The Montessori Framework

Moving Beyond Alignments & Crosswalks

NATIONAL CENTER for
MONTESSORI in the PUBLIC SECTOR

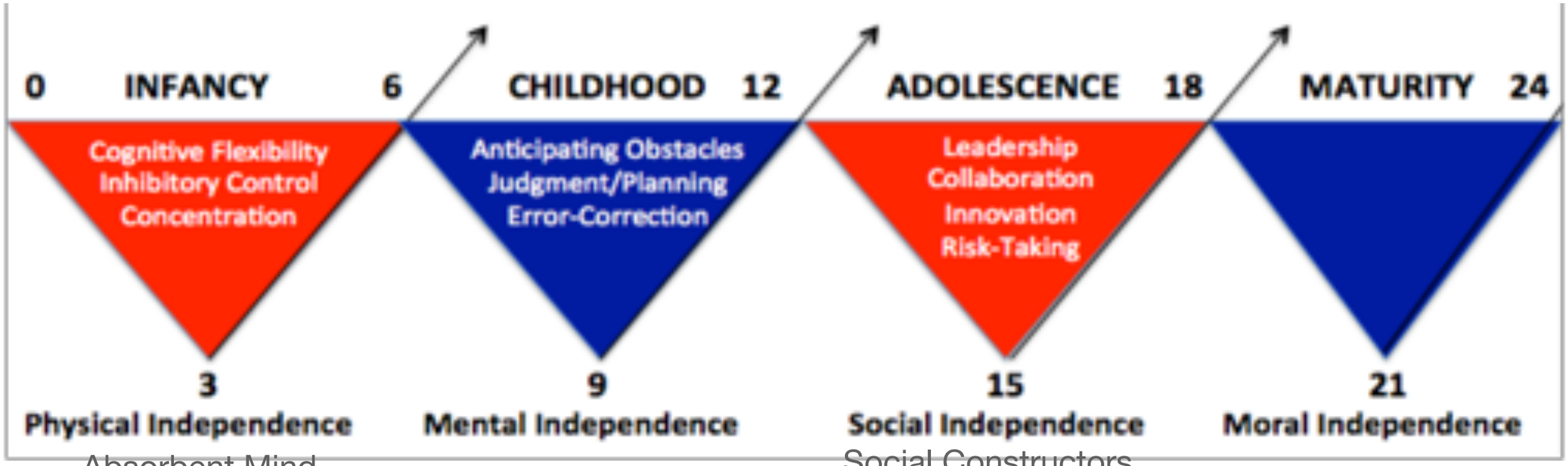
What We'll Discuss

- THE PROBLEM WITH ALIGNMENTS
- THE POTENTIAL OF A COMPREHENSIVE SYSTEM OF INPUTS AND OUTCOMES
- SOME EXAMPLES OF WORK-IN-PROGRESS

Montessori v Conventional Frameworks

MONTESSORI	CONVENTIONAL
Curriculum is Developmental • Dictated by human needs and tendencies • Skills build from simple to complex • Learning takes place through engagement with the environment rather than reception from teacher	**Curriculum is Determined by Standards** • Dictated by grade level expectations • Skills map backward from anchor standards • Learning is assumed to be directly determined by topics covered by teacher
Standards are Developmental • Ultimate goal is human flourishing as defined by self-determination, social harmony, & sustainability • Assumes knowledge and skill in the service of human potential • Maps forward from birth	**Standards are Negotiated** • Ultimate goal is college or career-readiness, access to opportunity • Assumes knowledge and skills in the service of instrumental achievement - eg: college acceptance, a well-paying job • Maps backward from exit expectations
Benchmarks based on three-year cycles • Designed to isolate developmental difficulties and lagging skills	**Benchmarks based on 3 month intervals** • Designed to predict performance on summative evaluation
Assessment is ongoing and based heavily on observation and performance of complex tasks	**Assessment is episodic and based on performance of relatively simple, decontextualized tasks**

Focus on Development

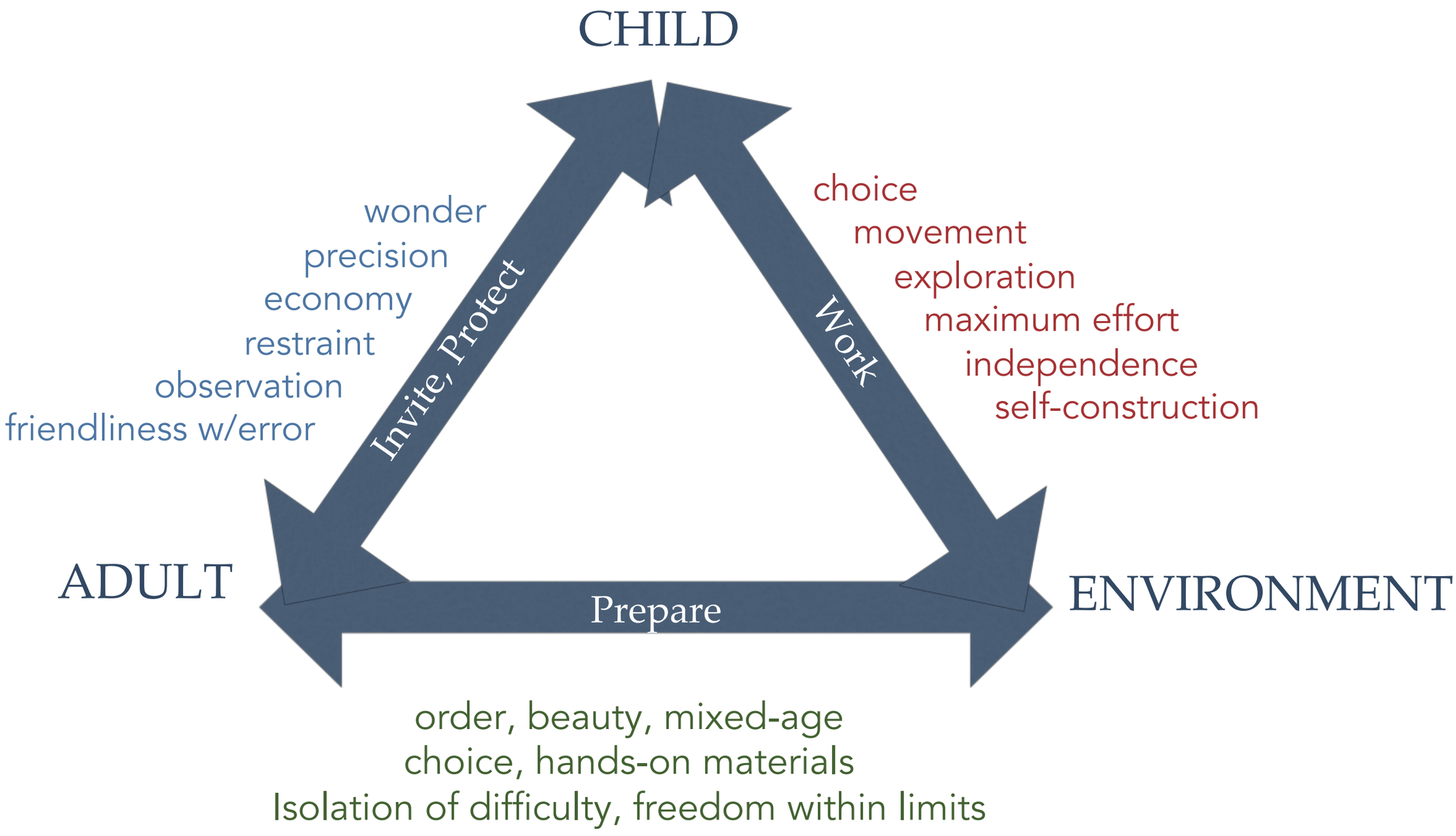


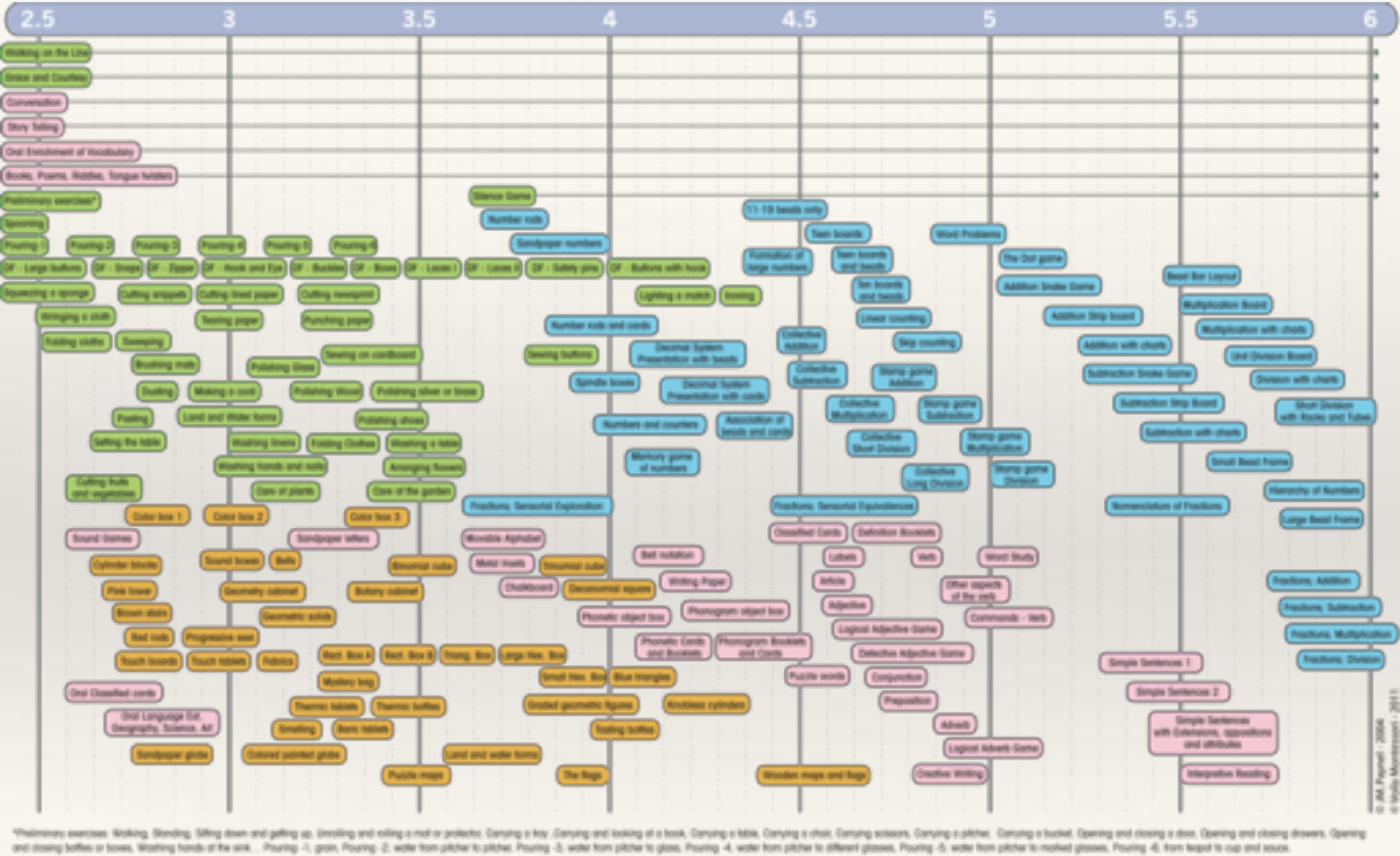
Absorbent Mind
Sensorial Explorers
Acquisition of Language
Normalization

Intentional Mind
Conceptual Explorers
Acquisition of Culture

Social Constructors
Organization of identity
in relation to others
Valorization

The Developmental Core





*Preliminary exercises: Walking, Standing, Sitting down and getting up, Unrolling and rolling a mat or protector, Carrying a tray ,Carrying and looking at a book, Carrying a table, Carrying a chair, Carrying scissors, Carrying a pitcher, Carrying a bucket, Opening and closing a door, Opening and closing drawers, Opening and closing bottles or boxes, Washing hands at the sink... Pouring -1: grain, Pouring -2: water from pitcher to pitcher, Pouring -3: water from pitcher to glass, Pouring -4: water from pitcher to different glasses, Pouring -5: water from pitcher to marked glasses, Pouring -6: from teapot to cup and sauce.

	BIRTH	1	2	3	4	5	6
Conversation	Babbling	First Words		Naming	Singing	Group Discussion	
					Sound Games (I spy, Mystery Bag)		
				Paired Interactions		Classification	
					Vocabulary Building		
Training the Hand					Fine motor exercises (cylinder blocks, tweezers….)		
				Washing	Pouring	Using a Stylus (Botany Cabinet)	
Writing					Refinement of movement (metal insets)		
					Forming Words(movable alphabet)		
					Using a Pencil tracing letters		
Reading					Listening to Stories		
					Decoding/Interpreting Images		
		Left/Right Tracking		Sound/Symbol Correspondence		Word Study	
					Puzzle Words		
				Handling books		Reading Aloud	

The Problem with Alignments

CCSS DOMAIN	CCSS CLUSTER OBJECTIVES	CCSS STANDARDS	RELEVANT A.M.I. ACTIVITIES	RESOURCES / MATERIALS
OA: Operations and Algebraic Thinking	Work with equal groups of objects to gain foundations for multiplication.	2.OA.C.3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.	40087 Golden Beads/Intro. To Multiplication 40088 Concept of Simple Multiplication 40091 Skip Counting	Cards and counters
		2.OA.C.4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	40107 Introduction of Checkerboard 40108 Multiplication by a One-Digit Multiplier 40109 Multiplication by a Multi-Digit Multiplier (Using Bead Bars, No Facts)	Bead bars/number tickets Checkerboard
	Represent and solve problems involving multiplication and division.	3.OA.A.1. Interpret products of whole numbers, e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 x 7.	40089 Decanomial w/bead bars	Bead bar box (decanomial)
		3.OA.A.2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	40051 Stamp Game with Squared Paper 40134 Racks and Tubes/Division by a One-Digit Divisor	Stamp game Racks and tubes
		3.OA.A.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	40131 Multiplication Word Problems 40143 Division Word Problems 40442 ff. Area Work	
		3.OA.A.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = ? ÷ 3, 6 x 6 = ?.		Finger charts Decanomial
	Understand properties of multiplication and the relationship between multiplication and division	3.OA.B.5. Apply properties of operations as strategies to multiply and divide. Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication.) 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or by 5 x 2 = 10, then 3 x 10 = 30. (Associative property of multiplication.) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56. (Distributive property.)	40056 Commutative Law of Addition 40057 Associative Property of Addition 40094 Commutative Law of Multiplication 40096-40104 Distributive Law of Multiplication and Associative Laws	Materials for commutative, distributive and associative properties
		3.OA.B.6. Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.		
	Multiply and divide within 100	3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	40110 Checkerboard and Bead bars (Multi-Digit Multiplier, some facts.) 40111 Checkerboard (Multi-Digit Multiplier, recording/final product) 40112-400113 Checkerboard	Materials for checkerboard
	Solve problems involving the four operations, and	3.OA.D.8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. This standard is limited to problems posed with whole numbers and having whole- number answers; students should know how to perform operations in the conventional order when there are no	40330 Order of Operations 40331 Solving an Equation for One Unknown Using the Laws of Inverse Operations 40337 Algebraic Word Problems 40056 Commutative Law of Addition	Bead bars Box of operation symbols and number cards Algebra materials

College & Career Readiness Anchor Standards	Third Grade CORE Standards	Learning Activity	Montessori Materials
Anchor Standards for Reading	**3rd Grade Reading Standards for Literature:**		
Key Ideas and Details	**Key Ideas and Details**		
1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.	Ability to read, ability to identify and extract key components, compose a sentence, ask questions, use language from the text to answer questions and to demonstrate understanding	Vocabulary cards, Variety of genres and media
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.	2. Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text.	Ability to read, ability to identify and extract key components, reads and understands a variety of materials, locates main idea, supporting details and different components of stories, engages in guided discussion, ability to show understanding through creative expression like visual art, drama, music, and written expression	Variety of books; ancient creation stories, ancient myths and fables as related to our "Cosmic Education" curriculum, ancient civilization timelines, Blooms Taxonomy command cards
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.	3. Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events.	Ability to read, ability to identify characters, ability to have a text to self connection, reads and understands a variety of materials,ability to identify and name a variety of feelings, recognizes literature as an expression of human experience, can sequence the events in the stories, engages in guided discussion, ability to show understanding through creative expression like visual art, drama, music, and written expression, uses descriptive language, understand cause and effect, identify inferences	Variety of books, adjective key lesson, command cards, grammar boxes and symbols, character education materials, blooms taxonomy cards, sequencing materials, timelines, cause and effect cards

A Comprehensive Framework

Internal Coherence & Pedagogical Integrity

Scope & Sequence – complete, detailed, searchable

- Adolescence
- Elementary
- Early Childhood

Standards – developmental, scaffolded

- Adolescence
- Elementary
- EC

Benchmarks - Actionable

Inputs	Outcomes
Quality Environments Quality Teachers	EFs, SEL, ELA, MATH, SCIENCE, CULTURE

Scope & Sequence

	Practical Life	Sensorial	Mathematics	Language	Cultural Studies Science, Geography, History	Aesthetic & Personal Development
PK1	Preliminary Exercises; pouring, carrying, polishing, Care of Person, Care of Indoor /Outdoor Environment, Grace & Courtesy	Visual, Auditory, Tactile, Olfactory, Gustatory Discrimination	Numbers to ten	Spoken Language – objects in the environment; Read-aloud; Sound Games, Mechanics of Writing &	Observing natural phenomena Planting & Watering	Drawing and painting Singing Musical Notation Visual Thinking Strategies
PK2	Sewing, Washing, folding, ironing cloths, preparing food, setting a table, passing objects, accepting and refusing.	Temperature, Olfactory, Constructive Triangles, Inscribed and Concentric figures, Bells, music signs and notes	Decimal System Linear Counting Memorization; Addition, Multiplication	Reading; Sound-letter Correspondence; Decoding; Hand Phonetic Object Game	Puzzle Maps Botany Cabinet (leaf shapes) Zoology vocabulary	
K	Making an introduction, How to apologize, walking gracefully so as not to disturb others	Chromatic sense, geometric forms (solid and cabinet material).	Skip Counting with Chains, Memorization Addition, Multiplication, Subtraction Division; Passage to Abstraction (small bead frame, division with racks & tubes, fractions, measurement)	Phonetic Reading, Phonograms, Word Study, Puzzle Words, Reading Classification, First Books; Function of Words; Parts of Speech; Word Study; Spelling	Land and Water Forms Classification (living, non-living, plant-animal) Time Culture/Country study	
1 2 3	Care of the environment – plants, animals; Table manners, serving and clearing. All of the above, plus mentoring of younger students Preparation for Going Out	**GEOMETRY & MEASUREMENT** Geometry: Congruent, Similar, Equivalent Angles, Lines, Polygons, Circles; Mass, Volume, Length	History of Math Counting Decimal System Operations Memorization Money Fractions Passage to Abstraction	History of Language Parts of Speech, Reading Analysis, , Grammar and Syntax, Composition; Research, Functional Writing Literature timelines, literature circles, speeches, discussion, debate, drama	Time; First Knowledge Natural History (timeline of life); Geography (physical and political); Nature of the Elements, Sun & Earth; Plant Kingdom; Animal Kingdom	Artist Study Elements of Design Principles of Design Choir; Band; Musical Theater Music Composition Visual Thinking Strategies
4 5 6	Care of environment Going Out Preparation for tests	**GEOMETRY & MEASUREMENT** History of Geometry History of Measurement Solid Geometry Plane Geometry Symmetry, Similarity, Congruence, Equivalence	Data & Statistics Percentage Fractions & Decimals Powers of Numbers Squaring & Cubing Algebra Relative Numbers	Literature timelines, literature circles, speeches, discussion, debate, drama Advanced study of style	Society & Civilization; Migration; Inquiry & Research Map Reading & Making; Work of Air, Atmosphere & Wind; Work of Water Economic Geography: Work of Humans Chemistry of the Plant Human Physiology Extended Research	All of the Above, plus: Small Ensembles Festival Opportunities
7 8 9	Occupations: Planting crops, chopping wood, milking cows, goats, etc Cooking and cleaning	Trigonometry	Algebra	**HUMANITIES** American Literature Literary Analysis Personal & Persuasive Essays Speeches	Environmental Science, Botany, Animal Biology History of Surrounding Location Mapping Surrounding Area	All of the above plus: Coffee Houses Poetry Slams

