

READ ME FIRST

Investigations ©2012 for the Common Core State Standards...

A focused, comprehensive, and cohesive program for grades K-5

In updating *Investigations* 2nd edition to encompass the Common Core State Standards and Mathematical Practice, the TERC authors carefully considered the what, where, when, and how to do this to ensure and maintain its cohesive curriculum. Carefully considering and analyzing the Common Core standards to determine what they actually asked for, the authors then determined where the new content to be added made the best connection for student learning. They added Common Core content at appropriate points by building on current content, contexts and representations already in the curriculum to create the comprehensive and cohesive program: *Investigations ©2012 for the Common Core State Standards*.

- New content is addressed in Teaching Notes and Math Notes where the content already existed, but connection to the standards needs to be more explicit.
- New content is addressed in Classroom Routines and Ten-Minute Math when the content in the Standards is more about practice than deepening understanding.
- New content is addressed in new Sessions when the mathematical idea can be extended and/or explained with one or two new Sessions.
- New content is addressed in a new Investigation when mathematical content extends beyond what was in the curriculum.

All of these new Sessions build on existing contexts and representations within the grade level, rather than introducing new contexts and representations used in a higher grade level. In some instances it may appear that a single new Session addresses a new concept. But, that new concept will be further developed and integrated into subsequent routines, games, homework, and practice pages.

Some sessions are recommended by the authors to be skipped to allow for new Common Core material. Before making these decisions, the authors carefully considered how it would impact the integrity of the grade level, of the curriculum. *Investigations ©2012 for the CCSS* program maintains coherence, focus and clarity to support all K-5 students in making sense of mathematics and learning that they can become mathematical thinkers.

The foundation of this Scope and Sequence is the Scope and Sequence found in the *Implementing Investigations* book at each grade level. This Common Core Scope and Sequence includes all Common Core content new to the *Investigations*, 2nd edition curriculum.

Math Focus Points from Sessions in *Investigations and the CCSS* guidebook are color-coded. **Color Key** to *Investigations ©2012 for the Common Core* Scope and Sequence:

BLUE

- indicates new Math Focus Points based on Common Core content in new Sessions
- indicates new Sessions that support Math Focus Points already in the program

GREEN

- indicates new Math Focus Points based on Common Core content in Classroom Routines and Ten-Minute Math
- indicates new Math Focus Points based on Common Core content in the Common Core Adaptations: Teaching Notes, and Math Notes

RED

- indicates Math Focus Points from sessions that the TERC authors recommend to be skipped, based on Common Core State Standards

Number and Operations

The Base-Ten Number System

Understanding the equivalence of one group and the discrete units that comprise it

Unit 1 Math Focus Points

- recognizing and representing the place value of each digit in 2- and 3-digit numbers
- using equivalencies among pennies, dimes, and dollars
- finding different combinations of 100s, 10s, and 1s for a number and recognizing their equivalence (e.g., 1 hundred, 3 tens, and 7 ones equals 1 hundred, 2 tens, and 17 ones, or 13 tens and 7 ones)
- recognizing and demonstrating the equivalence of one 100 to ten 10s and one 10 to ten 1s
- recognizing and using coin equivalencies

Unit 3 Math Focus Points

- constructing 1,000 from groups of 100
- recognizing and representing the number of tens in 3-digit numbers
- representing the structure of 3-digit numbers as being composed of 100s, 10s, and 1s
- **Representing 3-digit numbers using expanded form (1.7A)**
- using the value of each place to make 2- and 3-digit numbers closest to 100
- **using place value understanding to round whole numbers to the nearest 10 or hundred (1.7A)**

The Base-Ten Number System Extending knowledge of the number system to 1,000

Unit 3 Math Focus Points

- reading, writing, and sequencing numbers to 1,000
- using place value to determine the size of any number to 1,000

