Mathematics
Unit 4: Number Sense

Essential Understandings	▪ Various forms of real numbers are appropriate in different situations. ▪ Numerical skills are necessary to having fluency with algebraic concepts.
Essential Questions	▪ How do you compare and order signed fractions, decimals, percents, and powers? ▪ How does computing with positive rational numbers help with computing with signed rational numbers? ▪ What are some strategies for computing with signed rational numbers? ▪ How does one apply computing skills with rational numbers to word problems? ▪ How can picture and word models be represented using ratios in part to part and part to whole relationships? ▪ How does one determine a part-whole relationship from a fraction, decimal, or percent? ▪ Why is it important to memorize the equivalent forms of frequently used fractions, decimals, and percents? ▪ What strategies can be used for quickly converting between the frequently used fractions, decimals, and percents? ▪ How does one convert between fractions, decimals, and percents? ▪ What types of relationships are proportional? ▪ How does one set-up and solve proportions to solve problems involving discounts, taxes, and tips? ▪ What are the components of an exponential expression? ▪ What types of whole numbers can be expressed using whole number bases and exponents. ▪ How does one convert back and forth between numbers larger than ten and scientific notation form? ▪ How does one compare numbers written in scientific notation? ▪ How does one apply the order of operations to arithmetical expressions involving exponents and any type of real number? ▪ How does one apply the associative, commutative, and distributive properties to mental arithmetic procedures?

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Essential Knowledge	▪ Signed fractions, decimals, percents and powers can be compared using a number line. ▪ The basic skills of computing with positive rational numbers can be transferred to computing with signed rational numbers. ▪ Many types of word problems can be solved using a variety of rational numbers. ▪ Part to part and part to whole relationships can be determined in picture and word models. ▪ Part-whole relationships are found in all forms of percents. ▪ There are frequently used decimals and percents and their related fractions (with denominators of 2, 3, 4, 5, 8, and 10). ▪ Conversions between fractions decimals and percents require division and proportion skills. ▪ A proportion is an equation made by two equal ratios and can be solved by finding scale factors or by cross multiplying. ▪ Proportions and are used in a variety of applications including those with discount, tax, and tip problems. ▪ The important components of an exponential expression are the base and the exponent. ▪ Some whole numbers can be expressed using whole number bases and exponents. ▪ Scientific notation uses exponents and powers of ten to express numbers larger than ten in a different form. ▪ Numbers written in scientific notation can be ordered and compared using a number line. ▪ The order of operations is used to evaluate arithmetical expressions using all real numbers and including exponents. ▪ The associative, commutative, and distributive properties are useful for mental arithmetic.
Vocabulary	▪ <u>Terms</u>: ○ absolute value, composite numbers, cross product, exponential notation, factor trees, prime numbers, rational numbers, scale factor, scientific notation

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Essential Skills	▪ Compare signed rational numbers and place them on a number line. (I, R) ▪ Compute with fractions, decimals, and integers (R) including signed rational numbers (I). ▪ Set up and solve two step word problems involving all types of rational numbers. (I, R) ▪ Write ratios from picture and word models using part-to-part and part-to-whole relationships. (R, A) ▪ Explain the part-whole relationships of ratios written as fractions, decimals, and percents. (R, A) ▪ Convert between fractions, decimals, and percents. ▪ Memorize relative quantities as percentages and as decimals and fractions with frequently used denominators including 8^{ths}. (A) ▪ Explain or show that two equivalent ratios form a proportion. (R) ▪ Solve proportions by finding scale factors or by using cross products. (I, R) ▪ Set up and solve proportions in word problems including discount, tax, and tip problems. (I, R) ▪ Identify proportional relationships in practical situations. (I) ▪ Express whole numbers using exponents and find the values of powers. (R, A) ▪ Order and compare powers. (I, R) ▪ Write numbers over ten in scientific notation with positive exponents. (I, R) ▪ Order and compare numbers written in scientific notation. (I, R) ▪ Evaluate numerical expressions (including those with exponents) using positive rational numbers by following the order of operations. (I, R) ▪ Apply the associative, commutative, and distributive properties to mental math arithmetic. (I, R)

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Related Maine Learning Results	A. Number A1. Students use negative and positive rational numbers expressed as integers, fractions and decimals. a. Use positive and negative integer exponents for powers of ten. b. Convert between standard and scientific notation forms and compare the relative size of numbers including the interpretation of numbers as displayed on calculators and computers. A2. Students compute with signed rational numbers. a. Use and interpret exponents. b. Follow conventions of order of operations including exponents. c. Solve problems using signed rational numbers. A3. Students understand that when the ratios of two varying quantities is constant, the two quantities are in direct proportion. a. Use ratios to compare quantities and use comparison to solve problems. b. Identify proportional relationships. c. Use proportions to solve problems. A4. Students interpret and use percents to solve problems. a. Use percents when comparing fractional parts of set of unequal size. b. Solve practical problems involving percents.
NECAP	NECAP Number and Operations M(N & O) 7-1 M(N & O) 7-2 …ordering and comparing with exponent expressions. M(N & O) 7-3 M(N & O) 7-4