Grade 3 » Operations & Algebraic Thinking

Represent and solve problems involving multiplication and division.

CCSS.MATH.CONTENT.3.OA.A.1 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/A/1/)

Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

CCSS.MATH.CONTENT.3.OA.A.2 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/A/2/)

Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.

CCSS.MATH.CONTENT.3.OA.A.3 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/A/3/)

Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. [1]

CCSS.MATH.CONTENT.3.OA.A.4 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/A/4/)

Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations8×?=48,5=_÷3,6×6=?

Understand properties of multiplication and the relationship between multiplication and division.

CCSS.MATH.CONTENT.3.OA.B.5 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/B/5/)

Apply properties of operations as strategies to multiply and divide.[2] Examples: If 6×4=24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8×5=40 and 8×2=16, one can find 8×7 as 8×(5+2)=(8×5)+(8×2)=40+16=56. (Distributive property.)

CCSS.MATH.CONTENT.3.OA.B.6 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/B/6/)

Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.

Multiply and divide within 100.

CCSS.MATH.CONTENT.3.OA.C.7 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/C/7/)

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Solve problems involving the four operations and identify and explain patterns in arithmetic.

CCSS.MATH.CONTENT.3.OA.D.8 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/D/8/)

Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. [3]

CCSS.MATH.CONTENT.3.OA.D.9 (HTTP://WWW.CORESTANDARDS.ORG/MATH/CONTENT/3/OA/D/9/)

Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Lower Elementary Skills Inventory

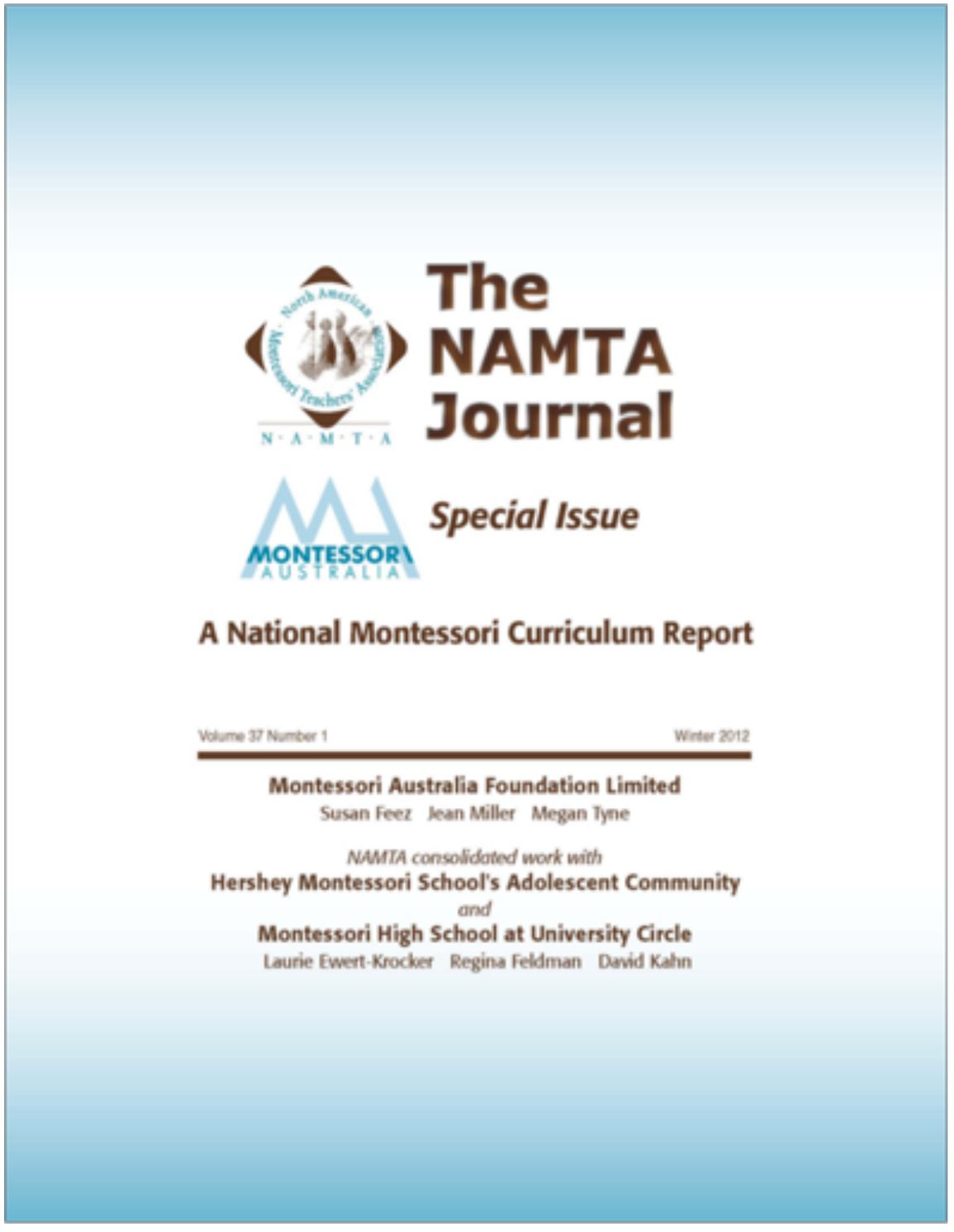
Mathematics

Solves whole number mathematical problems using all four operations with the Montessori materials (to the materials full place value capacity) moving towards abstraction.

