Chapter 3 Closure What have I learned?

Reflection and Synthesis

The activities below offer you a chance to reflect about what you have learned during this chapter. As you work, look for concepts that you feel very comfortable with, ideas that you would like to learn more about, and topics you need more help with. Look for connections between ideas as well as connections with material you learned previously.

1. TEAM BRAINSTORM

What have you studied in this chapter? What ideas were important in what you learned? With your team, brainstorm a list. Be as detailed as you can. To help get you started, a list of Learning Log entries and Math Notes boxes are below.

What topics, ideas, and words that you learned *before* this course are connected to the new ideas in this chapter? Again, be as detailed as you can.

How long can you make your list? Challenge yourselves. Be prepared to share your team's ideas with the class.

Learning Log Entries

- Lesson 3.1.1 – Equivalent Expressions
- Lesson 3.2.2 – Simplifying Rational Expressions
- Lesson 3.2.3 – Multiplying and Dividing Rational Expressions
- Lesson 3.2.4 – Adding and Subtracting Rational Expressions

Math Notes

- Lesson 3.1.3 – Vocabulary for Expressions
- Lesson 3.2.4 – Rewriting Rational Expressions
- Lesson 3.2.5 – Adding and Subtracting Rational Expressions

2. MAKING CONNECTIONS

Below is a list of the vocabulary used in this chapter. Make sure that you are familiar with all of these words and know what they mean. Refer to the glossary or index for any words that you do not yet understand.

closed set	**coefficient**	**constant term**
difference of squares	**equivalent**	**equation**
excluded value	**exponent**	**expression**
factor	**function**	**Giant One**
least common denominator	**polynomial**	**rational expression**
rational function	**rewrite**	**simplify**
substitution	**term**	

Make a concept map showing all of the connections you can find among the key words and ideas listed above. To show a connection between two words, draw a line between them and explain the connection. A word can be connected to any other word as long as you can justify the connection.

While you are making your map, your team may think of related words or ideas that are not listed here. Be sure to include these ideas on your

concept map.

3. PORTFOLIO: EVIDENCE OF MATHEMATICAL PROFICIENCY

This section gives you an opportunity to show growth in your understanding of key mathematical ideas over time as you complete this course.

Your team has been assigned the task of preparing a set of directions for future algebra students on how to perform operations with rational expressions. Your assignment is to select one rational expressions addition or subtraction problem and one rational expressions multiplication or division problem from the chapter. Show step-by-step how to do the two problems you have selected. Next to each step, include an explanation of why you are making that step. You want to be sure your result is correct, so use a graphing tool to check your answer by comparing the graph of the original problem and with the graph of your answer.

A student who has just enrolled in an Algebra 2 class needs help understanding why $(x + y)^2 = x^2 + 2xy + y^2$. She thinks that $(x + y)^2 = x^2 + y^2$. Justify why $(x + y)^2 = x^2 + 2xy + y^2$ so that she is convinced that your answer is correct.

4. WHAT HAVE I LEARNED

Most of the problems in this section represent typical problems found in this chapter. They serve as a gauge for you. You can use them to determine which types of problems you can do well and which types of problems require further study and practice. Even if your teacher does not assign this section, it is a good idea to try these problems and find out for yourself what you know and what you still need to work on.

Solve each problem as completely as you can. The table at the end of the closure section has answers to these problems. It also tells you where you can find additional help and practice with problems like these.

CL 3-127. Solve the following systems algebraically. What does each solution reveal about the graph of the equations in the system?

a. $x + 2y = 17$
$x - y = 2$

b. $4x + 5y = 11$
$2x + 6y = 16$

c. $4x - 3y = -10$
$x = \frac{1}{4}y - 1$

d. $2x + y = -2x + 5$
$3x + 2y = 2x + 3y$

CL 3-128. Solve each equation after first rewriting it in a simpler equivalent form.

a. $3(2x - 1) + 12 = 4x - 3$

b. $\frac{3x}{7} + \frac{2}{7} = 2$

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

d. $4x(x - 2) = (2x + 1)(2x - 3)$

CL 3-129. Which of the following pairs of equations or expressions are equivalent? Justify your reasoning either by using algebra to transform the first equation or expression into the second or by demonstrating with a counterexample.

a. $n(2n + 1)(2n - 1)$; $4n^2 - n$

b. $(2x - 1)^2$; $4x^2 - 1$

c. $10x^2 - 55x - 105$; $5(2x + 3)(x - 7)$

d. $\left(\frac{4x^{12}}{-2x^8}\right)^3$; $-8x^{12}$

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

f. $\sqrt{108}$; $6\sqrt{3}$

CL 3-130. Perform the indicated operation on each of the following rational expressions. Be sure to state any values of the excluded variable and that your final answer is simplified. If a graphing tool is available, check the graph of the original problem to see if it coincides with the graph of your answer.

a. $\frac{x^2-x-6}{x^2-9} \cdot \frac{x^2+5x+6}{x^2+4x+4}$

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

CL 3-131. Evan spent the summer earning money so he could buy the classic car of his dreams. He purchased the car for $2295 from Fast Deal Freddie, the local used car salesman. Freddie told Evan that the car would increase by half its value after five years. Evan knows that this model appreciates 8% annually. Did Freddie try to trick Evan, or was his claim accurate?

