Formal Lesson Plan 2

Transformations	
Teacher Candidate	Josie Becker
Mentor Teacher	James Johnson
University Coordinator	Pat Perkins
School	McClure Middle School
Grade	8th grade
Subject	Math, Algebra
Date	5-14-13

1. Context for Learning – *Who are the students you are teaching in this class?*

1.1 – What is the name of the course you are documenting?

8th grade honors- Algebra

1.2 – What is the length of the course?

54 min

1.3 – What is the class schedule?

10:56-11:50am

1.4 – Total number of students	33	Male	12	Female	21
1.5 – Number of students with limited English proficiency			1		
1.6 – Number of students identified as gifted and talented			6		
1.7 – Number of students with Individualized Education Plans (IEPs)			0		
1.8 – Number of students with 504 plans			0		

1.9 – Attach a chart that summarizes the required accommodations or modifications for any students that will affect your instruction of this lesson. Consult with your mentor teacher to complete the chart.

1.10 – Describe the range of abilities in the classroom.

Based on the Math Benchmark Assessment (MBA) taken in late April, students in this classroom have the following proficiencies of core standards assessed by the MBA. 70% of the students received scores meeting standards, 24% were below standard, and 6% were well below standard. These statistics, along with the number of students identified as gifted, reflects a high achieving class overall. However, several of the students do struggle with core math concepts, thus there is a wide range of abilities reflected in the class.

1.11 – Describe the range of socio-economic backgrounds of the students.

This class is made up of students from a wide range of socio-economic backgrounds. While all students live with a guardian, several are bussed from upwards of 15miles away and must commute over an hour to attend class due to undesired local neighborhood schools. In general, student socio-economic backgrounds fit the model of Queen Anne neighborhoods. The majority of students come from high socioeconomic status (SES) while only a few are considered low SES.

1.12 – Describe the racial/ethnic composition of the classroom and how you make your teaching and learning culturally responsive.

This class is composed of the following racial/ethnic groups:

Anglo	82.0%
Asian	6.0%
Hispanic	6.0%
Japanese-American	6.0%

This lesson is made culturally responsive by using collaborative group work to provide students with multiple perspectives and contributions. This lesson is differentiated based on using multiple methods of demonstrating learning. In this way, students of different cultures can contribute to their groups in meaningful ways using their specific backgrounds and skill sets as a foundation for learning.

1.13 – What prior knowledge, skills, and academic background do students bring to the lesson? (Consider previous learning experiences, assessment data, etc.)

The students in this class have just completed a unit on Probability. Prior to that, they participated in a unit on transformations and rational functions. Specifically, this period is a high achieving class and the majority of students have demonstrated proficiency in graphing and describing transformations.

1.14 – What do you know about the students' conversational and academic English? How do you know?

Based on written assessments and formative conversations with the class, all students in this class are proficient in conversational English. Based on formative assessment, only one student struggles with academic English. This is due to his status as a Former ELL student.

1.15 – Is there any ability grouping or tracking in the class? If so, please describe how it affects your class.

This class is labeled as an honors 8th grade class. This means that students are taught algebra instead of the typical 8th grade curriculum.

1.16 – What additional needs might students have?

Some students are not confident enough to speak up in class to ask questions during direct instruction. As a result, specific students are asked individually if they have questions or any areas of confusion. This is done during collaborative work time.

1.17 – Describe any district, school, grade-level, and/or cooperating teacher requirements or expectations that might impact your planning or delivery of instruction, such as required curricula, pacing plan, use of specific instructional strategies, or standardized tests, etc.

As a pilot school for the Math Benchmark Assessment (MBA), McClure is not required to follow the Seattle Public School pacing guide, thus the timelines created are a collaborative effort between myself and my mentor teacher. The next MBA will be given to students in May, and the standards it will assess have not been revealed, thus this lesson is not specifically geared toward the specific standards it will address.

This lesson is based on the "Discovering Algebra: An Investigative Approach" textbook chapter 8.6. The chosen instructional strategy is complex instruction (mixed ability grouping) rooted in differentiated instruction. (Tomilson)

1.18 – Describe any classroom rules, routines and/or classroom management issues that affect the lesson. How might you proactively address those issues in your lesson design?