Unit 8 Math Focus Points

- reading and writing numbers in the thousands

Computational Fluency Adding and subtracting accurately and efficiently

Unit 1 Math Focus Points

- adding and subtracting multiples of 10
- solving addition problems with 2-digit numbers by using strategies that involve breaking numbers apart by place or adding one number in parts
- solving addition problems with 2-digit numbers that involve more than 10 ones in the ones place in explaining the effect on the sum
- finding the difference between a 2-digit number and 100
- adding pennies and dimes to sums up to \$2.00
- **learning/reviewing addition combinations up to $10 + 10$ (2.1)**
- using knowledge of place value to find pairs of 2-digit numbers that add to 100 or a number close to 100
- using known pairs of 2-digit numbers that add to 100 to find related pairs that add to 100 or a number close to 100 (for example, $20 + 80 = 100$, so $22 + 78 = 100$)
- estimating the sums of 2-digit numbers by using knowledge of place value and known combinations
- finding combinations of coins that equal \$1.00
- using mathematical tools (cubes, 100 charts and grids, number lines) to solve problems and represent strategies

Unit 3 Math Focus Points

- estimating the sums of 2- and 3-digit numbers using knowledge of place value and known combinations
- finding pairs of numbers that add to 100

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- finding the difference between 2- and 3-digit numbers and 100
- finding the difference between 3-digit numbers
- solving addition problems with 2- and 3-digit numbers (to 400) by breaking numbers apart and recombining them
- representing addition strategies
- adding and subtracting multiples of 10 and 100
- developing strategies for solving addition problems by focusing on how each strategy starts
- gaining fluency with subtraction facts related to addition combinations up to $10 + 10$ (3.1)
- using multiples of 100 as a landmark to solve subtraction problems
- solving subtraction problems with 2- and 3-digit numbers (to 300) using strategies that involve either subtracting one number in parts, adding up, or subtracting back
- finding the difference between two numbers by either adding or subtracting
- reasoning about how increasing the numbers in a subtraction problem affects the difference

Unit 8 Math Focus Points

- combining hundreds to numbers above 1,000
- subtracting from multiples of 100
- adding multiples of 10 and 100 to, and subtracting them from, 3-digit numbers
- estimating answers to subtraction problems with 3-digit numbers
- using the relationship of numbers in a subtraction expression to multiples of 100 to solve subtraction problems
- solving addition problems with 3-digit numbers
- estimating and solving addition problems with sums greater than 1,000
- solving addition problems with more than 2 addends

Grade 3 Scope and Sequence

- estimating which of two sums is greater
- knowing and using subtraction problems related to the addition combinations to $10 + 10$ (the subtraction facts, e.g., $8 - 5$, $13 - 9$) with fluency (3.4)
- determining combinations of addends for a given sum
- solving addition and subtraction problems with more than one step
- solving addition and subtraction problems in the context of money (dollars, cents)

Whole Number Operations Understanding different types of subtraction problems

Unit 3 Math Focus Points

- solving subtraction problems that involve finding a missing part
- visualizing and representing the action of a subtraction problem which involves finding a missing part
- understanding comparison as the difference between two numbers
- solving subtraction story problems that involve comparison
- visualizing and representing the action of comparison problems
- using number lines to represent solutions to comparison problems
- solving subtraction problems that involve removal
- visualizing and representing the action of removal problems

Whole Number Operations Understanding the meaning of multiplication

Unit 5 Math Focus Points

- understanding multiplication as combining equal groups
- writing and solving multiplication problems in contexts
- identifying the number of groups, the number in each group, and the product in a multiplication situation

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- understanding the relationship among skip counting, repeated addition, and multiplication
- using and understanding multiplication notation
- using a variety of ways to notate missing factors (e.g., $5 \times \underline{\quad} = 30$, $5 \times \Delta = 30$ and $20 \div 4 = ?$) (1.3, 4.2, 4.4)
- using arrays, and rectangles made from square tiles, to illustrate the distributive property (3.5A, 3.5B)

