Lesson Plan 1

1. Content: Describe ***what*** it is you will teach. What is the content?

In this lesson, students will teach each other different exponent rules, as well as basic scientific notation, through a jigsaw.

1. Learning Goal(s): Describe what specifically students will ***know*** and ***be able to do*** after the experience of this class.

After this lesson, students will know the following exponent rules:

1. Exponents are subtracted when like bases are being divided
2. Negative exponents occur when there are more factors in the denominator and can be expressed as a positive if left in the denominator
3. A number raised to the zero power is equal to one
4. Exponents are added when like bases are being multiplied
5. Exponents are multiplied when an exponent is raised to an exponent
6. Scientific notation is a way to rewrite large and small numbers using the powers of 10 (North Carolina Unpacked Standards).

They will be able to use these rules to simplify expressions involving exponents on worksheets provided by their classmates.

1. Rationale: Explain how the content and learning goal(s) relate to your Curriculum Unit Plan learning goals.

A major goal of my unit is for my students to learn all the different exponent rules in order to successfully simplify expressions. Throughout this lesson, students will teach each other these rules and provide each other with practice problems, thereby both introducing and reinforcing them. In addition, students will be introduced to scientific notation, which they will explore in more detail later on in the unit.

1. Assessment: Describe ***how*** you and your students will know they have reached your learning goals.

Student learning will be assessed in a variety of ways. First, the teachers for each rule will need to fill in the missing blanks in the tables on the “What’s the Rule?” worksheet and record what they notice. This will serve as the first check for understanding, for students will need to correctly fill in the blanks and notice the pattern (i.e. their assigned exponent rule) in order to then teach it to the rest of their classmates. The next assessment check comes after students have jigsawed and taught each other the different exponent rules. Each team of teachers will give their students a worksheet with a few problems that they will solve using the new exponent rule they just learned. This allows the teachers to check their classmates’ understanding and provides an additional opportunity to assess the teachers’ understanding, for they must grade the completed worksheets and give their classmates feedback on their work.

1. Personalization and equity: Describe how you will provide for individual student strengths and needs. How will you and your lesson consider the needs of each student and scaffold learning? How specifically will ELL students and students with learning disabilities gain access and be supported?

This content lends itself well to differentiation, for the six different exponent rules vary in complexity. For example, learning the zero power rule entails also learning the exponent subtraction rule. Because that teaching group will need to learn two rules in one, I will assign that rule to higher-achieving students who will be able to handle that challenge. For a student who isn’t quite as confident in their math ability, I will assign a simpler rule, like exponent addition.

When I ask students to teach each other these different rules, I will emphasize to them that they need to explain their content as clearly as possible. I hope that students figure out how to scaffold learning for each other, and I will give them suggestions as they plan their mini-lessons.

The first part of this lesson is based in the question “What do you notice?” Since everyone can notice something, this lesson allows students of all learning abilities to gain access to the content right away. In addition, this lesson supports ELL students because it is heavily based in visuals. Students must notice a pattern from given examples that only include numbers and mathematical symbols; there is no English language component that they must comprehend before they can notice their pattern.

1. Activity description and agenda
   1. Describe the activities that will help your students understand the content of your class lesson by creating an agenda with time frames for your class. Be prepared to explain why you think each activity will help students on the path toward understanding.

See attached timed agendas.

* 1. What particular challenges, in terms of student learning or implementing planned activity, do you anticipate and how will you address them?

I anticipate that students will struggle to generalize their exponent rule using xm and xn on the “What’s the Rule?” sheet, for that transition to the abstract usually confuses students. I will emphasize to them that x, m, and n can be any numbers, just like the ones in the table. I can remind them that y= mx + b, which they are very familiar with, is a generalization of the rule for linear equations. They are essentially doing the same thing for their exponent rule – generalizing it so that they can plug in any numbers.

I also anticipate that students will have a hard time working through the lesson planning process. I plan to walk them through one of my own lesson plans before they begin so that they see what it actually looks like. This will also show them that they’re doing what real teachers do, which will hopefully peak their interest in the project.

1. List the Massachusetts Learning Standards this lesson addresses.
2. CCSS.MATH.CONTENT.8.EE.A.1

Know and apply the properties of integer exponents to generate equivalent numerical expressions.

1. CCSS.MATH.CONTENT.8.EE.A.3

Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities.