School of Education
Service – Leadership – Competence – Character

Lesson Design Template

Teacher Candidate  Elizabeth Lenz
Mentor Teacher      Catherine Kendall
University Coordinator Elizabeth Anderson
School              Ellensburg High School
Grade               10th grade
Subject             Math—Algebra II
Date                December 5th, 2012

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?
Algebra II

1.2 – What is the length of the course?
1 hour

1.3 – What is the class schedule?
8:30-9:30, MTWThF

1.4 – Total number of students 20  Male 9  Female 11

1.5 – Number of students with limited English proficiency 1

1.6 – Number of students identified as gifted and talented 3

1.7 – Number of students with Individualized Education Plans (IEPs) 1

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.
Since this is a 10th grade Algebra II class, these students are all pretty high achieving and successful in math. There are three students that are very talented; I differentiate instruction up whenever possible.

1.11 – Describe the range of socio-economic backgrounds of the students.
The SES of the majority of Ellensburg’s population is middle class. Consequently, all of my students are from the middle class.

1.12 – Describe the racial/ethnic composition of the classroom and how you make your teaching and learning culturally responsive.
The majority of Ellensburg’s population is Caucasian. The student with limited English proficiency just moved to Ellensburg from Korea. She is very successful at math, and is learning English fairly quickly.

1.13 – What prior knowledge, skills, and academic background do students bring to the lesson? (Consider previous learning experiences, assessment data, etc.)
Students need to bring their prior knowledge about probability and statistics from Algebra I, and what we have studied thus far in unit 3. This includes definitions of probability terms, knowledge of how to compute probabilities, and how to use our class’ problem solving steps.

1.14 – What do you know about the students’ conversational and academic English? How do you know?
I know students use conversational English when talking about concepts and homework with their peers because I hear them while they are in class. However, they are required to use the correct academic language and terms when writing explanations for answers on homework and tests. Most all of the students are good at doing this. Some need a little reminding and encouragement, but I know they are...
1.15 – Is there any ability grouping or tracking in the class? If so, please describe how it affects your class.

I do my best to avoid ability grouping and tracking in this class. However, these are the students that chose to take Algebra II as sophomores, so there is not a huge range of abilities in this class. I try not to create table groups that include only the gifted and talented students, and then other groups with the ELL and IEP students. I make a conscious effort to create groups with all ability levels.

1.16 – What additional needs might students have?

Students may need a reminder of the problem solving process and of definitions of the academic language they are expected to be using.

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.

We are required to align instruction to Washington State’s standards, so I need to be sure that I am teaching what they say. For this lesson, the PE’s I am aligning instruction to are listed below.

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?

Students are able to work in pairs or by themselves during this lesson, so students will need to remember classroom procedures for working with others. They must keep their voices at a reasonable level, and be respectful to their peers and peers’ ideas. I will address these routines during the lesson by reminding students of these two things before I hand out their problem solving activity.

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.

For this lesson, I made up the content and problem solving worksheet. It was not taken from the textbook we usually use, which is an Algebra II textbook that was published by Prentice Hall in 2010.

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

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

We are in the middle of our probability and statistics unit. We have spent some time reviewing concepts learned last year, computed probabilities, learned about tree diagrams, and now are about to learn the Fundamental Counting Principle.

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

Students need to be able to compute probabilities, and have a background in working with our problem solving steps. It may be helpful for them to remember when and how to use a tree diagram.

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

This lesson builds on students’ knowledge about probability and statistics, and how to find the total number of outcomes and sample space.

2.4 – How does this lesson fit in the curriculum?

This fits into the curriculum part way through our probability unit because students need to be able to find a shortcut to finding the total possible outcomes of an experiment before they learn more difficult concepts such as compound events, and probability with and without replacement.

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

This lesson builds on previous lessons of problem solving, and lessons involving probabilities where students have to compute the total number of possible outcomes for an experiment.

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

Students will need to utilize their knowledge of the Fundamental Counting principle in future lessons to
3. Learning Targets – What are the objectives for the lesson?

3.1 – What is the title of your lesson?
Introduction of the Fundamental Counting Principle.

3.2 – Summarize the content focus of the lesson. This summary might take the form of a “big idea” or “essential question.”
The big idea of this lesson is to problem solve to come up with the Fundamental Counting Principle. If students are not able to discover it, I will explicitly teach it.

