Kentucky Alternate Assessment Instructional Support Document - Math

KAS: KY.7.NS.2*_____

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.

Standard	Clarifications
KY.7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. ***Alternate Assessment Target:*** *Limit to rational numbers, including numerators and denominators of rational numbers, to within negative 12 and positive 12 for the full standard.*	a. Emphasis is on exploring and understanding how the rules for multiplying and dividing with negative numbers are connected to properties for the operations, rather than to think of them as arbitrary rules. They explain 4 times (-3) could be four days of golfing 3 under par and therefore, having an overall score of -12. The remaining operations are based on applying properties. b. Emphasis is on the equivalence relationship provided by the movement of one negative sign among the numerator, denominator, or in front of the entire fraction. **Alternate Assessment Clarification:** NA
Connections to Math Practices	**Coherence/Foundational Understandings**
MP.2 Reason abstractly and quantitatively (Add or remove context to solve problems.*) **MP.7** Look for and make use of structure (Simplify patterns by using their structure.*) **MP.8** Look for and express regularity in repeated reasoning. (Simplify problems by noticing patterns.*) **MP.6** Attend to precision (Communicate precisely.*) **Key Vocabulary:** rational numbers, integer, fraction, multiply, divide, absolute value, equivalent **Click here to see more about what teachers and students do to build the math practices:** **Engaging the Math Practices and Question Stems**	**Pre-requisite Skills** • An understanding of multiplying and dividing whole numbers • An understanding of what integers represent • An understanding of what a fraction represents • Know how to divide a fraction by a fraction Coherence KY.6.NS.1→ KY.7.NS.2 → KY.8.NS.1 Kentucky Academic Standards for Mathematics

*Clarification from Kaplinsky, R. (2018, November 18). *Making the Math Practices Readable*.

Instructional Considerations

Possible Areas of Difficulties/Misconceptions

- Students may believe that division always results in a smaller number. Using models when dividing with fractions will enable students to see that the results will be larger.
- Students may believe that they should always divide the greater value by the lesser value, as they generally have with whole number division.
- Students may believe that when you multiply fractions and decimals the total gets bigger and when you divide they get smaller. For example to think that $\frac{4}{6}$ x 5 will be 5 times bigger than $\frac{4}{6}$, when in fact the answer is only $3\frac{1}{3}$.
- Students may have difficulty understanding that the same properties of operations apply to integers, fractions, and whole numbers because the numbers "look" different. It will be important to support students in developing the concept of a rational number, so they view all of those numbers in a common category.

Suggested Tools/Visual Aids

- KY Alternate Assessment Resource Guide (General terms pps 6-11 ; Math terms pps 22-26)
- 2-sided counters
- Base ten blocks
- Connecting cubes
- Fraction circles (concrete and semi-concrete)
- Rectangular fractions (concrete and semi-concrete)
- Fraction tiles/strips (concrete and semi-concrete)
- Cuisenaire rods
- Number lines (representing negative and positive numbers as well as fractions)
- Rulers
- Register tape or paper strips
- Whiteboards and markers

Other Considerations

- It is important to avoid "teaching" the rules of multiplying/dividing fractions, integers, and whole numbers (all rational numbers) without developing an understanding of the properties of operations.
- Use models to develop understandings as you use symbols to record the computations.

Additional Resources

- Kaplinsky, R. (2018, November 18). *Making the Math Practices Readable*. Retrieved April 1, 2020 from https://robertkaplinsky.com/?s=revised+math+practices.
- Toy Theater. (2001-2020). *Virtual Manipulatives*. https://toytheater.com/category/teacher-tools/virtual-manipulatives/
- Van de Walle, J.A., Karp, K.S., Bay-Williams, J.M., Wray, J. & Nicole Rigelman, N. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally (10th Edition).* Pearson.