Appendix C
Coding Procedures for Curriculum Content Analyses

Materials included in this packet:

Rating Sheet
Comments & Suggestions worksheet
Subject Topic List
Categories of Student Expectations (Cognitive Demand) List

Introduction

Thank you for your participation in this content analysis workshop. Your assistance will assist us in collecting descriptive information about the subject matter content contained in the assessments and standards documents to be analyzed. Our goal is to content analyze several state standards and assessments using a two-dimensional taxonomy for describing subject matter content.

The data collected will be summarized into content maps and graphs that can be used to highlight the relative emphasis of academic content embedded in these curriculum related documents. The resulting content maps and graphs permit graphic comparisons of teacher reports of instructional content with locally relevant assessment instruments or standards. Content analysis will also serve to support alignment analyses into the relationships between instruction, assessment and standards. Results will be used to support the information needs of participating states, districts and schools, and will also be used in analyses associated with several NSF funded studies being conducted in the states and districts represented at this workshop.

Coding Dimensions

Topics

Each assessment item is to be rated on two intersecting dimensions. The first dimension relates to subject topic. Topic lists are organized by subject. The appropriate topic lists are contained in this packet, covering K-12 curriculum content for Mathematics, Science, English Language Arts/Reading and Social Studies. The topic lists are organized at two levels. The more general level identifies content areas (e.g. Number Sense, Measurement, Algebraic Concepts in math; or Energy, Biochemistry, Genetics in science, etc.) Within each of these content areas are listed some number of topics associated with that content area. You will note that each topic has a three- or four-digit number listed to its left. This number is the >topic code= and is to be entered on the rating sheet to identify the particular topic(s) associated with a given assessment item or standard strand or goal. Though each content area also has a number code associated with it, most coding is done at the fine grain, or topic level that most content coding is to be done. Exceptions to this rule are discussed in the coding conventions section below.

Expectations for Students (Cognitive Demand)

In addition, assessment items are coded in terms of the expectations for student performance (or cognitive demand) targeted by a given item or standard. Your packet contains a list of cognitive expectations for the appropriate subject(s), organized into five categories. Each category is defined using a list of descriptors to identify the types of cognitive demand associated with a given category of student expectation. It should be noted that the descriptors listed for each category are not exhaustive, but intended to be illustrative of the types of activities associated with each category. Unlike the topic list, raters are not asked to code at this fine-grain level of cognitive demand descriptors. Cognitive demand is coded only at the broader categorical level of student expectation. Each category is given a letter designation (B-F) to be used for coding purposes.

Procedures

1. ***Pre-coding Exercise***

A sample set of assessment items will be content analyzed individually by each rater using the coding procedures described below. These sample items and their related content codes will then be discussed by each rating team in order to establish a common understanding and set of coding conventions for conducting the content analyses of the various documents. Note the coding conventions listed at the end of this handout. Any additional conventions agreed upon by your team should be noted in the "Comments & Suggestions Worksheet" located in you packet.

2. ***Rating Form Identification***

Please make sure that you complete the information listed at the top of each rating form. This includes:

- District/State (as applicable)
- Assessment Name (e.g. Terra Nova, SAT-9, or relevant state assessment)
- Rater# (refer to the label on your folder)
- Subject (mathematics, science or language arts)
- Test Form (if applicable)
- Rating form page # (if more than two rating forms are required

3. ***Coding Procedures.***

Below is an excerpted line from the sheet you will record content codes on.

Item Number	Content Code 1		Content Code 2		Content Code 3	
	Topic Code 1	Expectation Code 1	Topic Code 2	Expectation Code 2	Topic Code 3	Expectation Code 3
1	503	B				

The correct way to record a content code (**503B**) is illustrated in the column in the above table labeled **Content Code 1**. Note that the number for the Sub-Topic and the letter for the Student Expectation are placed in separate cells. Every content code should consist of

both a topic number and a cognitive demand letter, even if one or the other repeats a previous code for that item.

Every item should be given at least 1 content code. **Up to three separate *topic by expectation* combinations** may be selected for any one assessment item, and up to six ***topic by expectation* combinations** may be coded for standards and/or other curriculum materials. For example, an assessment item might relate to two distinct topic areas, while involving only one student expectation category. In that case, the coder would enter two different topic codes in cells **Topic Code 1** and **Topic Code 2** on the Coding Sheet, but would enter the same expectation code in cells **Expectation Code 1** and **Expectation Code 2**. As another example, an item might be coded with three distinct topic by expectation combinations, with perhaps one topic being associated with two types of expectations, while a second topic is associated with yet a third category of expectation. Such an example might be coded as follows:

Item Number	Content Code 1		Content Code 2		Content Code 3	
	Topic Code 1	Expectation Code 1	Topic Code 2	Expectation Code 2	Topic Code 3	Expectation Code 3
1	103	B	103	D	102	C

Again, up to 3 topic by expectation combinations may be coded for each assessment item, and six combinations for each standard strand or curriculum materials section. Should a coding item be so complex as to suggest more than these limits, select the most dominant elements of the item to code up to the accepted limit of content codes.

Coding Conventions

Occasionally items are difficult to code with the taxonomy. The following coding conventions have been established to cover most situations.

1. If you determine that an item or standard cannot be associated with a specific topic in the taxonomy, then:

- If the content to code fits a general content area, but is ***not specific enough to identify a particular topic***, use the code for the major content area, (e.g., A**200**" for "Measurement" in mathematics, or "**200**" for "Science & Technology" in science).

- If the content pertains to a ***specific topic not listed in the taxonomy***, use the code for the most appropriate content area, and add "**90**" for the last two digits, (e.g., A**290**" for "Measurement" in mathematics, or "**290**" for "Science & Technology" in science).

- Use the Topic code "**000"**cases where you determine there is ***no appropriate content code whatsoever in the topic list*** that fits a given item or standard.

- Use the Topic code A**999**" in cases where you determine the item ***refers to content out of subject area*** (e.g., science content on a mathematics test).

2. If you determine that an item or standard ***cannot be associated with a specific category of cognitive demand***, enter a "**Z**" in the cognitive demand cell.

3. If you use any of the above conventions, please include a suggestion for an additional content area, topic or cognitive demand descriptor on the ***Comments & Suggestions worksheet*** in you packet. This will assist us in considering future revisions to the taxonomies. (Please be sure return the "Comments and Suggestions" worksheet to one of the workshop staff before leaving.)

4. **If your coding team establishes additional conventions for coding items, please note these as well on the Comments & Suggestions worksheet.**

Rater: _____ Document: _____ Date: _____ Page of

	Test Item Nbr		Content Code 1			Content Code 2			Content Code 3	
			TPC1	CGD1		TPC2	CGD2		TPC3	CGD3
1										
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	Test Item Nbr		Content Code 1			Content Code 2			Content Code 3	
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Workshop:_____ Subject: _____ Rater/Team: _____

Please use this sheet to document suggestions for:

- additional content areas
- additional sub-topics within a content area
- additional student expectation categories
- additional cognitive demand descriptors within a current student expectation category
- other comments or feedback you may have

Number	**Content Area**	**Sub-Topic**
Student Expectation Category		**Cognitive Demand Descriptor**
Coding Conventions:		
Other Comments and Suggestions:		

SEC K-12 Mathematics Taxonomy

100	**Nbr. sense /Properties/ Relationships**
200	**Operations**
300	**Measurement**
400	**Consumer Applications**
500	**Basic Algebra**
600	**Advanced Algebra**
700	**Geometric Concepts**
800	**Advanced Geometry**

900	**Data Displays**
1000	**Statistics**
1100	**Probability**
1200	**Analysis**
1300	**Trigonometry**
1400	**Special Topics**
1500	**Functions**
1600	**Instructional Technology**

Other Coding Conventions

Topics:

0	**All**
999	**Out of Subject Area**

Cognitive Demands:

B	**Memorize**
C	**Perform Procedures**
D	**Demonstrate Understanding**
E	**Conjecture/Analyze**
F	**Solve Non-Routine Problems**
Z	**Non-Specific Cognitive Demand**

100	Nbr. sense /Properties/ Relationships
101	Place value
102	Whole numbers and Integers
103	Operations
104	Fractions
105	Decimals
106	Percents
107	Ratio and proportion
108	Patterns
109	Real and/or Rational numbers
110	Exponents and scientific notation
111	Factors, multiples, and divisibility
112	Odd/even/prime/composite/square numbers
113	Estimation
114	Number Comparisons (order, magnitude, relative size, inverse, opposites, equivalent forms, scale or number line)
115	Order of operations
116	Computational Algorithms
117	Relationships between operations
118	Number Theory (e.g. base-ten and non-base-ten systems)
119	Mathematical properties (e.g., distributive property)
190	Other
200	**Operations**
201	Add/subtract whole numbers and integers
202	Multiply whole numbers and integers
203	Divide whole numbers and integers
204	Combinations of operations on whole numbers or integers
205	Equivalent and non-equivalent fractions
206	Add/subtract fractions
207	Multiply fractions
208	Divide fractions
209	Combinations of operations on fractions
210	Ratio and proportion
211	Representations of fractions
212	Equivalence of decimals, fractions, and percents
213	Add/ subtract decimals
214	Multiply decimals
215	Divide decimals
216	Combinations of operations on decimals
217	Computing with percents
218	Computing with exponents and radicals
290	Other

300	Measurement
301	Use of measuring instruments
302	Theory (arbitrary, standard units and unit size)
303	Conversions
304	Metric (SI) system
305	Length and perimeter
306	Area and volume
307	Surface Area
308	Direction, Location, Navigation
309	Angles
310	Circles (e.g., pi, radius, area)
311	Mass (weight)
312	Time and temperature
313	Money
314	Derived measures (e.g., rate and speed)
315	Calendar
316	Accuracy and Precision
390	Other
400	**Consumer Applications**
401	Simple interest
402	Compound interest
403	Rates (e.g., discount and commission)
404	Spreadsheets
490	Other
500	**Basic Algebra**
501	Absolute value
502	Use of variables
503	Evaluation of formulas, expressions, and equations
504	One-step equations
505	Coordinate Planes
506	Patterns
507	Multi-step equations
508	Inequalities
509	Linear and non-linear relations
510	Rate of change/slope/line
511	Operations on polynomials
512	Factoring
513	Square roots and radicals
514	Operations on radicals
515	Rational expressions
516	Multiple representations
590	Other

600	**Advanced Algebra**
601	Quadratic equations
602	Systems of equations
603	Systems of inequalities
604	Compound Inequalities
605	Matrices and determinants
606	Conic sections
607	Rational, negative exponents/radicals
608	Rules for exponents
609	Complex numbers
610	Binomial theorem
611	Factor/remainder theorem
612	Field properties of real number system
613	Multiple representations
690	Other
700	**Geometric Concepts**
701	Basic terminology
702	Points, lines, rays, segments, and vectors
703	Patterns
704	Congruence
705	Similarity
706	Parallels
707	Triangles
708	Quadrilaterals
709	Circles
710	Angles
711	Polygons
712	Polyhedra
713	Models
714	3-D relationships
715	Symmetry
716	Transformations (e.g., flips or turns)
717	Pythagorean Theorem
790	Other
800	**Advanced Geometry**
801	Logic, reasoning, and proofs
802	Loci
803	Spheres, cones, and cylinders
804	Coordinate Geometry
805	Vectors
806	Analytic Geometry
807	Non-Euclidean Geometry
808	Topology
890	Other

900	**Data Displays**
901	Summarize data in a table or graph
902	Bar graph and histograms
903	Pie charts and circle graphs
904	Pictographs
905	Line graphs
906	Stem and Leaf plots
907	Scatter plots
908	Box plots
909	Line plots
910	Classification and Venn diagrams
911	Tree diagrams
990	Other
1000	**Statistics**
1001	Mean, median, and mode
1002	Variability, standard deviation, and range
1003	Line of best fit
1004	Quartiles and percentiles
1005	Bivariate distribution
1006	Confidence intervals
1007	Correlation
1008	Hypothesis testing
1009	Chi Square
1010	Data Transformation
1011	Central Limit Theorem
1090	Other
1100	**Probability**
1101	Simple probability
1102	Compound probability
1103	Conditional probability
1104	Empirical probability
1105	Sampling and Sample spaces
1106	Independent vs. dependent events
1107	Expected value
1108	Binomial distribution
1109	Normal curve
1190	Other
1200	**Analysis**
1201	Sequences and series
1202	Limits
1203	Continuity
1204	Rates of change
1205	Maxima, Minima, and Range
1206	Differentiation
1207	Integration
1290	Other

1300	**Trigonometry**
1301	Basic ratios
1302	Radian measure
1303	Right triangle trigonometry
1304	Law of Sines and Cosines
1305	Identities
1306	Trigonometric equations
1307	Polar coordinates
1308	Periodicity
1309	Amplitude
1390	Other
1400	**Special Topics**
1401	Sets
1402	Logic
1403	Mathematical induction
1404	Linear programming
1405	Networks
1406	Iteration and recursion
1407	Permutation combinations
1408	Simulations
1409	Fractals
1490	Other
1500	**Functions**
1501	Notation
1502	Relations
1503	Linear
1504	Quadratic
1505	Polynomial
1506	Rational
1507	Logarithmic
1508	Exponential
1509	Trigonometric and circular
1510	Inverse
1511	Composition
1590	Other
1600	**Instructional Technology**
1601	Use of calculators
1602	Use of graphing calculators
1603	Use of computers and internet
1604	Computer programming
1605	Use of Spreadsheets
1690	Other

Cognitive Demand Categories for Mathematics

B	C	D	E	F
Memorize Facts, Definitions, Formulas	**Perform Procedures**	**Demonstrate Understanding of Mathematical Ideas**	**Conjecture, Analyze, Generalize, Prove**	**Solve Non-Routine Problems / Make Connections**
Recite basic mathematical facts	Use numbers to count, order, denote	Communicate mathematical ideas	Determine the truth of a mathematical pattern or proposition	Apply and adapt a variety of appropriate strategies to solve non-routine problems
Recall mathematics terms and definitions	Do computational procedures or algorithms	Use representations to model mathematical ideas	Write formal or informal proofs	Apply mathematics in contexts outside of mathematics
Recall formulas and computational procedures	Follow procedures / instructions	Explain findings and results from data analysis strategies	Recognize, generate or create patterns	Apply to real world situations
	Solve equations/formulas/ routine word problems	Develop/explain relationships between concepts	Find a mathematical rule to generate a pattern or number sequence	Synthesize content and ideas from several sources
	Organize or display data	Show or explain relationships between models, diagrams, and/or other representations	Make and investigate mathematical conjectures	
	Read or produce graphs and tables		Identify faulty arguments or misrepresentations of data	
	Execute geometric constructions		Reason inductively or deductively	

K-12 Science Content Areas

0	**Cross-cutting Themes/Big Ideas**
100	**Nature of Science**
200	**Science, Technology & Engineering**
300	**Science, Health & Environment**
400	**Measurement & Calculation in Science**
500	**Components of Living Systems**
600	**Biochemistry**
700	**Botany**
800	**Animal Biology**
900	**Human Biology**
1000	**Genetics**
1100	**Evolution**
1200	**Reproduction & Development**
1300	**Ecology**
1400	**Energy**

1500	**Motion & Forces**
1600	**Electricity**
1700	**Waves**
1800	**Kinetics, Equilibrium & Thermodynamics**
1900	**Properties of Matter**
2000	**Earth Systems**
2100	**Astronomy**
2200	**Meteorology**
2300	**Elements & The Periodic System**
2400	**Chemical Formulas & Reactions**
2500	**Acids, Bases, & Salts**
2600	**Organic Chemistry**
2700	**Nuclear Chemistry**
2800	**Freshwater Science (Limnology)**

Other Coding Conventions

Topics:

0	**All**
999	**Out of Subject Area**

Cognitive Demands:

B	**Memorize Facts/Definitions/Formulas**
C	**Perform Procedures**
D	**Communicate Understanding**
E	**Analyze Information**
F	**Apply Concepts/Make Connections**
Z	**Non-Specific Cognitive Demand**

K-12 Science Taxonomy

0	Cross-cutting Themes & Big Ideas in Science
1	Patterns
2	Cause and effect
3	Systems and System Models
4	Interdependence of science, technology, engineering
5	Influence of STEM on society and the natural world
6	Order and consistency in natural systems
7	Energy and Matter
8	Structure and Function
9	Stability and change
10	Scale, Proportion, Quantity
11	Science as a human endeavor
12	Constancy & Change
13	Order & Organization
14	Evidence, Models, Explanations
15	Form & Function
90	Other
100	**Nature of Science**
101	Nature and structure of science
102	Nature of scientific inquiry
103	Scientific habits of mind, logic, and reasoning
104	Issues of diversity, culture, and gender in science
105	History of scientific innovations
106	Ethical issues and critiques of science
107	Science methodologies
108	Evidence based claims, data analysis
109	Scientific models
110	Scientific explanation, communication
111	Qualitative and quantitative distinctions
190	Other
200	**Science, Technology & Engineering**
201	Technological benefits, trade-offs, consequences
202	Relationship between scientific inquiry and technological design
203	Use of science tools (incl. safe use)
204	Design, implement, and/or refine a solution or product
205	Engineering design principles (e.g., constraints, optimization, longevity)
206	Engineering & technological challenges
207	Engineering and technology industries
208	Engineering tools and techniques
209	Careers in engineering and technology
210	Use, design, or construct models
211	Emerging innovations/technologies
212	Systems and systems thinking
213	Biodiversity
214	Materials use
215	Natural and human made materials
216	Spatial/visualization-engineering
290	Other

300	Science, Health & Environment
301	Personal health, behavior, disease, and nutrition
302	Environmental health, pollution, and waste disposal
303	Acid rain
304	Ozone depletion
305	Resources and conservation
306	Toxic and nuclear waste
307	Greenhouse effect
308	Natural and human-caused hazards
309	Trade-offs and inter-relationships
310	Bio-ethics
390	Other
400	**Measurement & Calculation in Science**
401	The International System
402	Mass and weight
403	Length
404	Volume
405	Time
406	Temperature
407	Accuracy and precision vs. estimation
408	Significant digits
409	Derived units (e.g., rate and speed)
410	Conversion factors
411	Density
412	Data displays (e.g., tables, charts, maps, and graphs)
413	Units of measure
414	Use algebra to solve, predict or design solutions
415	Use geometry to solve, predict or design solutions
416	Use trigonometry to solve, predict or design solutions
417	Pressure
418	Error analysis
419	Scientific notation
420	Central tendencies of math: ratio
490	Other
500	**Components of Living Systems**
501	Cell structure and function
502	Cell Theory
503	Transport of cellular material (e.g. osmosis/diffusion)
504	Cell metabolism
505	Cell response
506	Cellular respiration
507	Cell specialization
508	Organs
509	Organ systems
510	Microbiology (e.g. micro-organisms, DNA/RNA,
511	Characteristics of life (incl. classification of living/non-
512	Homeostasis
513	Cell reproduction (incl. meiosis)
514	Tissue and tissue structure
590	Other

600	Biochemistry
601	Living elements (C, H, O, N, P)
602	Atomic structure and bonding
603	Synthesis reactions (proteins)
604	Hydrolysis
605	Organic Compounds (e.g., carbohydrates, proteins, nucleic/amino acids, lipids and enzymes)
607	Lipids
608	Properties of water
609	Neuro transmitters
610	Nucleic acids
690	Other
700	**Botany**
701	Nutrition and photosynthesis
702	Circulation
703	Respiration
704	Growth/development/behavior/response
705	Health and disease
706	Structure and function
707	Habitat
708	Classification
790	Other
800	**Animal Biology**
801	Nutrition
802	Circulation
803	Excretion
804	Respiration
805	Growth/development/behavior
806	Health and disease
807	Structure and function
808	Skeletal and muscular systems
809	Nervous and endocrine systems
810	Habitat
811	Digestive Systems
812	Classifications
813	Life cycles
890	Other
900	**Human Biology**
901	Nutrition and digestive system
902	Circulatory system and blood
903	Digestive & Excretory system
904	Respiration and respiratory system
905	Growth/development/behavior
906	Health and disease/immune system
907	Skeletal and muscular systems
908	Nervous and endocrine systems
990	Other

1000	Genetics
1001	Mendelian genetics
1002	Modern genetics
1003	Inherited diseases
1004	Biotechnology
1005	Human genetics
1006	Transcription and translation
1007	Mutation
1008	Meiosis
1009	DNA, replication
1090	Other
1100	**Evolution**
1101	Evidence for evolution
1102	Lamarckian theories
1103	Modern evolutionary theory
1104	Life origin theories
1105	Human evolution
1106	Classification
1107	Causes
1108	Natural selection (evolutionary adaptation & variation)
1109	Fossils
1110	Viruses
1111	Extinction
1190	Other
1200	**Reproduction and Development**
1201	Mitotic and meiotic cell division
1202	Asexual reproduction
1203	Inherited traits
1204	Reproduction and development in plants
1205	Reproduction and development in animals
1206	Reproduction and development in humans
1290	Other
1300	**Ecology**
1301	Food webs, chains, pyramids
1302	Competition and cooperation
1303	Energy flow relationships
1304	Biotic and abiotic factors
1305	Ecological succession
1306	Ecosystems
1307	Population dynamics
1308	Environmental chemistry
1309	Trophic State
1310	Niche populations
1311	Bio-geo-chemical cycles
1312	Matter cycle
1313	Habitat
1314	Symbiotics, Interrelationships
1390	Other

1400	Energy
1401	Potential energy
1402	Kinetic energy
1403	Energy & Matter, $E=MC^2$
1404	Heat energy and transfer
1405	Light energy
1406	Sound energy
1407	Laws of thermodynamics and entropy
1408	Work and energy
1409	Mechanical energy and machines
1410	Nuclear energy
1411	General and special relativity
1412	Transformation of energy
1413	Power
1414	Chemical energy
1415	Electrical energy
1416	Field stores/field energy
1417	Phase changes
1418	Solar/wind/alternative energy sources
1419	Energy efficiency/conservation
1490	Other
1500	**Motion & Forces**
1501	Vector and scalar quantities
1502	Displacement as a vector quantity
1503	Velocity as a vector quantity
1504	Relative position and velocity
1505	Acceleration
1506	Newton's First Law
1507	Newton's Second Law
1508	Newton's Third Law
1509	Momentum, impulse, and conservation
1510	Equilibrium
1511	Friction
1512	Gravity
1513	Types of force (e.g. mechanical, nuclear, weak, field)
1514	Buoyancy
1515	Torque
1516	Hydraulics and fluid pressure
1517	Relationship of mass & force
1518	Field force effects
1590	Other

1600	Electricity
1601	Static electricity (production, transfer, and distribution)
1602	Coulomb's Law
1603	Electric fields
1604	Current electricity
1605	Current, voltage, and resistance
1606	Series and parallel circuits
1607	Magnetism
1608	Effects of interacting fields
1609	Conductors and insulators
1610	Electromagnetism and electrical production
1611	Transformation to other forms
1612	Conservation of charge
1613	Electrochemistry
1690	Other
1700	**Waves**
1701	Characteristics and behavior
1702	Visible light (direction /speed/transformation)
1703	Non-visible light/electromagnetic spectrum (e.g. ultraviolet, infrared)
1704	Sound (e.g. direction, speed, transformation)
1705	Earthquakes, tsunamis, and ocean waves
1706	Radio waves
1707	Frequency and amplitude
1790	Other
1800	**Kinetics, Equilibrium & Thermodynamics**
1801	Molecular motion
1802	Pressure
1803	Kinetics and temperature
1804	Equilibrium
1805	Reaction rates
1806	Gas Laws
1807	Relationship between Velocity, Temperature, Pressure
1808	Hydraulics/fluid pressure
1890	Other

1900	Properties of Matter
1901	Characteristics and composition
1902	Elements, molecules, atoms, particles, compounds
1903	States of matter (S-L-G-P)
1904	Solutions and mixtures
1905	Physical and chemical changes
1906	Physical and chemical properties
1907	Isotopes, atomic number, and atomic mass
1908	Photons and spectra
1909	Atomic theory
1910	Quantum theory and electron clouds
1911	Conservation of mass and energy
1912	Subatomic particles
1913	Gas laws
1914	Atomic structure
1915	Matter cycles
1916	Natural and synthetic materials
1917	Properties of water
1990	Other
2000	**Earth Systems**
2001	Earth's shape, dimension, and composition
2002	Earth's origins and history
2003	Maps, locations, and scales
2004	Measuring using relative and absolute time
2005	Mineral and rock formations and types
2006	Erosion, weathering, deposition
2007	Plate tectonics
2008	Formation of: volcanoes, earthquakes, and mountains
2009	Topography (landforms)
2010	Dynamics and energy transfer
2011	Oceanography
2012	Hydrologic Cycle
2013	Soil Characteristics and Formation
2014	Movement of water - percolation
2015	Stratigraphy/sedimentation
2016	Fossils
2090	Other
2100	**Astronomy**
2101	Stars
2102	Galaxies
2103	Origins of the universe
2104	Asteroids, comets, meteoroids
2105	The solar system
2106	The Moon
2107	The Earth's motion: rotation and revolution
2108	Relationship of Earth, moon, and sun
2109	Location, navigation, and time
2110	Shadows & sun's location
2111	Planets
2112	Other objects in the universe
2113	Cosmological theories
2190	Other

2200	Meteorology
2201	The Earth's atmosphere
2202	Air pressure and winds
2203	The water cycle
2204	Weather (daily and seasonal weather)
2205	Climate
2206	Humidity
2207	Runoff ground water
2208	Flooding
2290	Other
2300	**Elements and The Periodic System**
2301	Early classification system(s)
2302	Modern periodic table
2303	Interaction of elements
2304	Element characteristics (families and periods)
2390	Other
2400	**Chemical Formulas & Reactions**
2401	Names, symbols, and formulas
2402	Molecular and empirical formulas
2403	Representing chemical change
2404	Balancing chemical equations
2405	Stoichiometric relationships
2406	Oxidation-reduction reactions
2407	Chemical bonds
2408	Electrochemistry
2409	The Mole
2410	Types of reactions
2411	Ionization
2412	Qualitative chemical analysis
2490	Other
2500	**Acids, Bases, and Salts**
2501	Arrhenius/Bronsted-Lowry/Lewis Theories
2502	Naming acids
2503	Acid/Base behaviors and strengths
2504	Salts
2505	pH
2506	Hydrolysis
2507	Buffers
2508	Indicators
2509	Titration
2590	Other
2600	**Organic Chemistry**
2601	Hydrocarbons, alkenes, alkanes, and alkynes
2602	Aromatic hydrocarbons
2603	Isomers and polymers
2604	Aldehydes, ether, ketones, esters, alcohols, and organic acids
2605	Organic reactions
2606	Carbohydrates, proteins, and lipids
2607	Nucleic acids
2690	Other

2700	Nuclear Chemistry
2701	Nuclear structure
2702	Nuclear equations
2703	Fission
2704	Radioactivity
2705	Half-life
2706	Fusion
2790	Other

2800	Freshwater science (Limnology)
2801	Run-off
2802	Pollution
2803	Water quality
2804	Trophic states
2805	Citizen action
2890	Other

Cognitive Demand Categories for Science				
B	**C**	**D**	**E**	**F**
Memorize Facts Definitions, Formulas	**Perform Procedures**	**Communicate Understanding of Science Concepts**	**Analyze Information**	**Apply Concepts / Make Connections**
Recite basic science facts	Make observations	Explain concepts	Classify and compare data	Use and integrate science concepts
Recall science terms and definitions	Collect and record data	Observe and explain teacher demonstrations	Analyze data, recognize patterns	Apply and adapt science information to real-world situations
Recall scientific formulas	Make measurements, do computations	Explain procedures and methods of science and inquiry	Generate questions, make predictions	Extend science concepts to novel situation
	Plan and design simple experiments	Organize and display data in tables and charts	Infer from data	Apply science ideas outside the context of science
	Test effects of different variables	Provide an evidence-based argument	Draw conclusions	Formulate or revise a hypothesis based on data
	Use appropriate tools		Complex classification	Plan and design complex experiments
	Execute procedures Simple			Model complex concepts
	Classification Create			Build or revise theory

K-12 ELA/Reading Content Areas

100	Phonemic awareness
200	Phonics
300	Vocabulary
400	Text and print features
500	Fluency
600	Comprehension
700	Critical Reasoning
800	Author's craft
900	Writing processes

1000	Elements of Presentation (Verbal and Written)
1100	Writing applications
1200	Language Study
1300	Listening and Viewing
1400	Speaking and Presenting
1500	Forms of Text
1600	Genre (fiction or non-fiction)
1700	Sources of Text
1800	Choice

Other Coding Conventions

Topics:

0	All
999	Out of Subject Area

Cognitive Demands:

B	Memorize/Recall
C	Perform Procedures
D	Generate/Create
E	Analyze/Investigate
F	Evaluate/Integrate
Z	Non-Specific Cognitive Demand

101	Phoneme isolation(e.g.,the distinct sounds /c/,/a/,and /t/)
102	Phoneme blending (e.g., c/a/t = cat)
103	Phoneme segmentation
104	Onset-rime
105	Sound patterns
106	Rhyme recognition
107	Phoneme deletion, substitution, and addition
108	Identify Syllables
190	Other
200	**Phonics**
201	Alphabetic principle (includes alphabet recognition and order)
202	Consonants
203	Consonant blends
204	Consonant digraphs (e.g., ch, sh, th, etc.)
205	Diphthongs (e.g., oi, ou, ow, oy [as in "boy"], etc.)
206	R-controlled vowels (e.g., farm, torn, turn, etc.)
207	Patterns within words
208	Vowel letters (a, e, i, o, u, y)
209	Vowel phonemes (15 sounds)
210	Sound and symbol relationships
211	Blending sounds
290	Other
300	**Vocabulary**
301	Compound words and contractions
302	Inflectional forms (e.g., -s, -ed, -ing)
303	Suffixes, prefixes, and root words
304	Word definitions (including new vocabulary)
305	Word origins
306	Synonyms, antonyms, homonyms
307	Word or phrase meaning from context
308	Denotation and connotation
309	Analogies
310	Sight words
311	Use of references
390	Other
400	**Text and print features**
401	Book handling
402	Directionality; sequence of text
403	Parts of a book (e.g., cover, title, front, back)
404	Letter, word, and sentence distinctions
405	Structural elements (e.g., index, glossary, table of contents, subtitles, and headings)
406	Graphical elements (e.g., graphs, charts, images, illustrations)
407	Technical elements (e.g., bullets, instructions, forms, sidebars)
408	Electronic elements (e.g., hypertext links, animations)
409	Environmental print, i.e. prints or symbols found in students' everyday environment
490	Other

501	Prosody (e.g., phrasing, intonation, and inflection)
502	Automaticity of words and phrases (e.g. sight and decodable words)
503	Speed and pace
504	Accuracy
505	Independent reading (e.g. repeated/silent reading for fluency)
590	Other
600	**Comprehension**
601	Word meaning from context
602	Phrase
603	Sentence
604	Paragraph
605	Main idea(s), key concepts, and sequence(s) of events
606	Descriptive elements (e.g., detail, color, condition)
607	Narrative elements (e.g., events, characters, setting, and plot)
608	Persuasive elements (e.g. propaganda, advertisement, and emotional appeal)
609	Expository or informational elements (e.g., explanation, lists, and organizational patterns such as description, cause-effect, and compare-contrast)
610	Technical elements (e.g., bullets, instruction, form, sidebars, etc.)
611	Electronic elements (e.g., hypertext links, animations)
612	Strategies (e.g., activating prior knowledge, questioning; making connections, predictions; inference, imagery, summarization, re-telling)
613	Self-correction strategies (e.g., monitoring, cueing systems, and fix-up)
614	Metacognitive processes (e.g., reflecting about one's thinking)
615	Interpreting maps, graphs, charts
616	Test-taking strategies
690	Other

701	Fact and opinion
702	Appealing to authority, reason, or emotion
703	Validity and significance of assertion or argument
704	Relationships among purpose, organization, format, and meaning in text
705	Author's assumptions or bias
706	Comparison of topic, theme, treatment, scope, or organization across texts
707	Inductive/deductive approaches (e.g., making inferences and drawing conclusions from texts)
708	Logical reasoning in text (e.g. implications, authors' rationale, development of argument, etc.)
709	Textual evidence and/or use of references to support
710	Drawing meaning from allegory and myth
711	Distinguishing real from fantastical events in literature
790	Other
800	**Author's craft**
801	Theme/thesis
802	Purpose (e.g., inform, perform, critique, or appreciate)
803	Characteristics of genre and forms
804	Point of view (e.g., first or third person, multiple perspectives, etc.)
805	Literary devices (e.g., analogy, simile, metaphor, hyperbole, flashbacks, structure, and archetypes)
806	Literary analysis (e.g., symbolism, voice, style, tone, and mood)
807	Influence of time and place on authors and texts (e.g., historical era or culture)
808	Aesthetic aspects of text (e.g. dramatic or poetic elements)
890	Other
900	**Writing processes**
901	Printing, cursive writing, and penmanship
902	Pre-writing (e.g., essential questions, topic selection, brainstorming, etc.)
903	Drafting and revising
904	Editing for conventions (e.g., usage, spelling, and structure)
905	Manuscript conventions (e.g., indenting, margins, citations, references, etc.)
906	Final draft and publishing
907	Use of technology (e.g., word processing, multimedia, etc.
990	Other