I will require student to sit in designated groups. At this point in the year, many students have grown accustomed to sitting in the same seats next to their friends. I will address the potential objection to changing seats by explaining the purpose of grouping students with whom they do not usually interact, as well as remind them that the grouping will not be permanent.

1.19 – Identify any textbook or instructional program you primarily use for instruction. If a textbook, please provide the name, publisher, and date of publication.

Algebra Textbook:
Murdock, J., Kamischke, E., Kamischke, E. (2007). Chapter 8.6 Introduction to rational functions. In K. Ferraioli (Ed.), Discovering algebra: An investigative approach (474-483). Emeryville, CA: Key Curriculum Press.

2. Lesson Plan Explanation – *Why are you teaching this lesson?*

2.1 – Upon what assessment data or previous lessons are you building?

This is a review lesson. The students have already participated in a full unit on transformations and rational functions. This review lesson is part of a series of review days in order to further define students' skills in this subject area, remind student of key ideas and vocabulary associated with the concepts, and build on students' prior understanding. Upon completion of the previous unit on transformations, students were given a pre and posttest. The results of the posttest suggest that students averaged a 90.3%, thereby demonstrating proficiency in the key concepts.

2.2 – What requisite skills do students need in order to access the lesson and participate fully?

Students must have prior knowledge of vocabulary associated with transformations and rational functions. Additionally, students will need to have a basic understanding of how to graph functions and describe graphs as transformations of a parent functions.

2.3 – How does the content build on what the students already know and are able to do?

Students have previously worked through a 12 day unit on transformations. Within this unit, students graphed functions and described them as transformations of a parent function.

2.4 – How does this lesson fit in the curriculum?

This lesson is the second in a series of 15 review lessons at the end of the school year.

2.5 – How does this lesson build on previous lessons or previous learning?

This is a review lesson. The students have already participated in a full unit on transformations and rational functions. This review lesson is part of a series of review days in order to further define students' skills in this subject area, remind student of key ideas and vocabulary associated with the concepts, and build on students' prior understanding.

2.6 – How will the learning in this lesson be further developed in subsequent lessons?

The learning in this lesson will not be directly developed further within this unit. However, underlying concepts such as graphing and verbal/written descriptions will be further developed throughout the 15 review lessons.

3. Learning Targets – *What are the objectives for the lesson?*

3.1 – What is the title of your lesson?

Review: Transformations and Rational Functions

3.2 – Summarize the content focus of the lesson. This summary might take the form of a "big idea" or "essential question."

Students will graph functions and describe them as transformations of a parent function.

3.3 – Cite the EALRs/standards using the numbers and text. Usually limit the lesson to 1 – 2 EALRs.

CCSS.Math.Content.HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases

3.4 – Cite the corresponding GLEs/performance expectations using the numbers and text.

CCSS.Math.Content.HSF-IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

CCSS.Math.Content.HSF-IF.C.7d (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

3.5 – Cite the objectives (skills or concepts) for the lesson. What do you want students to think, know and/or be able to do at the end of the lesson? Be concrete and specific. The objectives need to be measurable. Use action verbs. They need to be aligned with the GLEs/performance expectations and EALRs/standards.

Students will graph at least 2 functions and then describe them as transformations of the

