

Whole School Agreement (WSA) Template

Name:

Grade:

Rules:

Models:

Language:

Notation:

Generalizations:

Mathematical Lesson Formats:

Thirteen Rules that Expire

1. When you multiply a number by 10 just add a zero to the end of the number.
2. Use keywords to solve word problems.
3. You can't take a bigger number from a smaller number
4. Addition and multiplication make numbers bigger.
5. Subtraction and division make numbers smaller.
6. You always divide the larger number by the smaller number.
7. Two negatives make a positive.
8. Multiply everything inside the parentheses by the number outside the parentheses.
9. Improper fractions should always be written as a mixed number.
10. The number you say first in counting is always less than the number that comes next.
11. The longer the number, the larger the number.
12. Please Excuse My Dear Aunt Sally.
13. The equal sign means find the answer or write the answer.

Karp, K., Bush, S. B., & Dougherty, B. (2014) 13 rules that expire. *Teaching Children Mathematics*. 21(1) 18-25.

Expired Mathematical Language

What is stated	What should be stated
Using the words <i>borrowing</i> or <i>carrying</i> when subtracting or adding, respectively	Use <i>trading</i> or <i>regrouping</i> to indicate the actual action of trading or exchanging one place value unit for another unit.
Using the phrase <i>___ out of ___</i> to describe a fraction (For example, <i>one out of seven</i> to describe $\frac{1}{7}$.)	Use the fraction and the attribute. (For example, $\frac{1}{7}$ of the length of the string.) The <i>out of</i> language often causes students to think a part is being subtracted from the whole amount (Philipp, Cabral, and Schappelle, 2005).
Using the words <i>reducing fractions</i>	Use <i>simplifying</i> fractions. The language <i>reducing</i> gives students the incorrect impression that the fraction is getting smaller or being reduced in size.
Asking how shapes are <i>similar</i> when children are comparing a set of shapes	Ask, <i>How are these shapes the same? How are the shapes different?</i> By using the word <i>similar</i> in these situations, there can be eventual confusion with the mathematical meaning of <i>similar</i> that will be introduced in middle school relating to geometric figures.
Reading the = as <i>makes</i> (For example, $2 + 2$ <i>makes</i> 4 for $2 + 2 = 4$.)	Read the equation $2 + 2 = 4$ as $2 + 2$ <i>equals</i> or <i>is the same as</i> 4. The language <i>make</i> encourages the misconception that the equal sign is an action or an operation rather than representing a relationship.
Indicating that a number divides <i>evenly</i> into another number	Say that a number divides another number <i>a whole number of times</i> or it divides <i>without a remainder</i> .
<i>Plugging</i> a number into an expression or equation	Use <i>substitute</i> values for an unknown.
Using <i>top number</i> and <i>bottom number</i> to describe the numerator and denominator of a fraction, respectively	A fraction should be seen as one number, not two separate numbers. Use the words <i>numerator</i> and <i>denominator</i> when discussing the different parts of a fraction.

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Twelve Middle Grades Rules that Expire

1. The mnemonic KFC – Keep Flip Change when learning how to divide fractions.
2. When you factor, you need to use a factor rainbow.
3. The absolute value is just the number.
4. The expression 3^3 is equivalent to $3 + 3 + 3$.
5. Please Excuse My Dear Aunt Sally (PEMDAS) for order of operations.
6. A solution to an equation must be in the form $x = \square$
7. The “Butterfly Method” for Cross Multiplication to see which fraction is greater.
8. The most you can have is 100 percent of something.
9. Two negatives make a positive.
10. Use keywords to solve word problems.
11. A variable represents a specific unknown.
12. FOIL- First, Outer, Inner, Last

Karp, K., Bush, S. B., & Dougherty, B. (2015). 12 math rules that expire in the middle grades. *Mathematics Teaching in the Middle School*. 21(4), 208-215.

Expired Mathematical Language and Notation

What is stated/notated	Alternative appropriate statements or notations
Using the notation $8 + 4 = 12 + 5 = 17 + 3 = 20$ to symbolize a series of addition problems	Stringing together a series of additions (or other computations) cannot be connected with equal signs as the components are unequal.
Using a diagonal bar in fraction notation.	This notation becomes problematic with polynomials and for learners who often read the handwritten diagonal as a 1 use a horizontal bar - instead of $\frac{1}{2}$, write $\frac{1}{2}$.
Getting <i>rid</i> of the fraction or decimal.	Students create an equivalent equation by multiplying or dividing and are not doing away with the fraction or decimal point at all.
Using <i>rounding</i> to mean the same as <i>estimating</i> . Using the word <i>guess</i> to mean the same as <i>estimate</i> .	Rounding is one strategy to produce a computational estimate – but it is not synonymous with an estimate.
Using the word <i>point</i> to read a decimal. Such as “three point four” for 3.4.	Instead, read a decimal as a fraction, 3.4 is “three and four tenths.” This will make converting decimals into fractions an easier task.
<i>Reducing</i> fractions	Using the term reducing may cause students to think the fraction value is getting smaller. Instead, use simplifying fractions or write the fraction in simplest form or lowest terms.
<i>Plugging</i> in a value for a variable	Plugging is not a mathematical term. Instead students should substitute a value.
Fractions have a <i>top</i> and <i>bottom</i> number	The words top and bottom have no mathematical meaning and may incorrectly imply that a fraction consists of more than one number.

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15 Rules that Expire in Secondary Classrooms

1. “ $-x$ is negative x .”
2. The absolute value of a number is just the number.
3. The solution to an equation should always be written so that the variable is on the left of the equal sign, $x = \blacksquare$.
4. To check if two expressions are equivalent, you substitute 1 for the variable because that is the easiest.
5. Use cross simplifying with multiplication of fractions.
6. In the expression $3 - 2x$, the $2x$ is negative because of the $-$ sign.
7. If you have a straight line, it is a function.
8. An $x|y$ table must have a set number of ordered pairs.
9. You cannot find the square root of a negative number.
10. The square root of a times the square root of b always equals the square root of ab .
11. When multiplying, use FOIL- First, Outer, Inner, Last.
12. To solve an equation, move numbers and letters across the magic river (equal sign).
13. Use the Magic X to factor a trinomial.
14. You cannot factor a polynomial such as $x^2 - 5$.
15. Quadratic equations always have two solutions and linear equations always have one solution

Dougherty, B. J., Bush, S. B., & Karp, K. S. (2017). Circumventing high school rules that expire! *Mathematics Teacher*. 111(2), 134-138.

Expired Mathematical Language

What is stated	What should be stated
<i>Solve</i> an expression	<i>Evaluate</i> an expression
You have to <i>show all your steps</i> when solving an equation.	<i>Show your thinking</i> (use words, diagrams, graphs and so on)
Getting <i>rid</i> of the . . . (fraction, decimal, coefficient, like term, and so on).	Using the terminology 'get rid of' assumes that the indicated quantity disappears. This action, however, should instead be linked to a property of an operation or equality.
<i>Plugging</i> in a value for a variable	The word 'plug' is not a mathematical term. The use of the word 'substitute' more accurately depicts the action.
<i>Reducing</i> a fraction	Use of the word 'reducing' often indicates something is made smaller. That is not the case with equivalent fractions. Use the word 'simplify' rather than 'reducing.'

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