Whole Number Operations Reasoning about numbers and their factors and multiples

Unit 5 Math Focus Points

- finding the multiples of the numbers 2, 3, 4, 5, 6, and 10 by skip counting
- multiplying by multiples of 10 (3.7A)
- understanding the effect of multiplying by multiples of 10 (3.7A)
- describing and comparing characteristics of the multiples of a number
- understanding that doubling (or halving) one factor in a multiplication expression doubles (or halves) the product

Whole Number Operations Understanding and working within an array model of multiplication

Unit 5 Math Focus Points

- using arrays to model multiplication situations
- using arrays to find factors of 2-digit numbers up to 50
- using arrays to identify characteristics of numbers, including prime and square numbers
- using arrays to find a product by skip counting by one of its dimensions
- breaking an array into parts to find the product represented by the array

Grade 3 Scope and Sequence

- making sense of why the distributive property works (i.e. $9 \times 4 = (5 \times 4) + (4 \times 4)$ and $26 \times 4 = (10 \times 4) + (10 \times 4) + (6 \times 4)$) (2.6, 3.3)

Computational Fluency Learning the multiplication combinations with products up to 50 fluently

Unit 5 Math Focus Points

- using known multiplication combinations to determine the product of more difficult combinations (3.5A, 3.5B)
- identifying and learning multiplication combinations not yet known fluently (3.5A, 3.5B)

Unit 8 Math Focus Point

- fluently solving multiplication combinations with products to 50

Whole Number Operations Developing strategies for division based on understanding the inverse relationship between multiplication and division

Unit 5 Math Focus Points

- understanding division as the splitting of a quantity into equal groups
- using the inverse relationship between multiplication and division to solve problems
- using multiplication combinations to solve division problems
- using and understanding division notation
- writing and solving division problems in contexts

Whole Number Operations Describing, analyzing, and comparing strategies for adding and subtracting whole numbers

Unit 8 Math Focus Points

- using story contexts and representations to support explanations about how changing a number in a subtraction problem affects the difference (e.g., $200 - 75 = 125$ and $200 - 78 = 122$)
- solving addition problems by changing the numbers to create an equivalent problem that is easier to solve
- using story contexts and representations to support explanations about equivalent addition expressions (e.g., $88 + 105 = 90 + 103$)
- identifying addition strategies by focusing on how each strategy starts
- solving subtraction problems that involve comparison, removal, or finding missing part
- subtracting 3-digit numbers by using strategies that involve either subtracting one number in parts, adding up, or subtracting back
- representing solutions to subtraction problems with number lines, 1,000 charts, and/or story contexts
- subtracting by using strategies that involve changing one number to make a problem that is easier to solve

Rational Numbers Understanding the meaning of fractions (halves, fourths, eighths, thirds, sixths) and decimal fractions (0.50, 0.25) as equal parts of a whole (and object, an area, a set of objects)

Unit 7 Math Focus Points

- finding equal parts of a whole and naming them with fractions
- dividing an area into equal parts
- naming fractional parts with the unit fractions ($1/2$, $1/3$, $1/4$, etc.)
- ordering unit fractions

- demonstrating that different-shaped pieces that are the same fraction of the same area have equal areas
- naming fractional parts with fractions that have numerators greater than 1 ($3/4$, $2/3$, $3/6$, etc.)
- dividing a group into equal parts and naming the parts with fractions
- using fractional notation to record equivalencies (e.g., $3/6 = 1/2$, $1/2 = 2/4$)
- identifying equivalent fractional parts
- using mixed numbers to represent quantities greater than 1
- identifying equivalent fractions and decimals for values involving halves and fourths (e.g., $1/2 = 0.50$, $1/4 = 0.25$, $2 1/2 = 2.5$)
- reading, writing, and interpreting the meaning of the decimal numbers 0.50, 0.25, and numbers greater than 1 with these decimal portions, such as 2.5 and 2.25

Rational Numbers Using representations to combine fractions (halves, fourths, eighths, thirds, and sixths)

