GRADE 4 • MODULE 1

Place Value, Rounding, and Algorithms for Addition and Subtraction

In Grade 4, students extend their work with whole numbers. They begin with large numbers using familiar units (hundreds and thousands) and develop their understanding of millions by building knowledge of the pattern of *times ten* in the base ten system on the place value chart. They recognize that each sequence of three digits is read as hundreds, tens, and ones followed by the naming of the corresponding base thousand unit (thousand, million, billion). Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.

Topic A: Place Value of Multi-Digit Whole Numbers

The place value chart will be fundamental in Topic A. Building upon their previous knowledge of *bundling,* students learn that 10 hundreds can be composed into 1 thousand and, therefore, 30 hundreds can be composed into 3 thousands because a digit's value is ten times what it would be one place to its right. Conversely, students learn to recognize that in a number such as 7,777 each 7 has a value that is 10 times the value of its neighbor to the immediate right. 1 thousand can be decomposed into 10 hundreds, therefore 7 thousands can be decomposed into 70 hundreds. Similarly, multiplying by 10 will shift digits one place to the left, and dividing by 10 will shift digits one place to the right:

Topic B: Comparing Multi-Digit Whole Numbers

Students use place value as a basis for comparison of whole numbers. Although this is not a new topic, it becomes more complex because the numbers are larger. For example, it becomes clear that 34,156 is 3 thousand greater than 31,156.

Topic C: Rounding Multi-Digit Whole Numbers

Comparison leads directly into rounding, where their skill with isolating units is applied and extended. Grade 4 students learn to round to any place value initially using the vertical number line though ultimately moving away from the visual model altogether. Topic C also includes word problems where students apply rounding to real life situations.

Topic D: Multi-Digit Whole Number Addition

Topic E: Multi-Digit Whole Number Subtraction

In Grade 4, students become fluent with the standard algorithms for addition and subtraction. In Topics D and E students focus on single like-unit calculations (ones with ones, thousands with thousands, etc.) at times requiring the composition of greater units when adding (10 hundreds are composed into 1 thousand) and decomposition into smaller units when subtracting (1 thousand is decomposed into 10 hundreds). Throughout these topics, students will apply their algorithmic knowledge to solve word problems. Also, students use a variable to represent the unknown quantity.

Topic F: Addition and Subtraction Word Problems

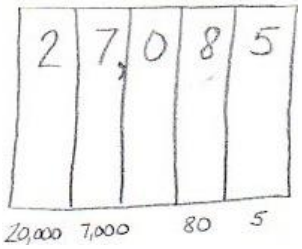
The module culminates with multi-step word problems . Tape diagrams are used throughout the topic to model additive compare problems.

Vocabulary

Ten thousands, hundred thousands (as places on the place value chart)
One millions, ten millions, hundred millions (as places on the place value chart)
Algorithm (A formula or set of steps for solving a particular problem)
Variable (A symbol representing an unknown quantity)
Sum (answer to an addition problem)
Difference (answer to a subtraction problem)
Rounding (approximating the value of a given number)
Place value (the numerical value that a digit has by virtue of its position in a number)
Digit (a numeral between 0 and 9)
Standard form (a number written in the format: 135)
Expanded form (e.g., 100 + 30 + 5 = 135)
Word form (e.g., one hundred thirty-five)
Tape diagram (bar diagram)
Number line (a line marked with numbers at evenly spaced intervals)
Bundling, making, renaming, changing, exchanging, regrouping, trading (e.g. exchanging 10 ones for 1 ten)
Unbundling, breaking, renaming, changing, regrouping, trading (e.g. exchanging 1 ten for 10 ones)
=, <, > (equal, less than, greater than)
Number sentence (e.g., 4 + 3 = 7)

Suggested Tools and Representations

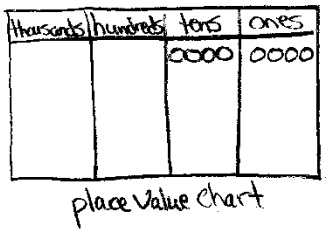
Expanded Form - Expanded form is a way to write a number that shows the sum of values of each digit of a number.

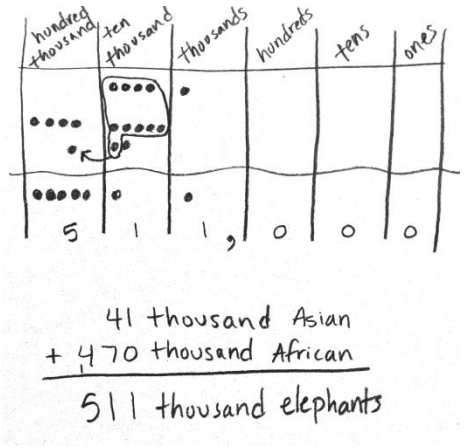


Standard Form: A number written in the format 27, 805
Word Format: The number written in words, ex. Twenty seven thousand eighty five

Here is a video about forms of numbers: http://www.youtube.com/watch?v=4AF7xj7pmWc

Place Value Chart





Videos about using the place value chart to add and subtract:

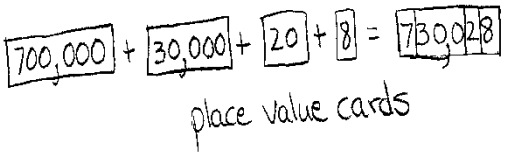
Place Value (Number Disks):
http://commoncore.org/maps/math/video-gallery/number-disks-place-value-disks

Place Value (Number Disks with Place Value Charts:
http://commoncore.org/maps/math/video-gallery/place-value-number-disks-with-place-value-charts

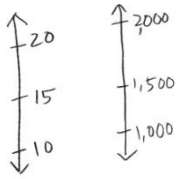
Place Value with Number Disks:
http://commoncore.org/maps/math/video-gallery/introduction-to-place-value-disks

Subtraction Problems Using number Disks:
http://commoncore.org/maps/math/video-gallery/subtraction-problems-using-number-disks

Place value cards

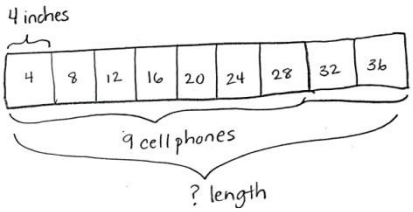


Number lines - a line marked with numbers at evenly spaced intervals



Rounding on a Vertical Number Line:
http://commoncore.org/maps/math/video-gallery/vertical-number-line-rounding

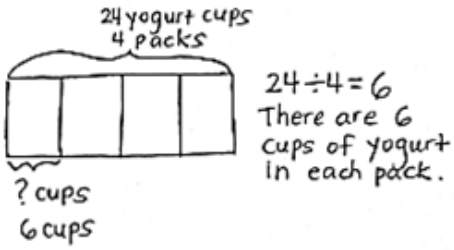
Tape Diagram – A tape diagram is a method for modeling problems with parts and wholes.
A cell phone is about 4 inches long. About how long are 9 cell phones laid end to end?



$9 \times 4 = 36$

9 cell phones are about 36 inches long.

Mrs. Peacock bought 4 packs of yogurt. She had exactly enough to give each of her 24 students 1 yogurt cup. How many yogurt cups are there in 1 pack?



Here is a video about Tape Diagrams:
http://commoncore.org/maps/math/video-gallery/solving-word-problems-with-tape-diagrams

For an online modeling tool, interactive problems for students to try and free apps:
http://www.mathplayground.com/thinkingblocks.html