3.3 – Cite the EALRs/standards using the numbers and text. Usually limit the lesson to 1 – 2 EALRs.
A2.6—Probability, data, and distributions.

3.4 – Cite the corresponding GLEs/performance expectations using the numbers and text.
A2.6.A—Apply the Fundamental Counting Principle and the ideas of order and replacement to calculate probabilities in situation arising from two-stage experiments (compounded events).
A2.6.C—Compute permutations and combinations, and use the results to calculate probabilities.

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.
SWBAT problem solve to discover what the Fundamental Counting Principle is.
SWBAT calculate probabilities that involve combinations.

3.6 – Rephrase your learning targets using student-friendly language.
Students will be completing a problem solving activity to try and discover a principle of probability. Students will be calculating a few probabilities that involve combinations.

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).
Given the problem solving activity, students will be working with partners to complete the activity in order to hopefully discover the Fundamental Counting principle. If they are not able to discover it on their own, I will be explicitly teaching and modeling it later in the lesson. Then they will have another chance to demonstrate their achieving the objectives and PE’s by individually completing an exit slip at the end of class.

3.8 – What do you as the teacher know about this particular concept/topic etc.?
As the teacher, I know how and when to use the Fundamental Counting principle, other more complex uses for it, and how to compute probabilities with combinations.

3.9 – Where did you find this information? (List specific resources, using APA style.)
I used my prior knowledge and experience for understanding this information regarding the Fundamental Counting Principle and problem solving steps. I refreshed my memory about the Principle and used variations of the problems given on the following website:

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 know what is meant by problem solving in our classroom. They will also need to know how to calculate probabilities.
### 3.11 – Academic Language – What key vocabulary (content-specific terms) do you need to teach?

Today I will be teaching what the Fundamental Counting principle is, after they will be problem solving about it. Students will learn the mathematical definition for this term.

### 3.12 – Academic Language Functions – What are students doing with language to express their developing understanding of the content you are teaching?

Students will need to use the correct probability language when writing explanations on homework and in the problem solving activity. They will also have to be able to interpret the words in story problems.

### 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?

There are no unusual words or phrases that students will need to use for this lesson.

### 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 get the chance to develop fluency with the probability language by writing explanations and reasons for why they are doing the math the way they are. Some students will also be coming up to the front of the class to explain how they found their answers, and they are required to use the correct language. Unit language quizzes will also be given to encourage students to study and learn how to use the academic language correctly.

### 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?

I will be walking around and looking at students’ problem solving worksheets to see how they are coming along. Students will also be completing an exit slip that will show whether or not students understand how to use the Fundamental Counting principle.

4.2 – How will students demonstrate their understanding?

Students will demonstrate their understanding by correctly applying the Fundamental Counting principle to the problem on their exit slip, and by completing the problem solving worksheet. Homework will also be a formative assessment that students will turn in tomorrow.

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

If students are not able to work through the problem solving sheet, I will need to change gears and teach using guided instruction. After class, I will grade the exit slips and see how many students correctly used the Fundamental Counting principle. If students did well, we will move to the next step involving the principle. If most of the students missed the exit slip problem, I will alter my lesson plan for tomorrow to re-teach this principle in a new way.

#### Summative Assessment (Product)

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

The unit test will test if students understand how to use the Fundamental Counting principle, as well as other probability related math. If they do well on the test, it will be evidenced that they achieved the standards and previous objectives.

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

The student with the IEP has a visual impairment, so we reserve the desk closest to the door for her so she does not have to wind around the classroom to get to her seat. Also, since the unit test is in a paper form, I will make an enlarged copy for her. For my student with limited English proficiency, I put special notes and definitions of common, non-math words that she may not know on the unit test.

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

Students will be able to self-assess the problem solving activity used as a formative assessment, because
we will be grading them in class. If students missed some of the questions, they will have the opportunity to ask how to do them correctly.

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

For this lesson, the assessments align very closely to the objectives. I generally try to always align them so students are not surprised and know what to work towards.

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?

