

d.a.p. (Developmental Activities Program) Mathematics (approximate ages: 5-8)

Developing Logical Thinkers: The Developmental Activities Program and Structures of Thinking: Concrete Operations, by Darrell & Dale Phillips
Young Children Reinvent Arithmetic: Implications of Piaget's Theory, 2nd Edition, by Constance Kamii

Mathematics at this level focuses on the development of logical thinking and the maturation and establishment of mental structures.

Children choose from a variety of materials. They are supported by one-on-one questioning and dialogue with a teacher to develop logical-mathematical reasoning structures.

Key structures developed at this level are:

- ordering (putting objects together by order, by length or size, or in patterns)
- classifying (working with sets or collections of objects that can be grouped in different ways)
- class inclusion (knowing what is part of something else)
- number sense (developing counting strategies, one-to-one correspondence; concepts of more, same, less; understanding odd and even numbers)

Children explore concepts of number and operations of addition and subtraction at their developmental level:

- concrete level - manipulating objects and describing actions
- transitional level - drawing pictures of objects and using words to describe actions
- symbolic level - using symbols to represent actions on objects

In small groups, children play mathematical board games and puzzle out story problems and challenges representing many mathematical situations and operations.

Mathematics is explored in real-world situations as children use their knowledge and skills in emergent dramatic play projects (like the "math store") and community-wide activities (bake sales and fundraising).

BrainDance-inspired movement activities support overall neurological development.

BrainDance was developed by Anne Green Gilbert of the Creative Dance Center <https://www.creativedance.org/about/braindance/>

We support all children to approach mathematics with deep confidence and understanding.

Bridges Mathematics (approximate ages: 7-8)

Bridges to Mathematics (Math Learning Center, Salem OR)

Young Children Continue to Reinvent Arithmetic: Implications of Piaget's Theory, 2nd Grade, 2nd Edition, by Constance Kamii

Young Children Continue to Reinvent Arithmetic: Implications of Piaget's Theory, 3rd Grade, 2nd Edition, by Constance Kamii

In addition to the individualized d.a.p. Mathematics approach, in a small-group setting using manipulatives and models, students explore and develop understanding of:

- addition and subtraction with objects and symbols
- introduction to division and multiplication concepts
- symmetry
- counting money
- characteristics of two-dimensional geometric figures and how they compare to three-dimensional shapes
- place value in whole numbers up to hundreds
- telling time with an analog clock
- repeating patterns
- growing patterns
- math facts through 10
- and fractions

As children work with concrete objects, one-on-one questioning and dialogue with a teacher supports the ongoing development of logical-mathematical reasoning structures.

Opening Eyes to Mathematics (approximate ages : 8-10)

Opening Eyes to Mathematics (Math Learning Center, Salem OR)

In a small-group setting, students use manipulatives, visual models and symbols to develop an intuitive understanding of mathematical concepts.

Students are encouraged to think of themselves as mathematicians by sharing a variety of different approaches, engaging in problem-solving collaboratively and individually, and participating in daily in-depth classroom discussions.

For each new concept explored, manipulatives are used first, followed by sketches and symbolism.

Math games are a means for becoming fluent in addition and subtraction facts and a fun way to explore a range of mathematical concepts.

Opening Eyes to Mathematics 1 / 2

The following concepts are explored:

- extensive exploration of difference
- addition, and subtraction in base ten
- continued exploration of other bases (including base five, two, three, and four)
- introduction to the area model of multiplication
- surface area and volume concepts
- introduction to fractions
- equivalent fractions
- prime and composite numbers
- telling time using analog clocks
- and multiplication counting patterns

Students sort collections using 'loops' to develop their logical thinking of Venn diagrams, as well as sorting using a 'matrix'.

At this level, mathematics homework is typically assigned once a week.

Opening Eyes to Mathematics 2/3

The following concepts are explored:

- multiple methods of addition and subtraction
- place value through base two, three and four exploration
- area method of multiplication and division
- division with remainders
- introduction to decimals
- two dimensional shapes
- angles
- introduction to fractions, equivalent fractions, improper fractions
- multiple variations of fraction word problems
- introduction to probability and graphs
- factors, prime and composite numbers
- multiplication counting patterns through 9's
- area and perimeter

At this level, mathematics homework is typically assigned twice per week, and in-depth classroom discussions are supported by near-daily written work.

Visual Mathematics (approximate ages : 10-14)

Visual Mathematics Courses 1 and 2 (Math Learning Center, Salem OR)

In a small group setting, students create visual models and explanations, apply and stretch their logical thinking, take part in challenging discussions and rigorous coursework, to explore topics at a deep level.

Students support each other as learners; they face disequilibrium together, share solutions, and celebrate discoveries. Student growth and development is assessed through daily in-depth homework assignments, in-class activities, class participation, oral presentations, and written communication.