Unit 7 Math Focus Points

- using representations to combine fractions that sum to 1 (e.g., $1/4 + 3/4 = 1$, $1/3 + 1/3 + 1/3 = 1$, $1/2 + 1/4 + 1/4 = 1$)
- using representations to combine fractions to equal other fractions ($1/2 = 1/3 + 1/6$)

Rational Numbers Developing understanding of fractions as numbers

Unit 7 Math Focus Points

- representing fractions on a number line **(1.4A, 1.4B)**
- identifying equivalent fractions **(1.4A, 1.4B)**
- comparing fractions **(1.4B)**
- using $>$ and $<$ to compare fractions **(1.2)**
- using the terms and notation for fractions that equal 1 or more wholes (e.g., $4/4 = 1$ whole, $3/1 = 3$ wholes, $6/1 = 6$ wholes) **(2.1)**

Patterns, Functions, and Change

Using Tables and Graphs Using graphs to represent change

Unit 6 Math Focus Points

- describing the overall shape of a line graph—increasing, decreasing, staying the same
- finding the difference between values on a line graph, including the difference between a positive and negative value
- associating a story with its corresponding graph
- plotting points on a graph to represent a situation in which one quantity is changing in relation to another
- identifying points on a graph with corresponding values in a table and interpreting the numerical information in terms of the situation the graph represents
- comparing situations by describing differences in their graphs

Using Tables and Graphs Using tables to represent change

Unit 6 Math Focus Points

- using tables to represent the relationship between two quantities in a situation with a constant rate of change
- interpreting numbers in the table in terms of the situation they represent
- comparing situations by describing differences in the tables that represent them

Linear Change Describing and representing a constant rate change

Unit 6 Math Focus Points

- describing the relationship between two quantities in a situation with a constant rate of change, taking into account a beginning amount in a constant increase

- creating a representation for a situation with a constant rate of change
- comparing different representations that show the same situation
- making rules that relate one variable to the other in situations with a constant rate of change
- connecting the steps of a general method or rule to the parts of the situation they represent

Number Sequences Constructing, describing, and extending number sequences with constant increments generated by various contexts

Unit 6 Math Focus Points

- identifying the unit and repeating pattern
- associating counting numbers with elements of a pattern
- determining the element of an ABC pattern associated with a particular counting number
- describing and extending a number sequence with a constant increment (e.g., 3, 6, 9, ... or 2, 5, 8, ...)
- identifying numbers that are multiples of three, or one less or one more than a multiple of 3

Data and Probability

Data Analysis Describing, summarizing, and comparing data

Unit 2 Math Focus Points

- describing and interpreting categorical data
- describing the shape of ordered, numerical data: where data are spread out or concentrated, where there are few data, highest and lowest values, and outliers **(2.3A)**
- using summaries such as *almost all*, *very few*, *half*, or *more than half*

- describing what values are typical or atypical in a data set
- developing arguments based on the data
- using data to compare groups

Data Analysis Representing data

Unit 2 Math Focus Points

- developing classifications to organize categorical data
- organizing categorical data in different ways to answer different questions
- representing categorical data using a picture or graph
- using a pictograph to represent data (2.3A)
- interpreting what the symbols on a pictograph mean (2.3A)
- reading and interpreting a bar graph
- reading a scale on a graph with intervals larger than 1
- using a line plot, bar graph, or other representation to represent ordered, numerical data
- interpreting what the numbers and symbols on a line plot mean
- developing a consistent scale to show where data are and are not concentrated (2.5)
- reading and interpreting a representation of ordered, numerical data (2.7)
- considering how well a data representation communicates to an audience

Data Analysis Designing and carrying out a data investigation

Unit 2 Math Focus Points

- developing and revising a survey question
- interpreting results of a data investigation (2.6, 2.7)

Geometry

Features of Shape Describing and classifying two-dimensional figures

Unit 4 Math Focus Points

- determining the geometric moves needed (slides, flips, turns) to prove or disprove congruence between two shapes
- identifying the attributes of triangles: three sides, three vertices, and three angles
- identifying the attributes of quadrilaterals: four sides, four vertices, and four angles
- comparing the properties of squares and triangles

