$ Subtract 1 from each side.

$x > 2$ Simplify.

▶ The solution is $x > 2$.

Use an open circle because $x = 2$ is *not* a solution.

$\boxed{x > 2}$

b. $-3x \le 9$

$\dfrac{-3x}{-3} \ge \dfrac{9}{-3}$ Divide each side by -3. Reverse the inequality symbol.

$x \ge -3$ Simplify.

▶ The solution is $x \ge -3$.

Use a closed circle because $x = -3$ is a solution.

$\boxed{x \ge -3}$

c. $-25 \ge 9y + 2$

$\underline{-2 \quad -2}$ Subtract 2 from each side.

$-27 \ge 9y$ Simplify.

$\dfrac{-27}{9} \ge \dfrac{9y}{9}$ Divide each side by 9.

$-3 \ge y$ Simplify.

▶ The solution is $y \le -3$.

Use a closed circle because $y = -3$ is a solution.

$\boxed{y \le -3}$

d. $-\dfrac{z}{2} + 6 > 10$

$\underline{-6 \quad -6}$ Subtract 6 from each side.

$-\dfrac{z}{2} > 4$ Simplify.

$-\dfrac{z}{2} \cdot (-2) < 4 \cdot (-2)$ Multiply each side by -2. Reverse the inequality symbol.

$z < -8$ Simplify.

▶ The solution is $z < -8$.

Use an open circle because $z = -8$ is *not* a solution.

$\boxed{z < -8}$

Practice

Check your answers at BigIdeasMath.com.
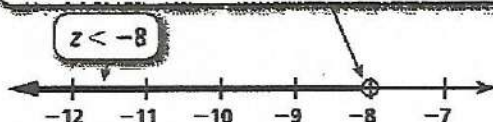
Solve the inequality. Graph the solution.

1. $x + 2 > 7$

2. $y - 5 \le -8$

3. $\dfrac{t}{-3} > -1$

4. $\dfrac{2s}{5} \le 6$

5. $-2q + 1 \ge 15$

6. $3z - 4 < -1$

Name _____ Date _____
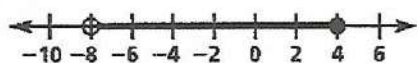
Solving Compound Inequalities

A **compound inequality** is an inequality formed by joining two inequalities with the word "and" or the word "or."

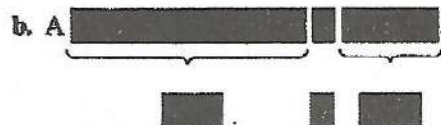**Example 1** Write each sentence as an inequality. Graph each inequality.

a. A number x is greater than -8 and less than or equal to 4.
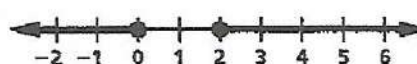
b. A number y is at most 0 or at least 2.

a. A number x is greater than -8 and less than or equal to 4.
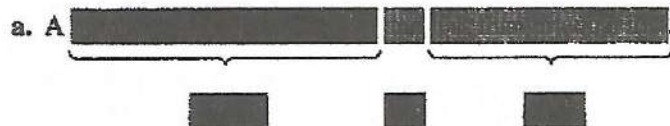
▶ An inequality is $-8 < x \le 4$.

Graph the intersection of the graphs of $x > -8$ and $x \le 4$.

b. A number y is at most 0 or at least 2.

▶ An inequality is $y \le 0$ *or* $y \ge 2$.

Graph the union of the graphs of $y \le 0$ and $y \ge 2$.

You can solve a compound inequality by solving two inequalities separately. When a compound inequality with "and" is written as a single inequality, you can solve the inequality by performing the same operation on each expression.
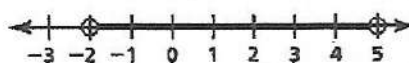
Example 2 Solve $-4 < x - 2 < 3$. Graph the solution.

Separate the compound inequality into two inequalities, then solve.

$-4 < x - 2$	*and*	$x - 2 < 3$	Write two inequalities.
$+2 \quad +2$		$+2 \quad +2$	Add 2 to each side.
$-2 < x$	*and*	$x < 5$	Simplify.