<table>
<thead>
<tr>
<th>Description of formative assessment activity</th>
<th>Evaluative criteria</th>
<th>What the assessment is designed to assess</th>
<th>Feedback to students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be problem solving to try to come up with the Fundamental Counting Principle. They have a problem to work through, using the problem solving steps. They will also finish an exit slip at the end of class.</td>
<td>I will observe if the students have completed the problem correctly. I will also be drifting while they are problem solving to see their approaches to the problem.</td>
<td>If students understand the problem solving steps, can reason appropriately, and if they can compute probabilities.</td>
<td>I will grade the problem solving activity and the exit slip after class, and return them the next day. If students completed them correctly, they will receive a √+, if they missed a couple, they will receive a √.</td>
</tr>
</tbody>
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<th>Description of summative assessment activity</th>
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<th>What the assessment is designed to assess</th>
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<tbody>
<tr>
<td>A comprehensive test at the end of the unit. It will test knowledge of the Fundamental Counting Principle, and probabilities of combinations.</td>
<td>Students will need to get the correct answer to receive full credit.</td>
<td>If students mastered the content of our probability and statistics unit.</td>
<td>Students will get their graded tests back with either an A, B, C, D, or F.</td>
</tr>
</tbody>
</table>

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

Students are expected to know the academic language associated with this probability unit when the test time comes around. I do, however, modify some of the linguistic demands for the ELL student.

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

In this lesson, it is not really assessed. The students are expected to use the correct language when explaining their answers in the problem solving activity. Later in the unit, I will be giving a vocabulary quiz, which will directly assess their understanding of academic language.

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)

<table>
<thead>
<tr>
<th>One Teach, One Observe (lead)</th>
<th>One Teach, One Drift (lead)</th>
<th>Station Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Teach, One Observe (observe)</td>
<td>One Teach, One Drift (drift)</td>
<td>Supplemental Teaching</td>
</tr>
<tr>
<td>Parallel Teaching</td>
<td>Team Teaching</td>
<td>Alternative Teaching</td>
</tr>
</tbody>
</table>

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 be completing a problem solving activity, reading an article about the top baby names of 2011, doing a few problems as a class, and completing an exit slip.

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

Students will be learning by using a problem solving approach at first while I am drifting around the room, then I will be teaching by direct instruction, and finishing with group work.

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 get to monitor whether or not they are achieving the learning targets by whether or not they are able to complete the problem solving activity and exit slip. If they cannot complete the exit slip, it is their responsibility to make a note that they need more instruction on the topic covered in that day's lesson.

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:

<table>
<thead>
<tr>
<th>Time</th>
<th>Learning experiences</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 minutes</td>
<td>Take attendance and open by asking students if they have a job or if their parents are encouraging them to get one? State and write the objective on the board for all students to see. *Problem solve to discover a new principle used in probability.</td>
<td></td>
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<tr>
<td>5 minutes</td>
<td>Review the Problem Solving steps that we follow when problem solving in our classroom by placing the list of steps under the document camera. [They are: 1) Write the problem in your own words. 2) Write what you are trying to find, and what information is known. 3) Draw a picture, table, graph, diagram, etc while working towards a solution. 4) Record an answer if you find one. 5) Whether or not you found an answer, comment about if you saw any patterns, or if you could find a more efficient way to do the problem (remind students they must use the correct language while problem solving—all possible outcomes, probability, sample space). -Ask if anyone needs clarifying for any of the 5 steps.</td>
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</tr>
<tr>
<td>Time</td>
<td>Activity</td>
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<tr>
<td>2</td>
<td>Pass out the problem to students and have a student read it aloud. Tell them they can work with a partner or with their table group if they want.</td>
<td></td>
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</tbody>
</table>
| 15    | Set students free to problem solve. Drift around the classroom to see how they are coming along and make sure they are on task (formative assessment). If students seem really stuck, ask open ended questions to get them thinking in ways that will hopefully get them back on track.  
  - Since you’re stuck trying to draw a picture, would it help if you listed the sample space, and then pictorially represent each kind of cake and frosting? What about tree diagram?  
  * If some students finish early, challenge them to draw another picture to represent their answer, or give them some more questions to compute based on the data they found.  
  - How can you represent your data in a different way?  
  - What would be the probability of you choosing a cupcake with chocolate frosting?  
  - What would be the probability of you choosing a vanilla cupcake with sprinkles? |
| 10    | Bring the class back together—hopefully most everyone will have finished by now (if not, give them a few more minutes). Go over the problem as a class. Ask for two students to come up and share their picture and results on the document camera, explaining what and how they found their answer (formative assessment).  
  - Ask why they chose to pictorially represent the information they way they did? How did it help them get the answer they found?  
  Ask if any students were able to find a shortcut way to get the number of possible outcomes for this problem? If so, what is it and how did they find it? |
| 20    | Introduce the Fundamental Counting Principle [If you have \( a \) ways of doing event 1, \( b \) ways of doing event 2, and \( c \) ways of doing event 3, then you can find the total number of outcomes by multiplying \( a \times b \times c \).] by completing the cupcake problem they all just
5 Minutes

finished.

