

Mathematics
Pre-Kindergarten

PURPOSE:

The purpose of teaching mathematics in pre-kindergarten is to provide concrete and manipulative experiences that will teach children to be problem solvers and thinkers. As the students learn to solve mathematical problems they will have fun and become confident to seek more challenging tasks.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Count by ones to 20
- Match quantities up to 10 with numerals and words
- Identify positions of objects in sequences
- Create groups of one to 10 objects
- Group objects and determine which group has more and which has fewer
- Understand the concepts of whole and half
- Use manipulative materials to solve addition and subtraction problems
- Estimate the number of objects in a group and verify results
- Demonstrate an understanding of one-to-one correspondence
- Explore and understand how the same number of objects may be arranged in different ways

B. Patterns, Relations and Algebra

The students will:

- Identify the attributes of objects as a foundation for sorting and classifying
- Sort and classify objects by color, shape, size, number, and other properties
- Identify, reproduce, describe, and extend, a simple pattern in many forms

C. Measurement

The students will:

- Recognize and compare the attributes of length, volume, capacity, weight, area and time using appropriate language

- Make and use estimates of measurements from everyday experiences
- Use nonstandard units to measure length, area, weight, and capacity

D. Geometry

The students will:

- Name, describe, sort, and draw simple two-dimensional shapes
- Describe attributes of two-dimensional shapes
- Name and compare three-dimensional shapes
- Identify positions of objects in space and use appropriate language to describe and compare their relative positions

E. Data Analysis, Statistics & Probability

The students will:

- Identify same and different objects
- Sort groups of objects
- Identify positions of objects
- Explore, compare and predict capacity of containers of different sizes
- Compare lengths and capacities using a graph

TEACHING STRATEGIES

- Teacher directed lessons
- Small group lesson and activities
- Cooperative group lessons and activities
- Whole group learning
- Modeling behavior
- Brainstorming
- Hands-on centers including, but not limited to: art, sand, listening, reading, writing, dramatic play, and science
- Manipulatives in plastic tubs including, but not limited to pattern blocks, geometric shapes, counters
- Puzzles
- Blocks and construction
- Experiences with: objects, water, food, nature, time, space, and outdoors
- Daily routines such as counting, estimating, lining up, and graphing
- Visual Literature
- Literature and storytelling
- Calendar
- Flannel Board

- Props including, but not limited to puppets, posters, and portraits
- Poems and rhymes
- Audio tapes
- Music

ASSESSMENT

- Traditional testing
- Hands on activities
- Class projects
- Flash cards
- Observations
- Interaction with peers and adults
- Progress Reports

RESOURCES

- Early Childhood News
- Pre-Kindergarten Curriculum Guides
- *I Am! I Can!* by Grace Mitchell-Harriet Chmela
- *A Practical Guide to Early Childhood Curriculum* by Claudia Eliason and Loa Jenkins
- *Sing & Learn Mac Millan Program*
- *Learning Basic Skills Through Music* by Hap Palmer
- *Getting To Know Myself* by Hap Palmer
- Literature Big Books including, but not limited to *Five Little Monkeys Jumping on the Bed* by Eileen Christebow, *Caps for Sale* by Esphyr Slobodkina, *Inch* by Leo Leoni, *A Pair of Socks* by Stuart J. Murphy, *The Very Hungry Caterpillar* by Eric Carle, *Goodnight Moon* by Margaret Wise Brown, *Apples Pumpkins* by Melvin & Gilda Berger, *Two Feet* by Gwen Pascoe & David Kennett

Mathematics

Kindergarten

PURPOSE:

The purpose of mathematics in kindergarten is to provide each student with a strong foundation in number sense and problem solving skills needed for further education. Students engage in communicating, reasoning, deducing, inferring, classifying, and representing numbers and shapes. They will form patterns and make connections based on observations.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Count sequentially to 100
- Match one to one correspondences to 20
- Match quantities up to 10 with numerals and words
- Count sequentially from a given number
- Identify position of objects in sequence up to the fifth place
- Coordinate counting and grouping skills to 20
- Use manipulatives to solve related addition and subtraction problems
- Identify pennies, nickels, dimes, and quarters
- Identify equal parts of a whole
- Make reasonable estimates up to 20

B. Patterns, Relations and Algebra

The students will:

- Recognize the attributes of an object as a basis for sorting and classifying
- Sort and classify objects according to size, shape, and color
- Count by fives and tens up to 100
- Recognize, extend, copy, explain, and create a simple pattern in many forms
- Begin to explore patterns on a number chart

C. Measurement

The students will:

- Compare and order a series of objects according to appropriate measurement terms
- Use nonstandard units to measure real objects
- Use mathematical language for sequencing pictures or events

- Make and use estimates of measurements from daily experiences
- Begin to explore the functions of a calendar
- Begin to explore the function of a clock

D. Geometry

The students will:

- Identify, name and draw: square, triangle, rectangle, and circle
- Understand positional relationships
- Begin to relate geometric solids to shapes
- Begin to relate geometric shapes to the environment
- Recognize straight and curved lines
- Begin to develop a sense of symmetry

E. Data Analysis, Statistics and Probability

The students will:

- Recognize likeness and difference
- Organize objects, pictures, and other data
- Compare and contrast quantities of objects using picture graphs
- Begin to make predictions based on data
- Begin to explore the concept of change

TEACHING STRATEGIES

- Teacher directed lessons
- Whole class activities
- Small group activities
- Working with a partner
- Individual activities
- Brainstorming
- Modeling

ASSESSMENT

- Oral questions at the end of each lesson
- Practice and enrichment worksheets
- Performance during various activities
- Art projects
- Playing games
- *John Collins Writing Program*

RESOURCES

- *Math Connects* Teacher's Edition Macmillan McGraw Hill
- *Math Connects* Student Edition Flipbook- Macmillan McGraw Hill

- *Math Connects* Resource Masters – Macmillan McGraw Hill
- *Math Connects* Reteach and Skills Practice Workbook – Macmillan McGraw Hill
- Calendar Time kit
- Graphs
- Charts
- Number line
- Pan balance
- Clock dials
- Money
- Games
- Manipulatives
- Technology
- Satellite Library
- Smart Board

Mathematics
Grade One

PURPOSE:

The purpose of mathematics in grade one is to expose and engage the students in problem solving, reasoning, investigating and connecting the world of numbers as it relates to the world around them.

OUTCOMES:

A. Number, Sense and Operations

The students will:

- Identify and spell correctly, number words to ten
- Count, write, and identify groups of objects to ten
- Master addition and subtraction facts to twenty
- Demonstrate the ability to write and solve math problems, using appropriate symbols
- Solve addition problems using two and three digits
- Write and solve open math sentences
- Identify odd and even numbers
- Understand the inverse relationship between addition and subtraction facts
- Describe and understand the differences between estimation and actual calculation
- Skip Count by twos, fives, and tens to 100
- Identify common fractions
- Name and write whole numbers to 100

B. Patterns, Relations and Algebra

The students will:

- Identify and recreate a simple repeating pattern using shape, size, color, and number
- Recognize congruent shapes
- Identify symmetry in two-dimensional shapes
- Identify the value of United States currency, the one dollar bill, five dollar bill, and ten dollar bill
- Describe functions related to trading
- Identify the value of United States coins

C. Measurement

The students will:

- Use a calendar, identify the days of the week, months of the year
- Tell time to the hour, half hour and quarter hour
- Compare temperature, length, weight and volume of objects using both metric and customary units, using the correct tools for measuring
- Identify parts of the day

D. Geometry

The students will:

- Recognize geometric shapes and sizes in the classroom
- Identify relative positions e.g., closer, further, high, low, left and right
- Demonstrate the ability to put shapes together and take them apart
- Find locations on a map, recognizing signs for north, south, east and west

E. Data Analysis, Statistics and Probability

The students will:

- Use interviews, surveys and observations to gather data about themselves and their surrounding
- Organize, classify and interpret data using tallies, charts, tables, bar graphs, and pictographs
- Formulate inferences and make educated guesses about a situation
- Decide which outcomes of experiments are most likely

TEACHING STRATEGIES

- Teacher directed lessons
- Cooperative group work
- Partner work
- Brainstorming
- Board work
- Home and family connection
- Board games
- Math manipulatives
- Smart Board lessons

ASSESSMENT

- Traditional Testing
- Flash card competition
- *John Collins Writing Program*
- Hands on activities
- Class projects

RESOURCES

- *Math* Scott-Foresman Addison-Wesley
- One-Minute Math Development Drill
- Technology
- *In Measuring Penny* by Loreen Leedy
- *Counting Cranes* by Mary Beth Owen
- Math Teacher resources
- Satellite classroom library

Mathematics
Grade Two

PURPOSE:

The purpose of mathematics in grade two is to encourage students to explore, develop, test, discuss, and apply math concepts. The children will build connections between conceptual and procedural knowledge. Concepts will make sense, problem solving is relevant, and results are successful.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Name and write whole numbers to 1,000
- Order the numbers
- Identify common fractions as parts of a whole, parts of groups, and numbers on the number line
- Introduce multiple uses of numbers including cardinal and ordinal
- Compare whole numbers using terms and symbols
- Identify odd and even numbers
- Demonstrate knowledge of inverse relationship between addition and subtraction
- Demonstrate understanding of addition and subtraction and their symbols
- Master addition and subtraction facts and fact families
- Demonstrate ability to add and subtract two and three digit numbers accurately
- Demonstrate understanding of algorithms for addition and subtraction
- Estimate, calculate, and solve problems involving addition and subtraction of two and three digit numbers
- Demonstrate difference between estimates and actual calculations

B. Patterns, Relations and Algebra

The students will:

- Construct and solve open sentences that have variables
- Describe functions related to trading and exchanging
- Graph equations
- Write and solve number sentences
- Solve two-step equations
- Solve equations in two variables

- Use inverse operations
- Use +, -, >, <, = to represent mathematical relationships in everyday situations
- Use positive and negative numbers
- Master counting by twos, fives, and tens
- Find values of United States coins
- Find and calculate the value of United States paper currency
- Use appropriate monetary notations
- Make change
- Estimate and compute with money amounts
- Identify different patterns on the hundred chart
- Describe and formulate addition and subtraction patterns

C. Measurement

The students will:

- Estimate and measure length, capacity, weight, volume, area, perimeter, circumference and temperature
- Compare the length, weight, area, and volume of two or more objects
- Measure and compare common objects using Metric and customary systems
- Select and correctly use the appropriate measurement tools
- Read a calendar to identify dates and holidays
- Identify parts of the day, days of the week, months of the year
- Identify dates
- Tell time using digital and analog clocks
- Elapsed Time

D. Geometry

The students will:

- Identify plane figures
- Identify space figures
- Identify symmetry in two-dimensional shapes
- Identify, describe, draw, and compare two-dimensional shapes
- Describe attributes and parts of two and three-dimensional shapes
- Compare length of sides, numbers of corners, edges, and faces
- Predict the results of putting shapes together and taking them apart
- Explore intersecting, parallel, and perpendicular lines

- Identify positions such as closer, farther, higher, lower, rotated, flipped, and enlarged

E. Data Analysis, Statistics and Probability

The students will:

- Collect and organize data
- Investigate concrete objects
- Conduct surveys
- Interpret data from graphs, grids, and maps
- Draw conclusions and make educated guesses about situations based on informational data
- Decide on outcomes of experiments
- Make organized lists
- Solve two-step problems

TEACHING STRATEGIES

- Teacher directed lesson plans
- Group activities
- Classroom grocery store
- Games
- Manipulatives
- Board drills
- White boards

ASSESSMENT

- Teacher generated tests and quizzes
- *John Collins Writing Program*
- Enrichment projects
- Board drills
- Group work
- Problem of the Day
- Work with manipulatives

RESOURCES

- *Math Connects* Macmillan McGraw Hill
- Manipulatives
- Flashcards
- Graphs, grids, charts
- Flip charts
- Pocket charts
- Geometric Shapes Kit
- Hand held clocks
- Classroom grocery store
- Technology

- White boards
- Smart Board

Mathematics
Grade Three

PURPOSE:

The purpose of mathematics in grade three is to develop an understanding of mathematical concepts and demonstrate their relevance in everyday activities. The students will begin with basic operations to develop a strong number sense and progress logically to problem solving.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Exhibit an understanding of the values of the digits in the base ten number system by reading, modeling, writing, comparing, and ordering whole numbers through 9,999
- Represent, order, and compare numbers through 9,999
- Represent numbers by expanded notation and written out in words
- Recognize and represent fractions as parts of unit whole and parts of groups
- Model and represent a mixed number as a whole number and a fraction
- Locate and compare fractions on the number line between 0 and 1 with denominators 2, 3, or 4
- Recognize classes to which a number may belong
- Identify the numbers in those classes
- Select, use, and explain various meanings and models of multiplication through 12×12
- Relate multiplication problems to corresponding division problems
- Use the commutative and identity properties of addition and multiplication on whole numbers in computations and problem situations
- Select and use appropriate operations to solve problems, including those involving money
- Organize and collect data using charts and graphs
- Represent the possible outcomes for a probability situation

B. Patterns, Relations and Algebra

The students will:

- Create, describe, and explain addition, subtraction and geometric symbolic patterns
- Determine which symbol is appropriate for a given number sentence

- Determine the value of a variable in simple equations involving addition, subtraction or multiplication
- Master telling time using an analog clock and a digital clock
- Estimate perimeter of a rectangle, circle, rhombus and unusual shapes
- Create and explain number patterns including multiplication
- Determine and balance simple equations
- Introduce map interpretation of scale

C. Measurement

The students will:

- Demonstrate an understanding of the attributes length, area and weight and select the appropriate type of unit for measuring each attribute using both the customary and metric systems
- Calculate simple unit conversions within a system of measurement
- Identify time to the minute on analog and digital clocks using AM and PM
- Compute elapsed time, using a clock for times less than one hour and using a calendar
- Find area and perimeter of a rectangle by measuring
- Identify and use appropriate metric units and tools to estimate, measure, and solve problems involving length, area, weight, temperature and time

D. Geometry

The students will:

- Compare and analyze attributes and other features of two-dimensional geometric shapes
- Describe, model, draw, compare and classify two and three-dimensional shapes
- Identify angles as right angles, less than a right angle and greater than a right angle
- Identify and draw parallel lines, perpendicular lines and other intersecting lines
- Use ordered pairs of whole numbers and/or letters to locate points on a grid
- Draw lines of symmetry in two-dimensional shapes.
- Explain the results of taking apart and combining two-dimensional shapes
- Investigate and analyze attributes of two and three-dimensional shapes
- Draw and compare two and three-dimensional shapes

E. Data Analysis, Statistics and Probability

The students will:

- Collect and organize data using observations, measurements, surveys or experiments and identify appropriate ways to display the data
- Match representations of a data set in the forms of tables, line plots, pictographs, tallies or bar graphs with the actual data set
- Construct and draw conclusions from representations of data sets in the forms of tables, line plots, pictographs, tallies and bar graphs
- List and count the number of possible combinations of objects from two sets

TEACHING STRATEGIES

- Flashcard drills
- Manipulatives
- Transparencies
- Problem of the day
- Bulletin board themes
- Drill and Practice
- Clocks
- Graphing
- Cooperative activities
- Teacher directed lessons

ASSESSMENT

- Quizzes
- Chapter tests
- Teacher observation
- Math fact competitions
- Class discussion
- Test and practice software
- Rubrics
- Journal
- Review and practice
- Cumulative Review
- *John Collins Writing Program*

RESOURCES

- Teacher Edition- Math Connects –Macmillan McGraw Hill
- *Math Connects* Homework Practice Workook
- *Math Connects* Resource Masters
- *Math Connects* Transition Masters
- 0-12 multiplication flashcards
- 0-12 division flashcards

- Technology
- Planner/ CD ROM
- *One-Minute Math* Frank Schaffer Publications
- *Math in Minutes* Creative Teaching Press

Mathematics
Grade Four

PURPOSE:

The purpose of mathematics in grade four is to strengthen students' ability to be actively engaged in problem solving, communicating, reasoning and connecting math skills through meaningful, challenging, and relevant learning in the classroom. Students in grade four will increase their ability to think and reason. The objective is learning to use strategies to compare, contrast, analyze, and make decisions.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Exhibit an understanding of the base ten number system by reading, modeling, writing whole numbers to at least 100,000
- Understand the value of each digit to compare and order numbers
- Represent order and compare large numbers using various notations including expanded form
- Demonstrate understanding of fractions as part of a whole unit, as part of a collection, and as locations on a number line
- Select, use, and explain models to relate common fractions and mixed numbers
- Order fractions greatest to least
- Find equivalent fractions and mixed numbers
- Identify and generate equivalent forms of common decimals and fractions less than one whole
- Exhibit understanding of base ten system by reading, naming, and writing decimals between zero and one up to hundredths
- Recognize factors and multiples of a given number
- Select, use, and explain multiplication of whole numbers
- Introduce and use commutative, associative and identity properties of operations
- Use appropriate operations: addition, subtraction, multiplication, and division to solve problems including, but not limited to, money problems
- Know multiplication facts through 12x12
- Add and subtract up to five digit numbers
- Multiply up to three digits by two digits accurately and efficiently