▶ The solution is $-2 < x < 5$.

Practice

Check your answers at BigIdeasMath.com.

Write the sentence as an inequality. Graph the inequality.

1. A number d is more than 0 and less than 10.

2. A number a is fewer than -6 or no less than -3.

Solve the inequality. Graph the solution.

3. $5 \le m + 4 < 10$

4. $-3 < 2k - 5 < 7$

5. $4c + 3 \le -5$ or $c - 8 > -1$

6. $2p + 1 < -7$ or $3 - 2p \le -1$

Name _____ Date _____

Properties of Exponents

$a^m \cdot a^n = a^{m+n}$ Add exponents.	$(ab)^m = a^m b^m$ Find the power of each factor.	$(a^m)^n = a^{mn}$ Multiply exponents.
$\dfrac{a^m}{a^n} = a^{m-n}, a \neq 0$ Subtract exponents.	$\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}, b \neq 0$ Find the power of the numerator and the power of the denominator.	$a^{-n} = \dfrac{1}{a^n}, a \neq 0$ $\qquad$ $a^0 = 1, a \neq 0$

Example 1 Evaluate (a) 4.9^0 and (b) $(-3)^{-4}$.

a. $4.9^0 = 1$ $\qquad$ Definition of zero exponent

b. $(-3)^{-4} = \dfrac{1}{(-3)^4}$ $\qquad$ Definition of negative exponent

$\qquad\qquad = \dfrac{1}{81}$ $\qquad$ Evaluate power.

Example 2 Simplify each expression. Write your answer using only positive exponents.

a. $2^3 \cdot 2^4 = 2^7 = 128$

b. $\dfrac{5^9}{5^6} = 5^{9-6} = 5^3 = 125$

c. $\dfrac{12y^0}{x^{-7}} = 12y^0 x^7 = 12x^7$

d. $\dfrac{x^6 \cdot x^2}{x^5} = \dfrac{x^{6+2}}{x^5} = x^{8-5} = x^3$

e. $(z^4)^2 = z^{4\cdot 2} = z^8$

f. $(6mn)^3 = 6^3 \cdot m^3 \cdot n^3 = 216m^3n^3$

g. $\left(\dfrac{y}{3}\right)^4 = \dfrac{y^4}{3^4} = \dfrac{y^4}{81}$

h. $\dfrac{10x^6y^{-2}}{5x^3y} = \dfrac{10}{5}x^{(6-3)}y^{(-2-1)} = 2x^3y^{-3} = \dfrac{2x^3}{y^3}$

Practice EVEN problems only.

Check your answers at BigIdeasMath.com.

Evaluate the expression.

1. $(-9)^0$

2. -8^{-1}

3. 4^{-3}

4. $\dfrac{-5^0}{3^{-2}}$

Simplify the expression. Write your answer using only positive exponents.

5. $2^9 \cdot 2^{-6}$

6. $-\dfrac{10^8}{10^{12}}$

7. $y \cdot y^{-5}$

8. $\dfrac{x^7}{x^{-7}}$

9. $-5x^7 \cdot x^{-11} \cdot 2x^4$

10. $\dfrac{x^{-2}}{5z^0}$

11. $(w^2)^{-3}$

12. $(8xy)^2$

13. $3x^5 \cdot (-2x)^4$

14. $(-5m^2n^{-1})^3$

15. $\dfrac{z^8}{z^{-2} \cdot z^9}$

16. $\dfrac{(x^5)^3}{x^6}$

17. $\left(\dfrac{3x}{2}\right)^3$

18. $\left(\dfrac{6x^4}{5y}\right)^{-2}$

19. $\dfrac{xy^{-2}}{x^4y^{-3}}$

20. $\dfrac{8xy}{6x^5yz^{-2}}$

21. **METRIC SYSTEM** There are 10^6 micrometers in a meter and 10^3 meters in a kilometer. How many micrometers are there in 10^6 kilometers?