CL 3-132. Decide whether each function below is even, odd or neither, and explain your reasoning.

a. $y = x^3 + x$

b. $y = x^2 + x$

c. $y = x^4 + x^2$

CL 3-133. First, identify the parent graphs of the following equations. Then, describe how their graphs would be transformed from the parent graphs.

a. $y = 0.25(x - 8)^3 + 2$

b. $(x + 3)^2 + y^2 = 25$

c. $y = |x - 5| + 3$

CL 3-134. Last year, Jennifer paid the following for her electricity based on the number of kWh (kilowatt-hours) that she used each month.

kWh used	0 – 20,000	20,000 +
Cost per kWh (cents)	9.1225	6.5714

a. Make a graph of Jennifer's electrical rates.

b. Describe the domain of each of the pieces of this function. Then write an equation for each part of the domain.

c. This year the electrical company has said it is going to raise its rates by 3%. Describe how this will transform the graph and then write new equations for each part of the domain.

CL 3-135. Describe the domain and range of each function or sequence below.

a. The function $f(x) = (x - 2)^2$

b. The sequence $t(n) = 3n - 5$

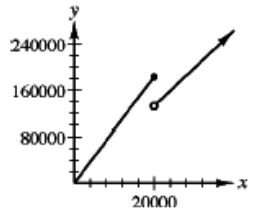
CL 3-136. Find the x- and y-intercepts of $y = x^2 - 3x - 3$.

CL 3-137. Check your answers using the table at the end of this section. Which problems do you feel confident about? Which problems were hard? Have you worked on problems like these in math classes you have taken before? Use the table to make a list of topics with which you need help and a list of topics you need to practice more.

Answers and Support for Closure Activity #4
What Have I Learned?

Note: MN = Math Note, LL = Learning Log

Problem	Solutions	Need Help?	More Practice
CL 3-127.	a. (7, 5) b. (−1, 3) c.$(-\frac{1}{4}, 3)$ d. (1, 1)	Lesson 1.1.3 Checkpoint 2B	Problems 3-9, 3-64, and 3-93
CL 3-128.	a. −6 b. 4 c. $(-\frac{1}{3}, 2)$ d. $\frac{3}{4}$	Lesson 2.2.3	Problems 3-25, 3-38, 3-43, 3-45,3-51, 3-68, and 3-80
CL 3-129	Methods vary. Sample answers below. a. $n(2n + 1)(2n - 1) = (2n^2 + n)(2n - 1)$ $= 4n^3 - 2n^2 + 2n^2 - n = 4n^3 - n$ Not equivalent b. $(2x - 1)^2 = (2x - 1)(2x - 1)$ $= 4x^2 - 2x - 2x + 1 = 4x^2 - 4x + 1$ Not equivalent c. $10x^2 - 55x - 105 = 5(2x^2 - 11x - 21)$ $= 5(2x + 3)(x - 7)$ Equivalent d. $(\frac{4x^{12}}{-2x^8})^3 = \frac{4^3x^{36}}{(-2)^3x^{24}} = \frac{64x^{(36-24)}}{-8}$ $= -8x^{12}$ Equivalent e. $2x - 3y = 6, -3y = -2x + 6,$ $y = \frac{2}{3}x - 2$ Not equivalent f. $\sqrt{108} = \sqrt{36 \cdot 3} = \sqrt{6^2 \cdot 3} = 6\sqrt{3}$ Equivalent	Lessons 2.2.1 and2.2.2	Problems 3-2, 3-3, 3-5, 3-6, 3-15,3-16, 3-41, and 3-46
CL 3-130.	a. 1 b. $\frac{(x+1)(2x+1)}{(x-1)} = \frac{2x^2+3x+1}{x-1}$	Lessons 3.2.2 and3.2.3	Problems 3-78, 3-90, 3-91, and 3-113
CL 3-131.	$y = (1.08)^t$ so when $t = 5$, $y \approx 1.46$ which is about 1.5, so Freddie's claim was fairly accurate.	Lessons A.3.2 andB.2.3	Problems 3-49, 3-65, and 3-94

CL 3-132.	a. odd, $f(-x) = -f(x)$ b. neither, $f(-x)$ does not equal $f(x)$ or $-f(x)$ c. even, $f(-x) = f(x)$	Lesson 2.2.3 MN: 2.2.5 LL: 2.2.3	Problems 3-9, 3-29, 3-33, and 3-51
CL 3-133.	a. parent: $y = x^3$; cubic shifted up 2 and right 8 and compressed by a factor of 0.25 b.parent: $x^2 + y^2 = r^2$; circle with center at (−3, 0) and radius of 5 c.parent: $y = \lvert x \rvert$; absolute value shifted up 3 and right 5	Lessons 2.2.1, 2.2.2,2.2.3, and 2.2.4	Problems 3-4, 3-5, 3-35, 3-54, and3-83
CL 3-134.	a.  b. $0 \le x \le 20{,}000$ and $x > 20{,}000$; $f_1(x) = 9.1225x$ and $f_2(x) = 6.5714x$ c. The slope of the lines will change. $f_1(x) = 9.3962x$ and $f_2(x) = 6.7685x$	Lesson 2.2.5	Problems 3-34, 3-56, 3-116, and3-118
CL 3-135.	a. Domain: all real numbers Range: $y \ge 0$ b. Domain: all positive whole numbers; Range: all numbers of the form $3n - 5$	Lesson 1.1.3 Checkpoint 3B MN: 1.1.3	Problems 1-34, 1-62, 1-109, 2-4,2-108, 3-8, 3-31, and 3-84
CL 3-136.	x-intercepts: $(\frac{3+\sqrt{21}}{2}, 0)$ and $(\frac{3-\sqrt{21}}{2}, 0)$ y-intercept: (0, −3)	MN: 1.1.4	Problems 1-48, 1-106, and 3-28