1001	Purpose, audience, and context
1002	Main ideas
1003	Organization
1004	Word choice
1005	Support and elaboration
1006	Style, voice, technique, and use of figurative language
1007	Writing Conventions (e.g. capitalization, punctuation, indentation, citation, etc.)
1008	Transitional Devices
1090	Other
1100	**Writing applications**
1101	Narrative (e.g., stories, fiction, and plays)
1102	Poetry
1103	Expository (e.g., report, theme, essay, etc.)
1104	Critical/evaluative (e.g., review)
1105	Expressive (e.g., journals or reflections)
1106	Persuasive (e.g., editorial, advertisement, argumentative)
1107	Procedural (e.g., instructions, brochure, lab report)
1108	Technical(e.g., manuals, specifications, research
1109	Real world applications of writing (e.g., resumes, letters to editor, note taking)
1190	Other
1200	**Language Study**
1201	Syllabication
1202	Spelling
1203	Capitalization and punctuation
1204	Signs and symbols (e.g., semiotics)
1205	Syntax and sentence structure
1206	Grammatical analysis
1207	Standard and non-standard language usage
1208	Linguistic knowledge (including dialects and diverse forms)
1209	History of language
1210	Relationships of language forms, contexts, and purposes (e.g., rhetoric and semantics)
1211	Effects of race, gender, ethnicity on language and language use
1290	Other
1300	**Listening and Viewing**
1301	Listening
1302	Viewing
1303	Nonverbal communication
1304	Consideration of others' ideas
1305	Similarities/differences of print, graphic, and nonprint communications
1306	Literal and connotative meanings
1307	Diction, tone, syntax, convention, rhetorical structure in speech
1308	Media-supported communication
1390	Other

1401	Public speaking and oral presentation
1402	Diction, tone, syntax, convention, and rhetorical structure in speech
1403	Demonstrating confidence
1404	Effective nonverbal skills(e.g., gesture, eye contact, etc .)
1405	Knowledge of situational and cultural norms for expression
1406	Conversation and discussion (e.g., Socratic seminars, literature circles, and peer discussion)
1407	Debate and structure of argument
1408	Dramatics and creative interpretation
1409	Media-supported communication
1410	Selecting presentation format
1411	Interviewing
1490	Other
1500	**Forms of Text**
1501	Myths, tales, fables, or epics
1502	Short stories
1503	Novels (including chapter books)
1504	Picture books
1505	Drama
1506	Poetry
1507	Public documents
1508	Consumer, technical, and business writing (e.g., manuals, how-to texts, ads, memos)
1509	Newspaper or magazine articles
1510	Speeches
1511	Essays
1512	Criticism and commentary
1513	Historical accounts
1514	Biography and autobiography
1515	Content area materials
1590	Other

1601	Traditional literature
1602	Contemporary literature
1603	Multicultural literature
1690	Other
1700	**Sources of Text**
1701	Basic readers
1702	Anthologies
1703	"Leveled" books
1704	Textbooks
1705	Children's trade books
1706	Young adult trade books
1707	Other supplementary texts
1708	Periodicals
1709	Non-print media
1790	Other
1800	**Choice**
1801	Teacher assigned
1802	Class or group choice
1803	Individual student choice
1890	Other

Cognitive Demand Categories for English Language Arts / Reading

B	C	D	E	F
Memorize / Recall	**Perform Procedures / Explain**	**Generate / Create / Demonstrate**	**Analyze / Investigate**	**Evaluate/Integrate**
Reproduce sounds or words	Follow instructions	Create / develop connections among text, self, world	Categorize / schematize information	Determine relevance, coherence, internal consistency, logic
Provide facts, terms, definitions, conventions	Give examples	Recognize relationships	Distinguish fact and opinion	Assess adequacy, appropriateness, credibility
Locate literal answers in text	Check consistency	Dramatize	Compare and contrast	Test conclusions, hypotheses
Identify relevant information	Summarize	Order, group, outline, organize ideas	Identify with another's point of view	Synthesize content and ideas from several sources
~~Describe~~	Identify purpose, main ideas, organizational patterns	Express new ideas (or express ideas newly)	Make inferences, draw conclusions	Integrate with other topics and subjects
			Predict probable	
	Gather information	~~Develop reasonable~~ alternatives	consequences	Critique
			~~Generalize~~	