College Algebra: Module 1 Definitions and Property Sheet

1-21-15

1 Language, Notation, and Numbers of Mathematics (R.1)

Rational Number - a *rational number* is the ratio of two integers provided that the denominator is some integer other than 0

Irrational Number - a *irrational number* is a number that is not rational

Order of Operations: (PEMDAS)

1. **Parentheses** - Simplifiy exressions within any parantheses or brackets beginning with the innermost grouping. If a fraction bar is used, simplify the numerator and denominator separately.
2. **Exponents** - Evaluate all exponents and roots
3. **Multiplication & Division** - Compute multiplications/divisions in the order they occur from left to right
4. **Addition & Subtraction** - Compute additions/subtractions in the order they occur from left to right

2 Algebraic Expressions and the Properties of Real Numbers (R.2)

Properties of Real Numbers:

1. **Associative Property**
   (a) Addition: $(a+b)+c = a+(b+c)$
   (b) Multiplication: $(a \cdot b) \cdot c = a \cdot (b \cdot c)$
2. **Commutative Property**
   (a) Addition: $a+b = b+a$
   (b) Multiplication: $a \cdot b = b \cdot a$

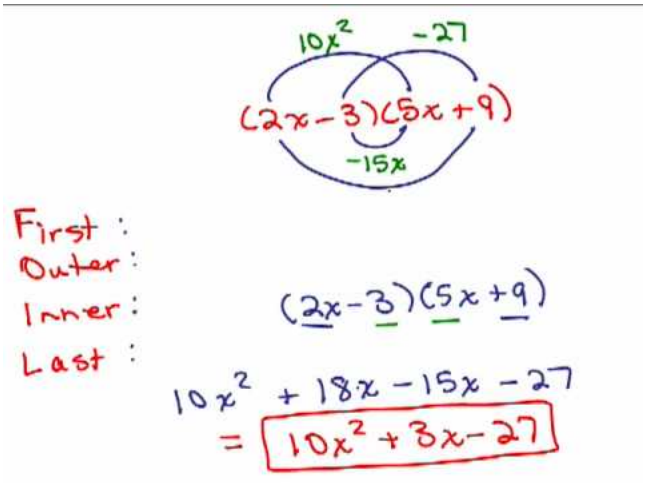
3. **Identity Property**
   (a) Addition: $a + 0 = a$
   (b) Multiplication: $a \cdot 1 = a$
4. **Inverse Property**
   (a) Addition: $a + -a = 0$
   (b) Multiplication: $a \cdot \dfrac{1}{a} = 1$
5. **Distribution Property:** $a \cdot (b + c) = a \cdot b + a \cdot c$

3 Exponents, Scientific Notation, and a Review of Polynomails (R.3)

Properties of Exponents:

1. **Zero Exponent Propert:** $a^0 = 1$ (provided $a \neq 0$)
2. **Negative Exponent Property:** $a^{-n} = \dfrac{1}{a^n}$
3. **Product Property:** $a^m \cdot a^n = a^{m+n}$
4. **Quotient Property:** $\dfrac{a^m}{a^n} = a^{m-n}$
5. **Power Property:** $(a^m)^n = a^{m \cdot n}$
6. **Product to Power Property:** $(a^m \cdot b^n)^p = a^{m \cdot p} \cdot b^{n \cdot p}$
7. **Quotient to Power Property:** $\left(\dfrac{a^m}{b^n}\right)^p = \dfrac{a^{m \cdot p}}{b^{n \cdot p}}$

FOIL Method:



4 Radicals and Rational Exponents (R.4)

Rational (Fractional) Exponents: $(\sqrt[n]{a})^m = \sqrt[n]{a^m} = a^{m/n}$

Radical Properties:

1. **Product Property:** $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
2. **Quotient Property:** $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$