Memorizes addition (0-10), subtraction (0-10) and multiplication facts (0-12).

Understands inverse relationships of addition & subtraction and multiplication and division. Explores commutative and associative laws as well as inverse operations with whole numbers.

Uses vocabulary for talking about addition (first addend, second addend, sum), subtraction (minuend, subtrahend, difference), multiplication (multiplicand, multiplier, product) and division (dividend, divisor, quotient).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Montessori Australia Foundation Limited
Susan Feez Jean Miller Megan Tyne
NAMTA consolidated work with
Hershey Montessori School's Adolescent Community
and
Montessori High School at University Circle
Laurie Ewert-Krocker Regina Feldman David Kahn

Skills Inventory Benchmarks	Knowledge, Skills and Understandings	Montessori Lessons	Work of the Child (examples)	Resources	CCSS Overview Area
Solves whole number mathematical problems using all four operations with the Montessori materials (to the materials full place value capacity) moving towards abstraction.	Combine knowledge of multiplication (concept and process) with memorized essential facts to achieve passage to abstraction (calculation without the support of concrete material) for multiplications with: multipliers to 4-digits multiplicands to 9-digits	**Checkerboard** Reading numbers – single to multi-digit Multiplication by a multi-digit multiplier - no use of facts, no writing Multiplication by a multi-digit multiplier - use all facts, recording problem and final product Multiplication by a multi-digit multiplier - use all facts, recording problem, partial products, and final product Writing products directly	introduction to multiplication checkerboard: colors and values using color-coded squares to build the checkerboard exploring hierarchies by multiplying and dividing x10 forming quantities with color-coded bead bars on the checkerboard, and reading and writing the numbers representing small multiplications with bead bars forming and solving multiplications (9-digit multiplicands; multi-digit multipliers) on the checkerboard and recording the calculations, first without and later with partial products using the checkerboard to make charts completing the passage to abstraction (calculating short and long multiplications without the support of concrete material; notating short and long multiplication calculations without guide paper).	multiplication checkerboard, color-coded number tiles and quantities represented in color-coded bead bars	Operations & Algebraic Thinking: Represent and solve problems involving addition and subtraction (1st grade & 2nd grade) Operations & Algebraic Thinking: Understand and apply properties of operations and the relationship between addition and subtraction (1st grade) Operations & Algebraic Thinking: Add and subtract within 20 (1st grade & 2nd grade) Operations & Algebraic Thinking: Work with addition and subtraction equations (1st grade) Operations & Algebraic Thinking: Work with equal groups of objects to gain foundations for multiplication (2nd grade) Operations & Algebraic Thinking: Represent and solve problems involving multiplication and division (3rd grade) Operations & Algebraic Thinking: Understand properties of multiplication and the relationship between multiplication and division (3rd grade) Operations & Algebraic Thinking: Multiply and divide within 100 (3rd grade)

Benchmarking

LEVEL KEY: E = Emerging **P** = Practicing **M** = Mastery

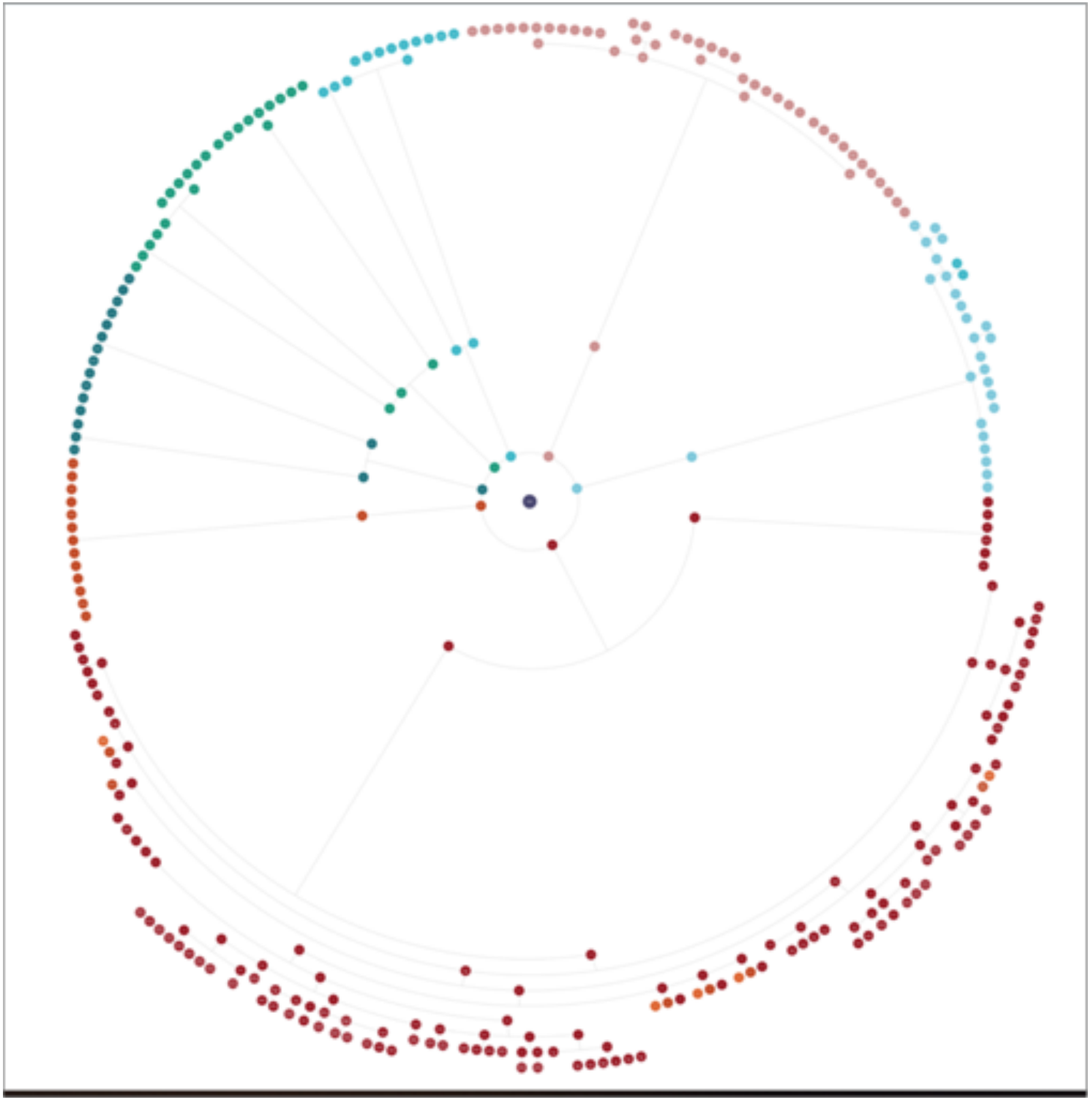
SKILL	LEVEL	NOTES
SOCIAL FLUENCY AND EMOTIONAL FLEXIBILITY		
Assumes responsibility for fostering the well-being of the class-room community (fixing a mess, participating in group games).		
Includes peers in daily activity – lunch/snack, group work, outdoor play.		
Recovers from disappointment.		
Embraces new experiences.		
Collaborates and compromises in group interactions.		
Follows social interaction conventions (“please”, “thank you”, “excuse me” etc.).		
Identifies virtues in self and others.		
Respectful of others body space and work space.		
EXECUTIVE FUNCTIONS		
Chooses appropriate work independently.		
Completes a work cycle independently.		
Maintains focus amid peer interactions.		
Attends to detail and care in final products (projects, papers, presentations).		
Invests maximum effort in projects that can take more than one day to complete.		
Persists in the face of challenge.		
Works toward mastery rather than adult approval.		
Refrains from interrupting ongoing conversation.		
Plans and reflects on work—as represented in a work journal or daily/weekly planner.		

