Number: MA.6.12

Benchmark Description: Multiply and divide fractions and decimals efficiently.

Type: big ideas

Subject: Mathematics

Grade: 6

Body of Knowledge: Algebra

Materials:

* White board
* Projector
* Computers
* Timer ( online)

Prior knowledge:

Before this lesson, students will have been introduced to fraction by the use of visuals and models. Students have studied the properties of addition with regards to fractions. And at this point should be able to demonstrate these skills sufficiently.

Also, prior to this lesson students were introduced to multiplication/ division of fractions using visuals and graphs. This lesson will be expand on those ideas in a more theoretical way and allow students to be able to solve equations without the aid of visuals.

Warm-up:

Bell-work activity: Students will be given a short, warm-up activity, based on the previous lesson. Using a power point slide, I will display three questions relating addition of fractions to multlication of fractions.

Ex. $\frac{1}{5}$ + $\frac{1}{5}+$ $\frac{1}{5}+\frac{1}{ 5}$ is equivalent to Ans: 4 times $\frac{1}{5}$ which equals 4/5

Other forms would be to show visuals of the same procedure, primarily using fraction with the same denominator.

Once the timer rings, we will discuss and review the problems. This will lead us to the main the discussion.

Discussion:

The main focus of today’s lesson is to understand the theory and computation of multiplying fractions.

Before starting the main lesson, I introduce a piece of mathematical notation: $a^{-1}$ or the inverse of a.

I will define $a^{-1}$ as a way for mathematicians to right fractions of $\frac{1}{ x}$ (one over some number x) ,

I will then define the theorem

 $\frac{a}{b}$ X $\frac{c}{d}$ = $\frac{ac}{bd}$

Proof:

$\frac{a}{b}$ X $\frac{c}{d}$ = a \*$b^{-1}$ \* c\* $d^{-1}$

 = a\*c\*$b^{-1}$ \* $d^{-1}$

 = a\*c\* ($(b\*d) ^{-1}$

 = $\frac{ac}{bd}$

This Proof will be explained in detail with the arbitrary values or while using actual values, to show it works for all cases, where b and d are not 0. I will go in full detail explain the logic of each step. (In my class we will have discussed some of the most axiomatic points in math, including the commutative rule of multiplication. These points will be discusses during the introduction period, that being the first few weeks of school))

Note students do not need to be able to replicate the proof. This is used to explain **why** this is true. The main point students need to know is the theorem itself. one point that may be needed is that a fraction is not a number, rather it is a function. Therefore, they will know that a,b,c, and d are just numbers being multiplied (further explanation to be done verbally).

This will be written down on the white board

This explanation will be followed by basic equation so students can grasp the concept. We will go over a few examples on the board.

Practice:

Students will practice this new technique on the computer using the web games found at:

<http://www.mathplayground.com>

 Multiplication: <http://www.mathplayground.com/fractions_mult.html>

 Division: <http://www.mathplayground.com/fractions_div.html>

These games offer instant feedback for students to see how they’re doing. The downside of this activity is that the steps to complete these assignments are not revealed when a student answers incorrectly. To help combat this drawback, students may work in groups to do this assignment. Both students will work on the problem on-screen and check each other’s answers. If there is a discrepancy, the students will work out the problem again and evaluate each other’s steps along the way.

Assessment:

Students will be assigned problems from the book as an assignment. This will be turned in as a grade. A 70% of the points will be given based off of attempting every question. 30% of the points will be based off of correctness.

Homework questions will consists of a variety of questions, some as simple as straight computational, others will be word problems, based off of real world scenarios.