COMMON CORE STANDARDS MATHEMATICS

Ed Services - Module 3

2012-2013

Norms

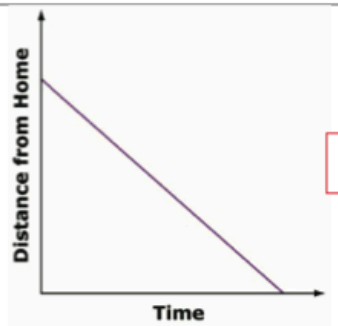


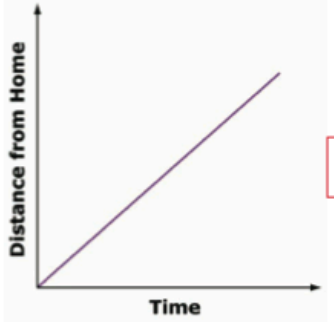
- Be respectful of one another
  - Stay focused on meeting content and objectives
  - Electronics away unless it's an emergency or for an activity
- Be a learner - actively participate in readings, discussions and activities.

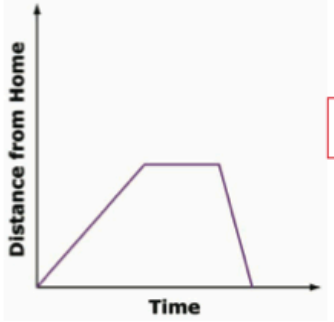
Math Task

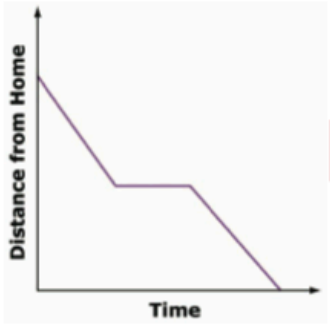
Each day, Maria walks from home to school and then from school to home. The graphs that follow show the distance that Maria is from home at different times during the walk.

Match the graphs to the descriptions of Maria's walk shown to the right of the graphs. Next to each graph, enter the letter (A, B, C, D) of the description that best matches the graph.









A. Maria walks from school to her friend's house. She visits her friend for a while. Then she walks the rest of the way home.

B. Maria walks from home to school at a constant rate.

C. Maria starts to walk from home to school. She stops to see whether she has her homework. She realizes she forgot her homework and runs back home to get it.

D. Maria walks from school to home at a constant rate.

8th Grade Content Standard for Functions

Functions **8.F**

Define, evaluate, and compare functions.

1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1]
2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*
3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*

Use functions to model relationships between quantities.

4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Grade 08 Mathematics Sample CR Item C1 TF

MAT.08.CR.1.0000F.F.090 C1 TF

Sample Item ID:	MAT.08.CR.1.0000F.F.090
Grade:	08
Primary Claim:	**Claim 1: Concepts and Procedures** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.
Secondary Claim(s):	Claim 2: Problem Solving Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies.
Primary Content Domain:	Functions
Secondary Content Domain(s):	
Assessment Target(s):	1 F: Use functions to model relationships between quantities. 2 C: Interpret results in the context of a situation. 2 A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. 2 D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).
Standard(s):	8.F.5
Mathematical Practice(s):	1, 2, 4, 5, 6, 7, 8
DOK:	2
Item Type:	CR
Score Points:	1
Difficulty:	M
Key:	D, B, C, A
Stimulus/Source:	
Target-specific attributes (e.g., accessibility issues):	
Notes:	All four graphs must be correctly matched to its corresponding description. Response boxes only accept single alpha characters A, B, C, or D as entries.