LEVEL KEY: E = Emerging **P** = Practicing **M** = Mastery

SKILL	LEVEL	NOTES
LINGUISTIC AND CULTURAL FLUENCY		
Reads words containing phonograms, recognizing phonograms in both onset and rime.		
Demonstrates key comprehension skills, including predicting textual meaning, skimming for main ideas, scanning for detailed information, and reading for inferred and/or implied meanings.		
Identifies main ideas, arguments, and evidence in a persuasive text.		
Evaluates factual and persuasive texts.		
Presents opinions and questions about a literary text supported by simple evidence from the text.		
Uses knowledge about the structure of different types of texts, as well as grammar and vocabulary patterns, to compare different writing styles and to expand and enhance meaning-making in sentences and texts.		
Identifies the purpose of parts of factual texts (title, author, table of contents/ menu, text, illustrations, diagrams and tables, index, bibliography).		
Recognizes a variety of factual and persuasive texts in a variety of forms, including: prose, letter-writing, images, diagrams, tables, flow charts, multimedia (paper-based, digital and web-based).		
Recognizes and identifies a variety of forms of literature (drama, poetry, myths, fables etc.).		
Demonstrates cursive handwriting skills (letter formation, directionality, slope, starting and finishing points, joins, placement on line).		
Uses digital technology, when appropriate, for communication, record-keeping, creative writing and project work.		
Edit written texts using feedback from peers and adults.		
Explores and evaluates own style, and the style of other writers, using knowl-edge about the elements of writing, including structure of different types of text, grammar patterns, knowledge of vocabulary).		

Representing a Non-Linear Curriculum


Practical Life
Sensorial
Arts
Montessori Curriculum
Mathematics
Cultural
Language
Geometry