appropriate parent function.
3.6 – Rephrase your learning targets using student-friendly language.
I will graph at least two functions and then describe them as transformations of the parent function.
3.7 – How will students demonstrate this? Describe observable actions. – e.g. *Given* (learning activities or teaching strategies)*, the students will* (assessable behaviors) *in order to demonstrate* (connection to EALRs/Standards).
Students will participate in inquiry-based instruction in order to demonstrate their understanding of specific parent functions and their key characteristics. Students will work collaboratively to graph several functions and describe them as transformations in order to demonstrate their conceptual understanding of the functions. Students will engage in small group or pair-share discussions in order to verbally demonstrate their conceptual understanding of the transformations.
3.8 – What do you as the teacher know about this particular concept/topic etc.?
As an undergraduate student of mathematics, I have had several classes based on transformations as well as functional notation. Additional teaching techniques and instructional examples have come from the class text (Algebra) and book on differentiated instruction by Tomilson.
3.9 – Where did you find this information? (List specific resources, using APA style.)
Algebra Textbook: Murdock, J., Kamischke, E., Kamischke, E. (2007). Chapter 8.6 Introduction to rational functions. In K. Ferraioli (Ed.), Discovering algebra: An investigative approach (474-483). Emeryville, CA: Key Curriculum Press.
3.10 – Academic Language – What are the linguistic demands embedded in the learning targets? (Consider what language and literacy skills students may need to know in order to demonstrate their competency on the learning targets successfully.)
Students will need to have a good grasp of English grammar in order to use full sentences to describe the functions as transformations. Additionally, students will need to be able to use either data or the graph and interpret the conceptual meaning of the given information as it relates to a parent function.
3.11 – Academic Language – What key vocabulary (content-specific terms) do you need to teach?
Key vocabulary words include: • Shift • Units • Quadratic function • Absolute value function • Rational function • Asymptote • Excluded value • Transformation • Translation
3.12 – Academic Language Functions – What are students doing with language to express their developing understanding of the content you are teaching?
Students will use the vocabulary words and give graphs or data to describe the functions as transformations of a parent function. Part of this task will include interpreting the graph as it relates to the parent function.
3.13 – Academic Language Forms – What words and phrases (implied grammatical features and syntactic structures) do students need in order to express their understanding of the content you are teaching? How will you teach students the relevant grammatical constructions?
Students will describe the functions using the format: This function is in the family of functions given by the parent function _____. The graph of the parent

function shifted ____ units to the _____ (right/left, up/down).

3.14 – Academic Language Fluency – What opportunities will you provide for students to practice the new language and develop fluency, both written and oral?

Students will have the opportunity to express and develop their verbal language fluency during the inquiry-based instruction, collaborative group work, and closing discussion. Students will further develop this fluency in written form by showing their work in their personal math journals and by completing the exit ticket.

4. Lesson Assessment – *How will students demonstrate their learning?*

Formative Assessment (Process)

4.1 – How will you know that the students are learning/working towards the learning targets?

During the warm up activities, the teacher will formatively assess by marking completed tasks with a stamp in students' journals. The teacher will monitor student progress throughout both the warm up segment and the group work portion of the lesson.

4.2 – How will students demonstrate their understanding?

Students will demonstrate learning by writing in their journals and graphing functions on graphing paper (to be pasted into their journals).

4.3 – Describe the ways in which you will use these assessments to inform your teaching decisions during the lesson.

During the group work, formative assessment will determine whether or not mini lessons will be given to individual students.

Summative Assessment (Product)

4.4 – In what ways will the evidence document student achievement?

The exit ticket will demonstrate student understanding of functions as transformations of parent functions. The exit ticket will also provide a demonstration of students' capability to graph various functions.

4.5 – How might you modify your assessment(s) for the students with whom you are working?

Students who struggle with graphing will be given the opportunity to work with a partner and receive prompts from the teacher. Students who need additional English support will receive verbal prompts and feedback while completing the exit ticket.

4.6 – How will students be able to reflect upon and self-assess their learning?

The exit ticket will give students the opportunity to rank their level of confidence in working with transformations.

4.7 – To what extent are your assessments aligned with your objectives?

The exit ticket is directly aligned with the objectives, but limits the number of graphs to 1.

4.8 – Complete the following table to highlight what the students will do to demonstrate competence specific to learning for this lesson. Consider the following questions:

Formative Assessment

- In what ways will you monitor student learning during the lesson and how might this guide your instruction?
- What specific actions do you expect to observe?
- How will you record what you see and hear?
- What feedback will you provide?
- How will your feedback support students in meeting the learning targets?

Summative Assessment

- What evidence of student learning will you collect?

- What criteria will you use to judge whether or not your students are meeting the learning targets?
- What are your evaluative criteria (or rubric) and how do they measure student proficiency for your learning targets?