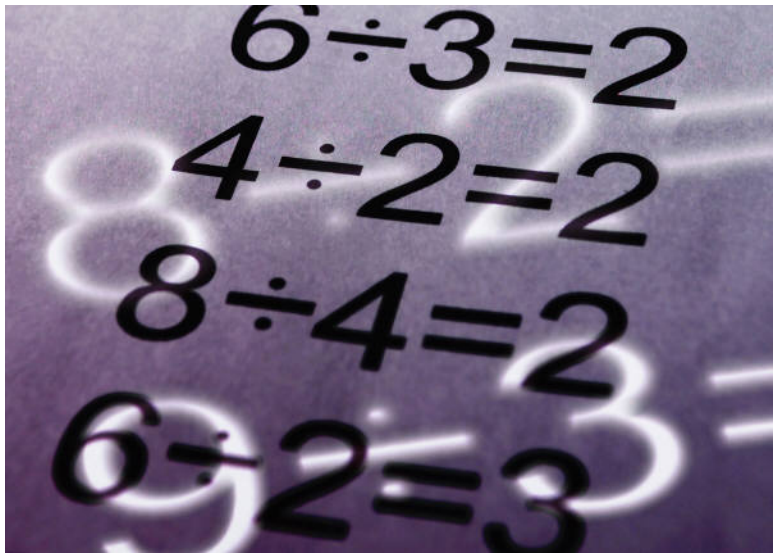
Standard Outcomes for Today

- Revisit Assessment Claims
- Math Practices
- Content Standards



Assessment Claims

- Meet with your 3:00 clock partner and revisit the assessment claims



Assessment Claims

Overall Assessment Claim	(Grades 3-8) "Students can demonstrate progress toward college and career readiness in mathematics." (Grade 11) "Students can demonstrate college and career readiness in mathematics."
Assessment Claim # 1	Concepts and Procedures
Assessment Claim # 2	Problem Solving
Assessment Claim # 3	Communicating Reasoning
Assessment Claim # 4	Modeling and Data Analysis

Standards for Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning

Standards for Mathematical Practices

- Foster reasoning and sense making in mathematics
- Carry across all grade levels
- Describe mathematics habits of mind that should be taught explicitly to all students

Meet to Discuss the Standards for Mathematical Practices

- Count off by 8 and then meet in groups. All 1's together, 2's together etc.

  - Group 1 – read the first math practice quietly, then have a discussion with your group about what the main idea(s) of the practice. Also discuss what this practice would look like in a class room.
  - Group 2 – Second Math practice, Group 3 – Third Math Practice etc.
  - Please be prepared to share out your group's ideas

The Promise of the Content Standards

These Standards are not intended to be new names for old ways of doing business. They are a call to take the next step. It is time for states to work together to build on lessons learned from two decades of standards based reforms. It is time to recognize that standards are not just promises to our children, but promises we intend to keep.

Council of Chief State School Officers and the National Governors Association

CCSS Content Standards

- CCSS are focused on key topics at each grade level.
- There is a coherent progression from one grade level to the next.
- Emphasis is on the conceptual understanding of the mathematics - more than one correct answer.
- Mathematical practices foster reasoning in mathematics - “think like a mathematician.”
- Emphasize participating in collaborative conversation.

Organization and Design of Mathematics Standards

- Standards for Mathematical Practice
  - ✓ Carry across all grade levels
  - ✓ Describe habits of mind of a mathematical expert student
- Standards for Mathematical Content
  - ✓ K-8 standards presented by grade level
  - ✓ Organized into domains that progress over several grades
  - ✓ Grade introductions give 2-4 focal points at each grade level
  - ✓ High school standards presented by conceptual category (Number & Quantity, Algebra, Functions, Modeling, Geometry, Statistics & Probability)

Common Core State Standards for Mathematics

- Define what students should understand and be able to do in their study of mathematics
- Is the ability to justify appropriate to student's math maturity
- Understanding and procedural skill are equally important and can be assessed using tasks of sufficient richness
- Access to multiple strategies provides flexibility in problem solving

Components of the Content Standards

Standards

Define what students should understand and be able to do.