Practical Life
Sensorial
Arts
Montessori Curriculum
Mathematics
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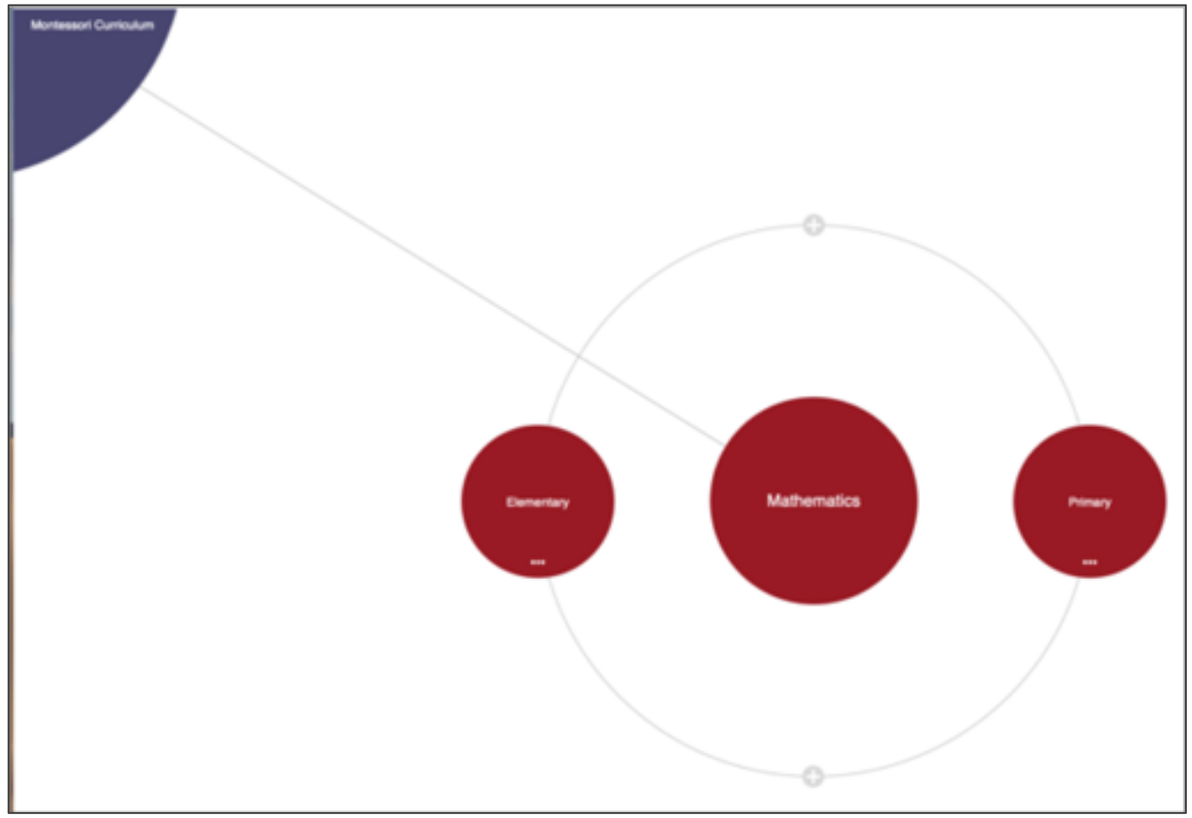
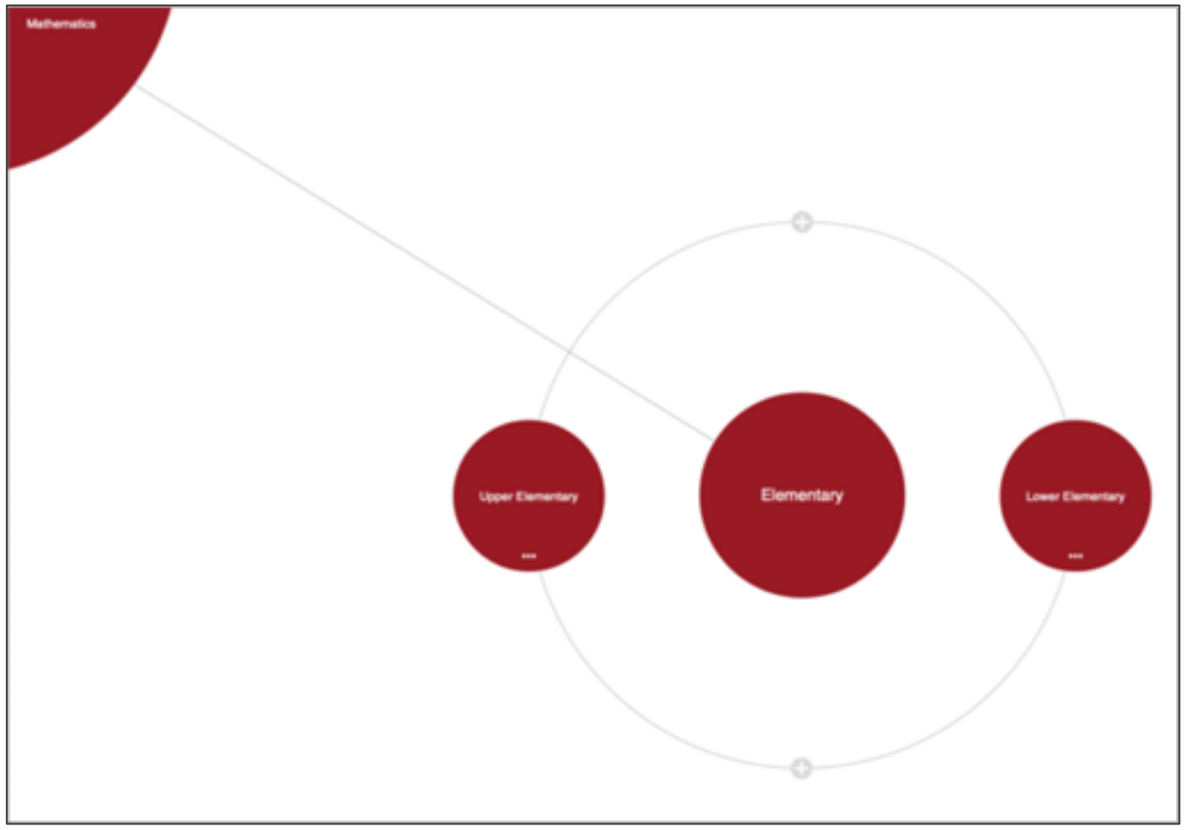
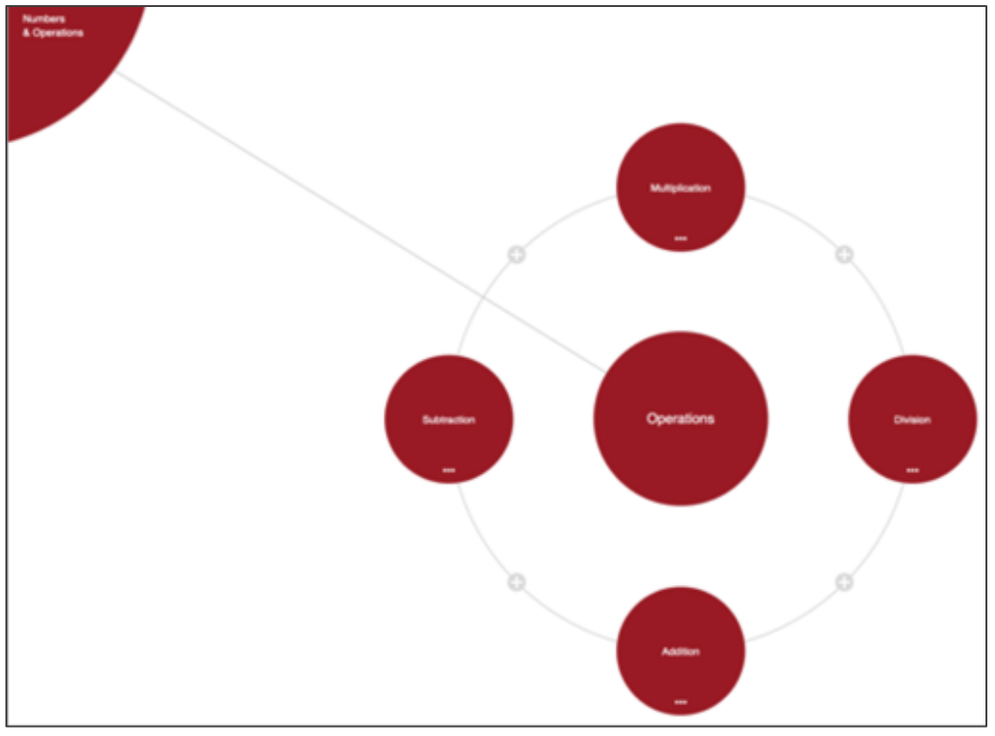
Geometry
Language