Description of formative assessment activity	Evaluative criteria	What the assessment is designed to assess	Feedback to students
Observation: Warm Up	Completion of writing the learning targets. Correctly identifying the function rules.	Can students visually identify the rules of three functions based on their graphs?	Stamp in their journals.
Inquiry-based instruction	Participation in answering questions.	Can students justify why adding constants will shift the graph in a certain direction?	Affirmation, encouragement, further prompting.
Monitoring: Group work	Staying on task, completion of the learning target, and collaborative work.	Are students making adequate progress in completing the learning target? Are students capable of graphing different functions? Can students describe the functions using full sentences? Are students able to work together in a group?	The teacher will prompt groups who are struggling, give mini lessons to struggling students, and affirm student work.
Closing Discussion	What is a transformation? What is a parent function? Why is it important to know?	Can students verbally articulate key concepts around transformations as well as why the concepts are important?	The teacher will affirm good conversations and ask for student input in front of the whole class.
Description of summative assessment activity	**Evaluative criteria**	**What the assessment is designed to assess**	**Feedback to students**
Exit ticket	Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. Graph rational	Can students graph specific functions on an x-y coordinate plane and describe the graphs as transformations of a parent function?	Assessed Exit tickets with identified resources for further learning in areas students struggle.

	functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.		

4.8 – Academic Language – Identify the linguistic demands in your assessments and how they might be modified.

Students will need to write using full sentences to describe a function as a transformation of a parent function. Students will be allowed to ask clarifying questions, and in some cases work with a partner so as to give all students an opportunity to succeed.

4.9 – Academic Language – How is the understanding of academic language being assessed?

Students will be assessed on the specific vocabulary they use in their description of the functions on the exit ticket. Students will be formatively assessed in a similar manner throughout the closing discussion.

5. Instructing and Engaging Students in Learning – *What will happen in the lesson?*

5.1 – What co-teaching strategy will be used during this lesson? *(if applicable, check appropriate method)*

One Teach, One Observe (lead)		One Teach, One Drift (lead)		Station Teaching	
One Teach, One Observe (observe)		One Teach, One Drift (drift)		Supplemental Teaching	
Parallel Teaching		Team Teaching		Alternative Teaching	

If not applicable, is this lesson during your solo time in the classroom?	Yes	**X**	No	

5.2 – What learning activities do you have planned for the students? (This describes what the students do.)

Students will participate in inquiry-based instruction and discussion of homework. Students will also work collaboratively in groups to graph functions and determine the function rules of several graphed functions.

5.3 – What instructional strategies will you use? (This describes what the teacher does.)

Inquiry-based instruction, group work monitoring.

5.4 – What opportunities will the students have to articulate the learning target(s), monitor their own progress, and identify support needed to achieve the learning target(s)?

Students will write the learning target in their journal, use the learning target to remain on task during group work, discuss the learning target and why it is important during the closing discussion, and finally, demonstrate proficiency by completing the exit ticket.

5.5 – Describe the sequence of steps in the lesson in the following table. General lesson sequences may be more directive (e.g., ITIP) or open (constructivist). Whatever design is used, the lesson needs to be explicitly outlined.

For example, an ITIP lesson sequence would include the following sequence:

- Objective & Purpose → Anticipatory Set → Input/Activity →Modeling →Check for Understanding →Guided Practice →Independent Practice

For a constructivist lesson:

- Objective & Purpose →Explore/Experiment →Hypothesize/Explain →Report/Assess

Sufficient detail is needed to see intention of the learning experiences. Consider the following questions:

- How will you communicate the learning targets to the students?

- How will you communicate your expectations to the students?
- How will you connect to your students' previous experiences?
- How will you link the lesson to their lives as students?
- What are the key teacher questions or prompts?
- What are the procedural directions for students to follow?
- How will you explicitly teach/model or demonstrate the skill/strategy/concept?
- How will you adapt the instructional procedures to meet the needs of the students whom you are teaching?
- What learning activities make up the lesson?
- What kind of examples/samples will you provide for your students?
- How will students know where the work is going and what is expected of them?
- What opportunities will you provide for students to practice this new skill/strategy?
- What questions might you pose to push student thinking and check for understanding?
- What feedback do you plan to provide?
- How might you correct student misunderstandings?
- What kind of opportunities will you provide students to apply this new learning and demonstrate mastery?
- How might students evaluate their work and its implications?