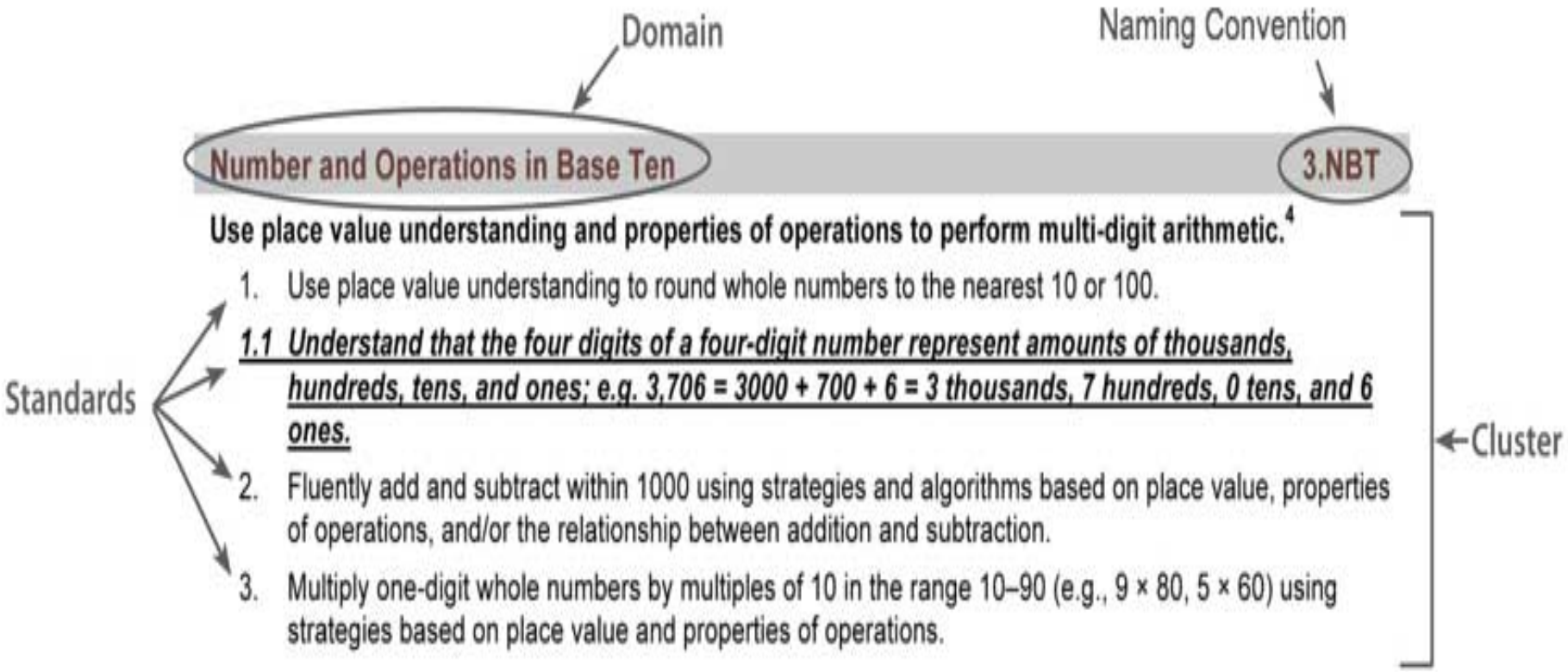
Clusters

Summarize groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

Domains

Are larger groups of related standards. Standards from different domains may sometimes be closely related.

Content Standards K-8



CCSS Compared to Previous Standards K-8

Strands
CA Standards
K-7

- Number Sense
- Algebra and Functions
- Measurement and
- Geometry
- Statistics, Data Analysis and Probability
- Mathematical Reasoning