Features of Shape Describing and measuring angles

Unit 4 Math Focus Points

- recognizing right angles
- identifying a right angle as having a measure of 90 degrees
- understanding angle size as the degree of turn
- comparing the sizes of angles

Features of Shape Describing properties of three-dimensional shapes

Unit 9 Math Focus Points

- describing the components and properties of different classes of solids such as polyhedra (3-D shapes having only flat surfaces, such as prisms and pyramids) and nonpolyhedra (such as cones and cylinders)
- distinguishing between polyhedra and nonpolyhedra
- distinguishing between prisms and pyramids
- identifying the components of polyhedra (faces, edges, and vertices) and how they come together to form the whole

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- visualizing and building polyhedra by using knowledge of their components (faces, edges, and vertices) and how they come together to form the whole

Features of Shape Translating between two-dimensional and three-dimensional shapes

Unit 9 Math Focus Points

- determining the number and shapes of the faces of cubes and other rectangular prisms and how they come together to form the whole
- designing patterns that make open boxes for a cube
- designing patterns that make open boxes for 2-cube rectangular prisms
- designing patterns that make nets for triangular pyramids
- determining the number and shapes of the faces of a triangular pyramid and how they come together to form the whole
- communicating about spatial relationships
- decomposing images of 3-D shapes and then recombining them to make a given structure

Measurement

Linear Measurement Measuring with standard units

Unit 2 Math Focus Points

- measuring in inches
- measuring lengths longer than the measuring tool
- understanding the relationship between feet and inches
- combining feet and inches to get a total measurement
- using correct notation to write a measurement in feet and inches

Grade 3 Scope and Sequence

Unit 4 Math Focus Points

- reviewing the length of units of measure (inch, foot, yard, centimeter, and meter)
- establishing measurement benchmarks
- using U.S. standard and metric units to accurately measure length
- recognizing and explaining possible sources of measurement error

Linear Measurement Understanding and finding perimeter

Unit 4 Math Focus Points

- understanding perimeter as the measure around the outside edges of a two-dimensional figure
- finding perimeter using standard units
- **using tiles to find the perimeter of a rectangle (2.5A)**
- creating different shapes with the same perimeter
- **understanding that rectangles can have the same perimeter and different areas or the same area and different perimeters (2.5A)**
- finding the perimeter of an irregular shape

Area Measurement Understanding and finding area

Unit 4 Math Focus Points

- understanding that area is measured in square units
- understanding that when measuring area, the space being measured must be completely covered with no gaps or overlaps
- **using tiles to find the area of a rectangle (2.5A)**
- using squares and triangles to make shapes with an area of four square units
- examining the relationship between the area of squares and triangles
- understanding that shapes with the same area can look different (**i.e., same area, different perimeter (2.4)**)

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- understanding that rectangles can have the same perimeter and different areas or the same area and different perimeters (2.5A)
- finding the area of partially covered rectangles
- finding the area of an irregular shape
- designing a shape for a given area
- finding area by counting or calculating whole and partial square units
- adding to find the area (2.3, 2.4, 2.5)

Unit 5 Math Focus Point

- using tiles to find the area of a rectangle (3.1A)
- developing an understanding that area can be found by multiplying the dimensions of a rectangle (3.1A)
- multiplying the dimensions or side lengths of a rectangle to find the area (3.1, 3.2, 3.3)

Measuring Temperature Understanding temperature and measuring with standard units

Unit 6 Math Focus Points

- reading and interpreting positive and negative temperatures on a thermometer and on a line graph
- associating temperatures with particular activities or clothing

Volume Structuring rectangular prisms and determining their volume

Unit 9 Math Focus Points

- determining the number of cubes that will fit in the box made by a given pattern
- designing patterns for boxes that will hold a given number of cubes
- seeing that the cubes filling a rectangular prism can be decomposed into congruent layers

