

Grade:	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7/8	Grade 9
Outcome:	NK.1 Whole numbers to 10	N1.4 Whole numbers to 100	N2.1 Whole numbers to 100	N3.1 Whole numbers to 1000	N4.1 Whole numbers to 10 000	N5.1 Whole numbers to 1 000 000	N6.1 Place value greater than one million and less than one thousandth		N9.2 Rational numbers
					N4.7 Decimal numbers in the tenths and hundredths	N5.6 Decimal numbers to the thousandths	N6.6 Integers		
Understanding why?	<ul style="list-style-type: none"> Counting tells how many. 								
	<ul style="list-style-type: none"> Understanding place value in individual numbers. 								
	<ul style="list-style-type: none"> The value of the digit depends on its location or place. 								
	<ul style="list-style-type: none"> Based on powers of ten. Understanding place value in computational algorithms for arithmetic. 								
Progression of Learning	Counting								
	<ul style="list-style-type: none"> Rote counting One-to-one correspondence quantity 								
	Skip Counting								
	<ul style="list-style-type: none"> rote counting quantity 								
	Comparing and Relating Numbers								
Representing Numbers									
				Extension to larger whole numbers					
					Extension to numbers less than one				
Counting Principles	<ul style="list-style-type: none"> You say one and only number for each object. There is a consistent set of counting words that never changes. The last number spoken tells how many. It does not matter what you count, the process for counting remains the same. It does not matter in which order you count, the number in the set does not change. 								

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Big Ideas	<ul style="list-style-type: none"> • There are many ways to represent numbers. • The patterns in the place value system are built on patterns and can make it easier to interpret and operate with numbers. • To compare the numbers of items in two sets, you can match the items, one to one, in the two sets to see whether one set has more. Or, you can compare the position of the numbers that describe the two quantities in the number sequence. • Grouping becomes a necessary strategy when counting large quantities. 								
						<ul style="list-style-type: none"> • The base-ten place-value system extends in both to tiny values as well as large values. Between any two place values, the ten-to-one ratio remains the same. • We can extend the patterns in the way we write whole numbers to write decimals. (FSiM KU7) • Decimals can be renamed as fractions. 			
Vocabulary		-less -more -estimate	-place value -ones -units -tens -hundreds -greater than/less than -estimate	-place value -base ten -hundred -thousand -century -standard form -written form -estimate	-place value -base ten -thousand -ten thousand -decimal number -decimals Decimal point -tenth -hundredth -expanded form	-place value -base ten -hundred thousand -million -decimal number -thousandth -benchmarks	-place value -base ten -decimal number -integer		-place value -base ten -integer -rational number -irrational number
Instructional Strategies	-see below	-see below	-manipulatives that are not base-ten -ten strips -establishing patterns -number lines -hundreds chart -open-ended questioning						
				-base ten manipulatives					

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Misconceptions	-see below	-see below	-grouping objects does not change the count -counting to 100 does not mean student can transfer that understanding to count beyond 100 (student may count 99, 100, 110, 120,...)	-counting a new century would be counting 207, 208, 209, rather than 298, 299, 300, 301 -ordering numbers by the first digit regardless of the place the first digit holds -there are 100 100s in 1000	-ordering numbers by the first digit regardless of the place of the first digit holds -understanding that one unit can represent a tenth when a rod represents one -ten hundredths is the same as one tenth	-student omit 0 as a place holder	-think that greater numbers are further away from 0 on the number line			
				-zero hold a place -each base ten block is made up of ten of the size smaller (100 is made of 10 10s, 10 is made of 10 1s)						
						-decimal is decoration or a punctuation mark -decimal separates two whole numbers -the numbers on the right of the decimal are the reverse of the whole number place value system -the more digits after the decimal, the smaller the number -the fewer digits after the decimal, the smaller the number -think of hundredths as hundredths of the tenths rather than hundredths of the whole				

Progression of Outcomes for Place Value

Kindergarten	Grade 1	Big Ideas	Vocabulary	Instructional Strategies	Misconceptions
NK.1 Say the whole number sequence by 1s starting anywhere from 0 to 10 and from 10 to 0.	N1.1 Say the number sequence 0-100	The whole numbers are in a particular order and there are patterns in the way we say them that help us remember the order. (FSiM KU4)	-counting forwards -counting backwards -skip counting	-choral counting -open-ended questioning -counting forward and backward	-sequence pattern in the teens is difficult for students to hear and understand -counting must always start at 1 or 0
NK.2 Recognize, at a glance, and name familiar arrangements of 1 to 5 objects, dots, or pictures.	N1.2 Recognize, at a glance, familiar arrangements of up to ten objects.	We can often see how many are in a collection just by looking and also by thinking of it in parts. (FSiM KU2)	-subitizing	-using familiar representations like dice, dot cards, ten frames, five frames, rekenreks -using unfamiliar scatters -open-ended questioning	
NK.3 Relate a numeral, 0 to 10, to its respective quantity.	N1.3 Counting	Numbers often tell how many or how much. We can count a collection to find out how many are in it. (FSiM KU1)	-quantity -set -counting on -counting back	-open-ended questioning -choral counting -counting concrete objects -authentic counting situations -counting on -counting back	-double-counting (counting one object more than once) -omitting objects in the count -unaware of not keeping track of scattered objects -rearrangement of objects does not change the quantity -starting the count at any place does not change the quantity
NK.5 Compare quantities, 0 to 10, using one-to-one correspondence.	N1.5 Comparing up to 20 elements.	We can compare and order the numbers themselves. (FSiM KU8)	-compare -order	-open-ended questioning -authentic situations -using familiar representations like dice, dot cards, ten frames, five frames, rekenreks to compare -comparing unfamiliar scatters	-comparing two quantities and thinking the sets which takes up the most space is more -comparing size rather than quantity
	N1.7 Demonstrate whole number representations.	Place value helps us to think of the same whole number in different ways and this can be useful. (FSiM KU6)	-represent	-writing numbers -writing words -drawing pictures -reading numbers -using manipulatives to represent such as ten frames, five frames, rekenreks, any objects for counting -open-ended questioning	-different representations refer to different quantities

Resource List:

Battista, Michael. (2012) *Cognition-Based Assessment and Teaching of Place Value*. Portsmouth, NH: Heinemann.

Government of Western Australia. (2006) *First Steps in Math, Number Sense - Whole and Decimal Numbers, and Fractions*. Canada: Pearson Professional Learning.

Small, Marian. (2012) *Great Ways to Differentiate Mathematics Instruction*. New York, NY: Teachers College, Columbia University.