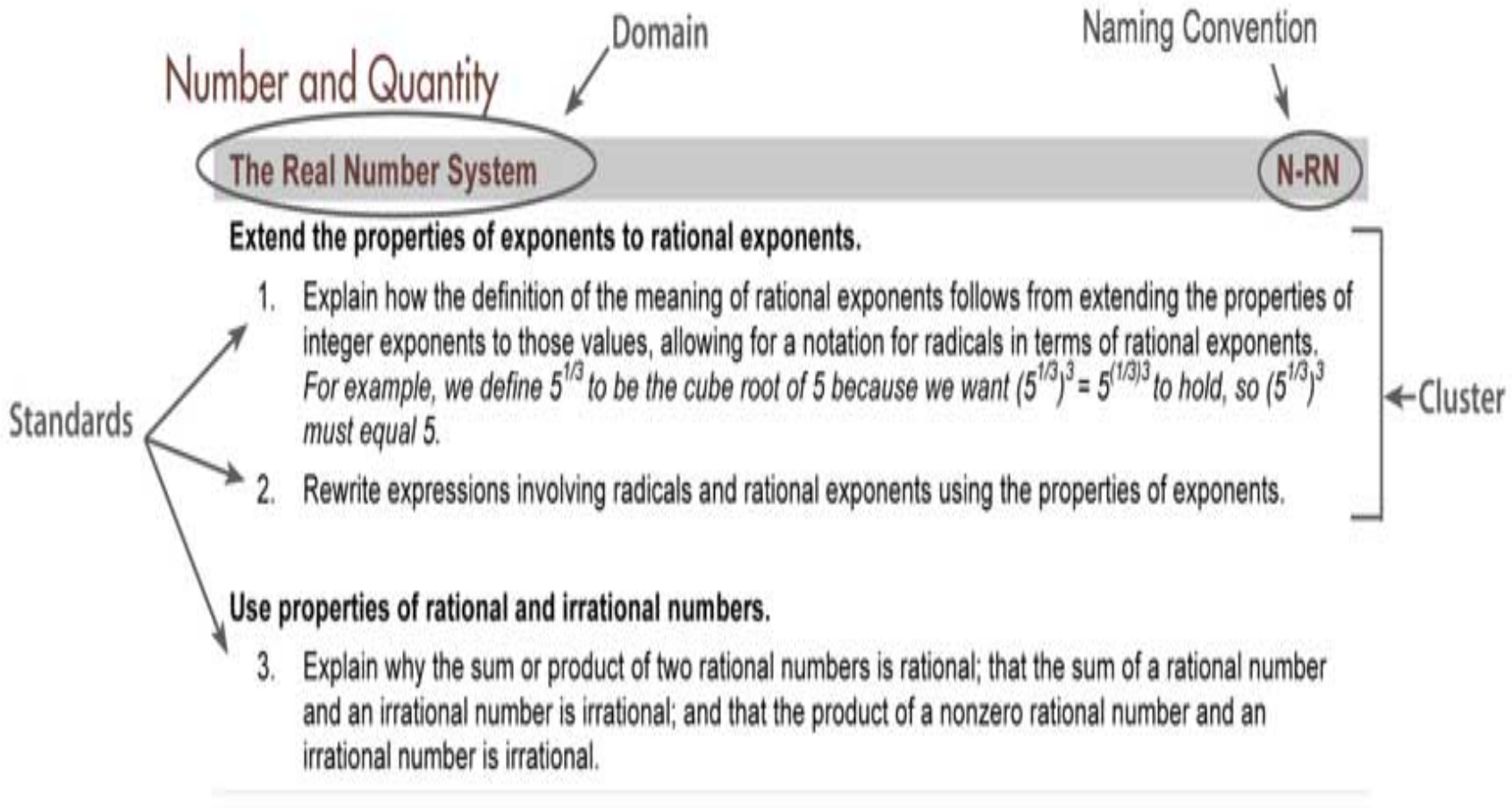
Domains
Common Core State Standards
K-5

- Counting and Cardinality (K only)
- Operations and Algebraic Thinking
- Number and Operations in Base 10
- Number and Operations-Fractions
- Measurement and Data
- Geometry

6-8

- Ratio and Proportional Relationships (Grades 6-7)
- The Number System
- Expressions and Equations
- Functions (Grade 8)
- Geometry
- Statistics and Probability

High School Example
Number and Quantity Content Cluster



Mathematics Standards for High School

Arranged by conceptual categories (NOT by course):

- Number and Quantity(N)
- Algebra (A)
- Functions (F)
- Modeling (★)
- Geometry (G)
- Statistics and Probability(S)

Mathematics Standards for High School

- Specify the math that all students should study to be college and career ready
- Identify additional math standards that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics. These are indicated by (+).
- Include the addition of two courses from California:
  - Calculus
  - Advanced Placement Probability and Statistics
- Development of suggested course descriptions will be done by CDE as part of their long-range implementation plan
  - Traditional vs. Integrated

Mathematics Sample Assessment Item

For numbers 1a–1e, select Yes or No to indicate whether each of these expressions is equivalent to $2(2x + 1)$.