Math groups function as community of mathematicians working together: sharing strategies, building on each other's ideas, supporting each other in times of disequilibrium, and taking turns leading the group discussion.

Visual Mathematics One: Part 1

The following concepts are explored:

- mystery lengths
- linear measure
- dimension and area in base five and ten
- addition and subtraction concepts in base five and ten
- multiplication and division concepts in base five and ten
- whole number and decimal numeration
- whole number and decimal addition and subtraction
- inventing addition and subtraction algorithms
- division concept of a fraction
- relationships between decimals and fractions
- rounding and ordering numbers
- estimating sums and differences
- and angle measurement using pattern blocks

Visual Mathematics One: Part 2

The following concepts are explored:

- order of operations
- averaging
- probability
- place value and numeration in a variety of bases
- congruence
- reflective and rotational symmetries
- introduction to algebraic counting patterns
- linear and area measurement
- fraction relationships
- modeling situations
- terminating and repeating decimals
- decimal addition and subtraction
- relationship between fractions and decimals
- division concept of a fraction
- and continued work in addition, subtraction, multiplication and division of whole numbers

Visual Mathematics One: Part 3/Visual Mathematics Two: Part 1 (“Visual Math 1 / 2”)

The following concepts are explored:

- angle measurement
- graphing
- geoboard areas
- dimensions and perimeter
- standards for linear measurement in English and Metric units
- introduction to decimal multiplication and division
- percentages
- linear and area models for fractions operations
- algorithms for fraction operations
- sampling, confidence and probability
- surface area and volume
- visually modeling algebraic situations with diagrams and sketches
- creating algebraic formulas for growing patterns that allow for predictions and generalizations about their growth
- positive and negative integers (addition, subtraction, and multiplication)
- and continued work in addition, subtraction, multiplication, division of whole numbers, and decimal addition and subtraction

Visual Mathematics Two: Part 2

The following concepts are explored:

- multiplication and division models
- growing patterns
- graphing
- percentages
- ratio and proportion
- data collection and analysis
- algebraic expressions
- squares and square roots

Visual Mathematics Two: Part 3

The following concepts are explored:

- surface area
- volume
- variables
- formulas
- growing patterns
- positive and negative integers
- advanced multiplication and division concepts
- graphing
- area of complex polygons
- angle measurement
- probability and relationships in data

Visual Mathematics Two: Part 3/Visual Mathematics Three: Part 1

The following concepts are explored:

- modeling addition and subtraction of fractions using rectangles
- modeling percentages and picturing percentage problems
- ratio and proportion
- getting information by sampling
- data collection and analysis
- modeling algebraic expressions
- solving algebraic equations visually
- squares and square roots
- the Pythagorean theorem,
- sorting and classifying solids
- similarity and scaling in 2-D and 3-D
- symmetry
- inventing formulas for area and volume (including circles)

Integrated Mathematics 1 (approximate ages 14-18)

Interactive Mathematics Program, years 1, 2, 3, 4, by Dan Fendel. IMP is an integrated, problem-centered program focused on developing deep understanding of complex mathematical concepts.

In a small-group setting, students create visual models and explanations, apply and stretch their logical thinking, and take part in challenging discussions and rigorous coursework to explore topics at a deep level.

Math groups are a community of mathematicians working together, sharing strategies, building on each other's ideas, supporting each other in times of disequilibrium, and taking turns leading the group discussion.

Student growth and development is assessed through daily in-depth homework assignments, in-class activities, class participation, oral presentations, and written communication.

Integrated Mathematics 1

The following concepts are explored:

- symmetry
- inventing formulas for area
- arithmetic sequences
- solving algebraic equations
- properties of radicals and triangle relationships

Integrated Mathematics 2

The following concepts are explored:

- Geometric constructions
- introduction to quadratic equations
- analyzing graphs including linear and quadratic functions
- inequalities and absolute values
- modeling to solve algebraic situations
- probability
- deductive versus inductive reasoning
- trigonometry
- areas of regular polygons and volumes of 3D shapes
- solving systems of linear equations
- integer and fractional exponents

- exponent laws
- scientific notation
- and introduction to logarithms

Integrated Mathematics 3/4

The following concepts are explored:

- three-variable equations
- three-dimensional coordinates
- matrix algebra
- solving systems of linear equations and inequalities by linear programming
- exponential growth
- natural logs
- graphs of sine and cosine functions
- polar coordinates
- inverse trigonometric functions and identities
- radian measure
- proof of the quadratic formula
- trigonometric proofs
- and derivatives and rates of accumulation leading to discovery of the Fundamental Theorem of Calculus

*** Each year, at all levels, students choose a math concept or create their own math challenge to present at our Annual Math Night event.**