Topic A

Multiplicative Patterns on the Place Value Chart

5.NBT.1, 5.NBT.2, 5.MD.1

Focus Standard:		5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
		5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
		5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
Instructional Days:		4	
Coherence	**-Links from:**	G4–M1	Place Value, Rounding, and Algorithms for Addition and Subtraction
	-Links to:	G6–M2	Arithmetic Operations Including Dividing by a Fraction

Topic A begins with a conceptual exploration of the multiplicative patterns of the base ten system. This exploration extends the place value work done with multi-digit whole numbers in Grade 4 to larger multi-digit whole numbers and decimals. Students use place value disks and a place value chart to build the place value chart from millions to thousandths. Students compose and decompose units crossing the decimal with a view toward extending students' knowledge of the *10 times as large* and *1/10 as large* relationships among whole number places to that of adjacent decimal places. This concrete experience is linked to the effects on the product when multiplying any number by a power of ten. For example, students notice that multiplying 0.4 by 1000 shifts the position of the digits to the left 3 places, changing the digits' relationships to the decimal point and producing a product with a value that is 10 x 10 x 10 as large (400.0) (**5.NBT.2**). Students explain these changes in value and shifts in position in terms of place value. Additionally, students learn a new and more efficient way to represent place value units using exponents, e. g., 1 thousand = 1000 = 10^3 (**5.NBT.2**). Conversions among metric units such as kilometers, meters, and centimeters give an opportunity to apply these extended place value relationships and exponents in a meaningful context by exploring word problems in the last lesson of Topic A (**5.MD.1**).

A Teaching Sequence Towards Mastery of Multiplicative Patterns on the Place Value Chart	
Objective 1:	**Reason concretely and pictorially using place value understanding to relate adjacent base ten units from millions to thousandths. (Lesson 1)**
Objective 2:	**Reason abstractly using place value understanding to relate adjacent base ten units from millions to thousandths. (Lesson 2)**
Objective 3:	**Use exponents to name place value units and explain patterns in the placement of the decimal point. (Lesson 3)**
Objective 4:	**Use exponents to denote powers of 10 with application to metric conversions. (Lesson 4)**