Grade 3 Scope and Sequence

Liquid Volume, Weight and Mass

Understanding and measuring liquid volume, and weight and mass

Unit 9 Math Focus Points

- understanding measures of liquid volume (4A.1, 4A.3)
- estimating and measuring liquid volume (4A.1, 4A.3)
- solving story problems involving liquid volume (4A.1, 4A.3)
- understanding measures of weight and mass (4A.2, 4A.3)
- estimating and measuring weight and mass (4A.2, 4A.3)
- solving story problems involving weight and mass (4A.2, 4A.3)

Classroom Routines

Class Collection

Unit 3 Math Focus Points

- solving addition problems with 2- and 3-digit numbers
- finding the difference between 3-digit numbers
- finding the difference between 2- and 3-digit numbers in 1,000

What's the Temperature?

Units 1- 9 Math Focus Points

- learning about temperature: reading a thermometer, learning to associate different temperatures with words like *colder* and *warmer*, and establishing landmark temperatures
- recording information in a table and on a graph
- reading information from the shape of the graph: hot, cold, increasing, decreasing

Ten-Minute Math

Counting Around the Class

Units 5 and 8 Math Focus Points

- finding the multiples of numbers through skip counting
- becoming familiar with multiplication patterns
- understanding the relationship between skip counting and multiplication

Guess My Rule

Units 2, 6, and 8 Math Focus Points

- using evidence and formulating questions to make hypotheses about the common characteristics of groups of people or things
- systematically eliminating possibilities
- using mathematical terms to describe numbers

More or Less?

Units 1, 2, and 9 Math Focus Points

- breaking apart, reordering, or combining numbers within a problem, for easier computation
- using knowledge of place value and known combinations to estimate sums and differences
- practicing addition and subtraction skills

Practicing Place Value

Units 1, 4, 6, 7, and 9 Math Focus Points

- recognizing and interpreting the value of each digit in 2- and 3-digit numbers
- finding different combinations of a number, using only 100s, 10s, and 1s and recognizing their equivalence (i.e., 1 hundred, 3 tens, and 7 ones = 1 hundred, 2 tens, and 17 ones = 13 tens and 7 ones = 12 tens and 17 ones, etc.)
- reading and writing numbers up to 1,000

- writing numbers in expanded form (i.e., $678 = 600 + 70 + 8$) (U4 1.1, 1.2, 1.3, 1.4, 1.5, 2.4, 2.5A, 2.5, 3.2, 3.5, 3.6, U6 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, U7 1.1, 1.3, 1.4A, 1.4B, 2.3, 2.1, 2.3, U9 4A.1, 4A.2, 4A.3)
- rounding numbers to the nearest ten and hundred (U4 1.1, 1.2, 1.3, 1.4, 1.5, 2.4, 2.5, 3.2, 3.5, 3.6, U6 2.2, 3.1, 3.3, 3.4, U7 1.1, 1.3, 1.4A, 2.1, 2.3, U9 4A.1, 4A.2, 4A.3)
- adding multiples of 10 to, and subtracting multiples of 10 from 2- and 3-digit numbers

Quick Images

Units 4 and 9 Math Focus Points

- organizing and analyzing visual images
- developing language and concepts needed to communicate about spatial relationships
- decomposing images of 2-D shapes and then recombining them to make a given design (Unit 4)
- decomposing images of 3-D shapes and then recombining them to make a given structure (Unit 9)

Today's Number

Units 2, 3, 6, and 7 Math Focus Points

- generating equivalent expressions for a number using particular constraints
- practicing computation skills
- using notation to record expressions

What Time Is It?

Units 3, 5, and 7 Math Focus Points

- naming, notating, and telling time to the nearest 5 minutes on a digital or analog clock
- telling time to any minute on a digital or analog clock
- determining intervals of time to the minute
- telling time to the nearest five minutes and measuring time intervals in minutes (1.7A)