Montessori Curriculum
Elementary
Mathematics
Primary

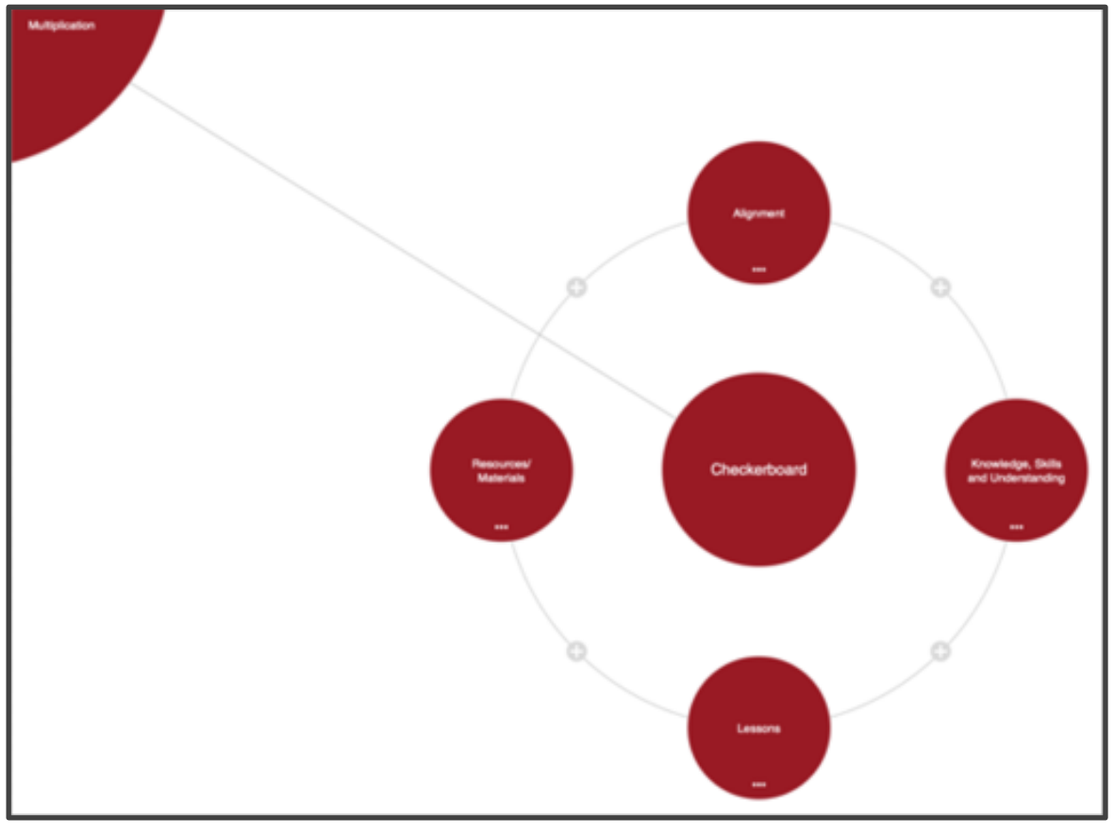

Mathematics
Upper Elementary
Elementary
Lower Elementary

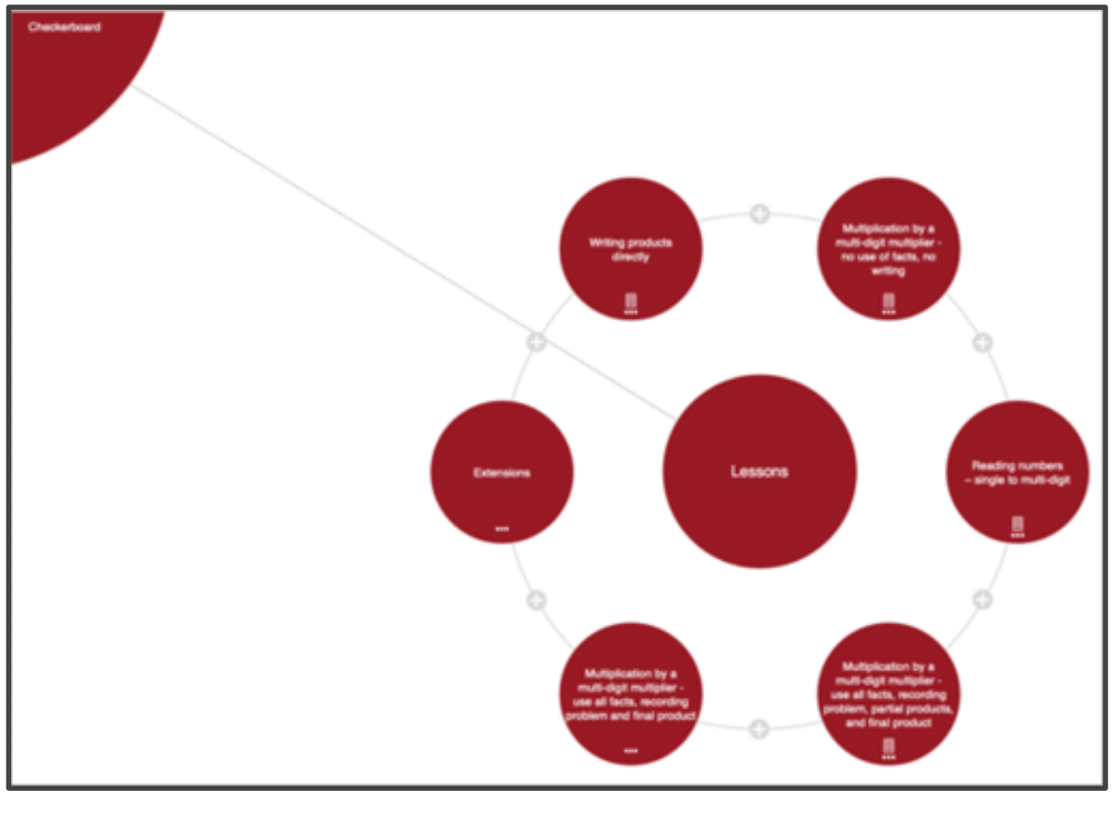

Elementary
Data Analysis and Probability
Algebra
Fractions
Lower Elementary
Measurement
Numbers & Operations
History of Mathematics


Lower Elementary
Numeracy
Numbers & Operations
The decimal system, categories and numeration
Operations


Numbers & Operations
Multiplication
Subtraction
Operations
Division
Addition


Operations
Decanomial: Table of Pythagoras Geometric Form of Multiplication
Algorithm
Large Bead Frame
Multiplication
Laws of Multiplication
Flat Bead Frame
Checkerboard
Bank Game


Multiplication
Alignment
Resources/ Materials
Checkerboard
Knowledge, Skills and Understanding
Lessons


Checkerboard
Writing products directly
Multiplication by a multi-digit multiplier - no use of facts, no writing
Extensions
Lessons
Reading numbers – single to multi-digit
Multiplication by a multi-digit multiplier - use all facts, recording problem and final product
Multiplication by a multi-digit multiplier - use all facts, recording problem, partial products, and final product