Do another problem together as a class using the Fundamental Counting Principle. Pass out the article and give students a couple minutes to read it. The problem is: *The top 4 most popular names for baby girls are: Sophia, Isabella, Emma, and Olivia. Let’s say the most popular middle names for baby girls are the next 3 names: Ava, Emily, Abigail. How many possible names can be made from these lists? (12 names). What is the probability a parent will name their daughter Isabella Ava if they choose one name each from these two lists? (1/12).* Have students list the sample space, find the answer, and give a sentence explanation of why it is correct. Then ask students to give a thumbs up when they have solved the problem so you can gauge when to ask someone to answer it (formative assessment).

If time allows, a little more challenging problem to do in class would be: *You live in a state that requires license plates to have two letters followed by three digits. How many different license plates can be made? (26 x 26 x 10 x 10 x 10 = 676000; because there are 26 options of letters, and 10 options of digits).*

End the lesson by reviewing the objective and asking students if it was achieved. Also, tell students what the homework assignment is, and give them a heads up that tomorrow we will be furthering our study of the Fundamental Counting Principle by using the outcomes with compounded events. Finally, have them finish an exit slip in which they answer the following problem using only the Fundamental Counting Principle, but showing their work: *A bagel factory offers 12 different kinds of bagels and 4 types of cream cheese. How many possible combinations of bagels and cream cheese are there? (12 x 4 = 48 combinations). This serves as a final formative assessment.*

<table>
<thead>
<tr>
<th>5.6 – Closure – How will the key points of the lesson be articulated?</th>
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</thead>
<tbody>
<tr>
<td>In closing, we will review the objective of our lesson, I will give a heads up of how we will continue to work with the Fundamental Counting principle the next day, and the students will get one more chance to reinforce their learning of the principle when completing their exit slips.</td>
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<table>
<thead>
<tr>
<th>5.7 – Closure – What questions or prompts will you use to elicit student articulation of their progress towards the attaining the learning target(s)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will ask the students if they feel we accomplished the objective, and then grade their exit slips to see if they can individually show understand the objective.</td>
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</table>

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<tr>
<th>5.8 – Closure – How will students rethink and revise their understanding and work?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will have to think through the objective when completing their exit slip, and they will get a grade and feedback about it the next day. If they then need to revise their work and answer, they have the opportunity to do so.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>5.9 – Materials – What materials, including community resources and educational technology, will you need in order to teach this lesson?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The materials we will need are: 21 Problem Solving worksheets, 11 baby name articles, 21 exit slips, my answer keys, whiteboard, whiteboard makers, and a document camera.</td>
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</table>

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<tr>
<th>5.10 – Materials – What materials will students need for this lesson?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will need to bring their notebooks, blank paper, a pencil, pen, and eraser. I will give them a problem solving worksheet and an exit slip. Each table pair will get a baby name article.</td>
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<tr>
<th>5.11 – Grouping of students for learning – How will student learning groups be formed?</th>
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<tbody>
<tr>
<td>For this lesson, students will sit in their assigned seats and can work by themselves while completing the problem solving worksheet, or work with their table partner.</td>
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<thead>
<tr>
<th>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?</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are no specific management and safety issues related to this lesson. The usual fire, earthquake, and lockdown procedures will take place if necessary. Students know and have practiced what to do in each circumstance if a situation should arise.</td>
</tr>
</tbody>
</table>

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<tr>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No part of this lesson explicitly requires family involvement, but they can look on our classroom website to see the objective for today’s class, or can check in to see the progress of their student’s grade at the end of this unit.</td>
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<td>The student with the IEP has a visual impairment. We reserve the desk closest to the door for her so she does not have to wind around the classroom to get to her seat. Every day, I print out a sheet to give her that has an enlarged version of the objective and notes I will be covering in class.</td>
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<th>Student with limited English proficiency:</th>
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<tr>
<td>For the student with limited English proficiency, I put special notes and definitions of common English, non-math words that she may not know on worksheets, quizzes, and unit tests.</td>
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