It should be clear that the learning experiences are aligned with the learning targets and assessment tasks. The sequence of lesson steps should reflect:

- Multiple approaches to learning that are responsive to the description of students provided in the *Context for Learning*.
- Research and principles of effective practice.
- A transformative multicultural perspective.
- Attempts to stimulate problem solving and critical thinking.

Complete the following table:

- Provide an estimate of time.
- List the sequence of the various learning experiences in the lesson.
- Articulate a purpose for your selection of each significant learning activity. Focus on the choice of instructional strategies and on why significant learning experiences are chosen for student engagement. Your purpose statements can help identify evidence of effectiveness in your teaching.

Time	Learning experiences	Purpose
(5min)	Warm up: Write the learning target in your journal. Match the following functions to their parent function.	The warm up will make use of prior knowledge and act as a framework of understanding.
(5min)	Homework Review: Students will have the opportunity to ask questions on homework from the day before.	Homework discussions will provide closure on the topic from the day before.
(7min)	Inquiry-based instruction: Notation: F(x) +c and F(x+c) Explain how one shifts the function up/down, and the other shifts it horizontally.	Inquiry-based instruction is used so as to engage students in active learning and build on prior understanding.

(20min) (5min) (12min)	What happens when we multiply the function by -1? (It reflects the function about the x-axis) Group Work (worksheet: students will graph several functions and determine the function rule of graphed functions) Pair-share discussion Standards Based Exit Ticket • Rational Functions • Transformations of parent functions	Collaborative work is used to provide students with a team-minded approach to learning, allow peer assistance, and enable verbal and intrapersonal learning to take place. Discussions are used as a verbal learning opportunity and provide lesson closure. Formative assessment The exit ticket provides the teacher with an opportunity for summative assessment and gives students an opportunity to self-assess their understanding.

5.6 – Closure – How will the key points of the lesson be articulated?

The key points will be discussed in table groups during the "pair-share" discussion. Additionally, the key points will be articulated in writing and through graphing on the exit ticket.

5.7 – Closure – What questions or prompts will you use to elicit student articulation of their progress towards the attaining the learning target(s)?

- What is a transformation?
- What is a parent function?
- Why is it important to know?

5.8 – Closure – How will students rethink and revise their understanding and work?

Based on the results of the exit ticket, students will determine if they need additionally practice work on transformations. Students will have access to additional worksheets if necessary.

5.9 – Materials – What materials, including community resources and educational technology, will you need in order to teach this lesson?

- Document Camera
- Dry erase markers
- Worksheets
- Graphing paper

5.10 – Materials – What materials will students need for this lesson?

- Worksheets
- Math journals
- Pencil
- Graph paper
- Ruler

5.11 – Grouping of students for learning – How will student learning groups be formed?

The groups will be teacher directed and pre-determined (see attached seating chart).

5.12 – Management and Safety Issues – Are there management and/or safety issues (physical and/or emotional) that need to be considered when teaching this lesson? If so, list them. What will you do to

prepare your students for these issues?
As students will be in teacher-determined groups, there may be some opposition to the seating initially. As it is late in the spring, many students prefer to sit with friends. However, for the purpose of this lesson and to provide students with an environment of focus, the seating arrangement has been selected. In order to combat any opposition, the teacher will explain the reasoning behind the seating assignments.
5.13 – Family involvement – Describe any family involvement that accompanies this lesson. If the lesson does not explicitly require family involvement, then describe how the lesson fits in with the family involvement plan for the unit. Letting parents know how the student is doing in the course may also be part of the plan
Prior to this lesson, parents have been informed of a systematic review that their students will be going through. Help in the form of homework review will not be required, though it is encouraged. Additionally, the results of the students' work will be published in a quarterly newsletter sent home to parents.