B. Patterns, Relations and Algebra

The students will:

- Create, describe, extend, and explain symbolic and numeric patterns
- Use letter and symbolic variables
- Determine value of variables
- Use pictures, models, tables, charts, graphs, words, number sentences, and mathematical notations to interpret mathematical relationships
- Solve problems involving proportional relationships and map scale
- Determine how change in one variable relates to change in a second variable
- Explore properties of equality in number sentences

C. Measurement

The students will:

- Demonstrate understanding of length, area, volume and weight
- Display ability to convert measurements
- Calculate time on both analog and digital clocks using AM and PM
- Demonstrate ability to compute elapsed time using a clock as well as a calendar
- Find exact area and perimeter of a rectangle, triangle, or irregular shape using diagrams, models and grids
- Identify and use appropriate metric and customary measuring tools to estimate, measure, and solve problems involving length, area, volume, weight, time, angle, size and temperature
- Develop the concepts of area and perimeter by accurately measuring some regular and irregular shapes
- Introduce concrete objects to explore volume and surface area of a cube and a rectangular prism

D. Geometry

The students will:

- Recognize and analyze the number of sides, faces, corners, right angles, diagonals, and lines of symmetry of two and three dimensional shapes
- Describe, model, draw, compare and classify two and three dimensional shapes

- Recognize similar and congruent figures
- Identify angles as right, acute or obtuse
- Describe and draw intersecting, parallel, and perpendicular lines
- Use ordered pairs of numbers and/or letters to locate points on a graph
- Describe and apply techniques such as reflections, rotations, and translations for determining congruent shapes
- Identify and describe line symmetry in two dimensional shapes
- Predict and validate the results of partitioning, folding, and combining
- Investigate two dimensional representations of three dimensional objects

E. Data Analysis

The students will:

- Collect and analyze data using observations, measurements, surveys, and experiments and identify appropriate ways to display data
- Match data such as lists, tables or graphs with actual set of data
- Make predictions, draw conclusions from various sets of data including bar graphs, pictographs, line graphs, line plots, and tallies
- Demonstrate the ability to find the mean, median, mode, and range of a set of numbers
- Demonstrate understanding of probability that involves equally likely events
- Investigate the construction of simple circle graphs as they relate to fractional parts

TEACHING STRATEGIES

- Teacher directed lessons
- Assess prior knowledge
- Cooperative group work
- Work with a partner
- Board work
- Mental math games, student directed
- Flash cards
- Math manipulatives

ASSESSMENT

- Teacher observation

- Traditional testing
- Quizzes
- Homework
- Chapter tests
- Cumulative review
- *John Collins Writing Program*
- Projects

RESOURCES

- *Math Connects* – Macmillan McGraw Hill
- Technology
- Classroom Computer
- *Writing About Mathematics* – Sue O’Connell
- *Fractions Grade 4* –Instructional Fair Inc.
- *Exploring Measurement* – Rick Carter
- *Math in Minutes* – Creative Teaching Press
- *Math Word Problems* – Remedia Publications
- *The Mailbox Magazine* – Intermediate

Mathematics
Grade Five

PURPOSE:

The purpose of mathematics in grade five is to help students make sense of mathematics in a meaningful way. They will develop a stronger sense of numbers by multiplying and dividing whole numbers and decimals. They will explore angles and polygons. They will understand fractions by adding, subtracting, multiplying and dividing fractions and mixed numbers. They will understand measurement and explore and find perimeter and area. They will understand measurement by exploring solids and shapes and by understanding weight, mass, temperature volume and capacity. They will learn ratio, percent and probability by exploring patterns in ratio tables, percent patterns and predicting.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Demonstrate an understanding of positive integer exponents
- Demonstrate an understanding of place value to billions
- Represent and compare very large to very small positive numbers in various forms
- Apply and understand fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line
- Identify and determine common equivalent fractions, mixed numbers, decimals, and percents
- Find and position integers, fractions, mixed numbers, and decimals
- Recognize number theory concepts including prime and composite numbers, prime factorization, greatest common factor, least common multiple, and divisibility rules for 2, 3, 4, 5, 6, 9, and 10
- Select and use appropriate operations to solve problems
- Demonstrate an understanding of the inverse relationship of addition and subtraction, and use that understanding to simplify computation and solve problems
- Accurately and efficiently add, subtract, multiply, and divide whole numbers and positive decimals
- Accurately and efficiently add, subtract, multiply, and divide positive fractions and mixed numbers

- Estimate results of computations with whole numbers and with positive fractions, mixed numbers, decimals and percents.
- Describe reasonableness of estimates

B. Patterns, Relations, and Algebra

The students will:

- Analyze and determine the rules for extending symbolic, arithmetic, and geometric patterns and progressions
- Use the properties of equality to solve problems
- Represent real situations and mathematical relationships with concrete models, tables, graphs and rules in words and with symbol
- Produce and interpret graphs that represent the relationship between two variables in everyday situations

C. Measurement

The students will:

- Apply the concepts of perimeter and area to the solution of problems involving triangles and rectangles
- Identify, measure, describe, classify, and draw various angles.
- Draw triangles given two sides and the angle between them, or given two angles and the side between them
- Solve problems involving simple unit conversions within a system of measurement
- Explore volumes and surface areas of rectangular prisms
- Find the sum of the measures of the interior angles in triangles by measuring the angles and without measuring the angle

D. Geometry

The students will:

- Identify, describe, and compare special types of triangles
- Identify, describe, and compare special types of three-dimensional shapes based on their properties, such as edges and faces
- Identify relationships among points and lines
- Using ordered pairs of whole numbers, graph, locate, and identify points, and describe paths on the Cartesian coordinate plane

- Describe and perform transformations on two-dimensional shapes such as translations, rotations and reflections
- Identify and describe line symmetry in two-dimensional shapes, including shapes that have multiple lines of symmetry
- Determine if two triangles or two quadrilaterals are congruent by measuring sides

E. Data Analysis, Statistics, and Probability

The students will:

- Given a set of data, find the median, mean, mode, maximum, minimum, and range and apply to solutions of problems
- Construct and interpret line plots, line graphs, bar graphs and circle graphs
- Predict the probability of outcomes of simple experiments and test the predictions

TEACHING STRATEGIES

- Teacher directed lessons
- Cooperative group work
- Graphic organizers
- Transparencies
- Problem solving

ASSESSMENT

- Quizzes
- Homework
- Chapter tests
- Cumulative Review
- *John Collins Writing Program*
- Projects
- Drills
- Continuous daily review
- Assessment Sourcebook
- *Daily Word Problems Grade 5* Evan Moor

RESOURCES

- *Math Connects* – Macmillan McGraw Hill
- *Math Connects* – Reteach masterss
- *Math Connects* – Skills Practice Workbook
- *Math Connects* – Homework Practice Workbook

- *Math Connects* Problem Solving Practice Workbook
- *Math Connects* – Enrichment Masters
- *Math Connects* - Assessment
- *Math Connects* – Teacher Reference Handbook

Mathematics
Grade Six

PURPOSE:

The purpose of mathematics in grade six is to increase student proficiency with mathematical concepts and skills learned at the elementary level. Students develop the ability to use multiple strategies and skills when problem solving. The course uses both concrete and abstract concepts to enable students to better understand their world. Students develop their abilities to reason logically, apply and communicate their mathematical skills to real-world activities.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Demonstrate and apply an understanding of positive integer exponents, in particular, when used in powers of ten
- Master place value to billions and thousandths
- Compare very large and very small positive numbers in various forms such as expanded notation without exponents
- Master and demonstrate a solid understanding of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line
- Calculate and analyze common equivalent fractions, mixed numbers, decimals and percents
- Compare and order positive and negative integers, and positive fractions, mixed numbers, decimals, and percents