1a.	$4x + 2$	◯ Yes	◯ No
1b.	$2(1 + 2x)$	◯ Yes	◯ No
1c.	$2(2x) + 1$	◯ Yes	◯ No
1d.	$2x + 1 + 2x + 1$	◯ Yes	◯ No
1e.	$x + x + x + x + 1 + 1$	◯ Yes	◯ No

7th Grade Content Standard for Expressions and Equations

Expressions and Equations	7.EE

Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
    a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*
    b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*

Grade 7 Mathematics Sample SR Item

MAT.07.SR.1.000EE.C.162

Sample Item ID:	MAT.07.SR.1.000EE.C.162
Grade:	07
Claim(s):	**Claim 1: Concepts and Procedures** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.
Assessment Target(s):	1 C : Use properties of operations to generate equivalent expressions.(DOK 1)
Content Domain:	Expression and Equations
Standard(s):	7.EE.1, 7.EE.2
Mathematical Practice(s):	2, 5
DOK:	1
Item Type:	SR
Score Points:	1
Difficulty:	M
Key:	YYNYY
Stimulus/Source:	
Target-Specific Attributes (e.g., accessibility issues):	
Notes:	Multi-part item

For numbers 1a–1e, select Yes or No to indicate whether each of these expressions is equivalent to $2(2x + 1)$.

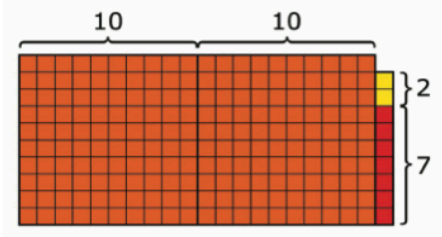
1a.	$4x + 2$	◯ Yes	◯ No
1b.	$2(1 + 2x)$	◯ Yes	◯ No
1c.	$2(2x) + 1$	◯ Yes	◯ No
1d.	$2x + 1 + 2x + 1$	◯ Yes	◯ No
1e.	$x + x + x + x + 1 + 1$	◯ Yes	◯ No

A multiplication problem is shown below.

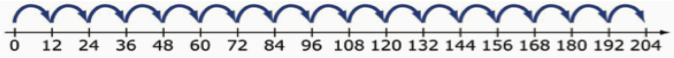
$$\begin{array}{r} 17 \\ \times 12 \\ \hline \end{array}$$

Which model(s) below could represent the solution to this problem? Click the letter next to all that apply.

Ⓐ

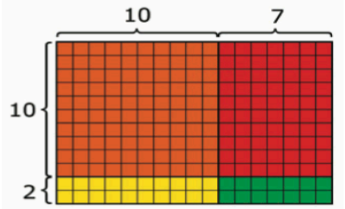


Ⓑ



Ⓒ $(1 \times 1)+(1 \times 7)+(2 \times 1)+(2 \times 7)$

Ⓓ



Ⓔ $(17 \times 2)+(17 \times 1)$

Ⓕ



4th Grade Content Standard for Numbers and Operations in Base Ten

Number and Operations in Base Ten[2]	4.NBT

Generalize place value understanding for multi-digit whole numbers.

1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*
2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
3. Use place value understanding to round multi-digit whole numbers to any place.

Use place value understanding and properties of operations to perform multi-digit arithmetic.

4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.
5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Grade 4 Mathematics Sample SR Item C1 TE

MAT.04.SR.1.00NBT.E.035 C1 TE

Sample Item Id:	MAT.04.SR.1.00NBT.E.035
Grade:	04
Claim(S):	**Claim 1: Concepts and Procedures** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.
Assessment Target(S):	1 E: Use place-value understanding and properties of operations to perform multi-digit arithmetic.
Content Domain:	Numbers and Operations in Base Ten
Standard(S):	4.NBT.5
Mathematical Practice(S):	1, 2, 4, 5, 8
DOK:	2
Item Type:	SR
Score Points:	2
Difficulty:	M
Key:	B, D
Stimulus/Source:	
Target-Specific Attributes (E.G., Accessibility Issues):	
Notes:	Multi-answer item

Think About It!

- Take a moment to think about the Mathematics Common Core State Standards
  - One thought
  - One application/idea
  - One question
- Record your thoughts on the “Post It” Note document

Let's Revisit the Outcomes for Today

- Revisit Assessment Claims
- Math Practices
- Content Standards



References

- http://www.cde.cs.gov/ci/cc
- http://www.nagb.org/publications/frameworks/reading-2009.dov National Assessment Governing Board
- http://www.corestandards.org
- http://www.k12.wa.us/SMARTER/ SMARTER Balanced Assessment Consortium
- http://www.teachingchannel.org videos on CCSS and Lessons

Information from CDE, SBAC, Mathematics Coaching Consortium @ wccusd, Silicon Valley Math Initiative