- Apply number theory concepts including prime and composite numbers, prime factorization, greatest common factor, least common multiple, and divisibility rules for 2, 3, 4, 5, 6, 9
- Identify ratios and proportions involving unit rates, scale drawings and maps
- Apply multiple operations to solve problems involving addition, subtraction, multiplication, division and positive integer exponents with whole numbers and with positive fractions, mixed numbers, decimals, and percents
- Use the number line and other models to add and subtract integers including subtracting negative integers
- Apply the Order of Operations for expressions
- Master an understanding of the inverse relationship of addition and subtraction to simplify computation and solve problems
- Accurately add, subtract, multiply and divide whole numbers and positive decimals, fractions and mixed numbers to solve problems
- Master estimating, and results of computations with whole numbers, positive fractions, mixed numbers, decimals, and percents

B. Patterns, Relations and Algebra

The students will:

- Analyze and apply the rules for extending symbolic, arithmetic and geometric patterns, and progressions
- Replace variables with given values to evaluate and simplify expressions
- Use the properties of equality to solve multi-step problems
- Analyze real situations and mathematical relationships with concrete models, tables, graphs, rules in words, and with symbols
- Solve linear equations using concrete models, tables, and graphs
- Produce and interpret graphs that represent the relationship between multiple variables in everyday situations
- Identify and describe relationships between two variables with a constant rate of change

C. Measurement

The students will:

- Master the concepts and formulas of perimeter and area to the solution of problems
- Analyze, measure, classify, and construct various angles, triangles and quadrilaterals
- Solve problems involving proportional relationships and units of measurement
- Find and analyze areas of triangles, parallelograms, and trapezoids
- Identify, measure and describe circles and the relationships of the radius, diameter, circumference and area
- Calculate volumes and surface areas of rectangular prisms
- Determine the sum of the angles in simple polygons with and without measuring the angles

D. Geometry

The students will:

- Identify polygons based on their properties, including types of interior angles, perpendicular or parallel sides, and congruence of sides
- Identify three-dimensional shapes
- Identify relationships among points, lines, and planes
- Graph points and identify coordinates of points on the Cartesian coordinate plane
- Describe and perform transformations on two-dimensional shapes
- Identify types of symmetry, including line and rotational
- Determine if two shapes are congruent by measuring sides or a combination of sides and angles, as necessary; or, by motions or series of motions
- Match three-dimensional objects and their two-dimensional representations

E. Data Analysis, Statistics and Probability

The students will:

- Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range
- Create and analyze stem-and-leaf plots, line plots, and circle graphs
- Use tree diagrams and other models

- Predict experimental and theoretical probability outcomes

TEACHING STRATEGIES

- Teacher directed lessons
- Whole class activities
- Working with a partner
- Lessons with oral, visual, and tactile strategies to address learning styles
- Make connections by reading books, including, but not limited to *The Greedy Triangle* by Marilyn Burns and *Sir Circumference and the First Round Table* by Cindy Neuschwander

ASSESSMENT

- *John Collins Writing Program*
- Group projects
- Journal writing
- Homework
- Tests and quizzes
- Critical Thinking Problem
- Midterm and Final

RESOURCES

- *Math Connects: Concepts, Skills, and Problem Solving (course one)* Glencoe McGraw Hill
- *Math Connects: Concepts, Skills, and Problem Solving (course two)* Glencoe McGraw Hill
- Internet websites including, but not limited to Mathforum.org, NCTM.org, Brainpop.com
- Manipulatives including, but not limited to Cuisinaire Rods, Pattern Blocks, Geoboards, graphing white boards, dice and plastic money
- Graphic Organizers
- Overheads
- Technology
- Smart Board

Mathematics
Pre-Algebra

PURPOSE:

The purpose of Pre-Algebra is to increase student proficiency with numerical concepts and progressing from concrete to abstract concepts at an acceptable pace. Focus is on developing strategies to solve problems using variables.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Compare, order, estimate, and translate among integers, fractions and mixed numbers, decimals, and percents
- Define, compare, order, and apply frequently used irrational numbers
- Use ratios and proportions in the solution of problems, in particular, problems involving unit rates, scale factors, and rate of change
- Represent numbers in scientific notation and use that notation in problem situations
- Apply number theory concepts, including prime factorization and relatively prime numbers to the solution of problems
- Demonstrate and apply an understanding of absolute value
- Apply the rules of powers and roots to the solution of problems
- Extend the Order of Operations to include positive integer exponents and square roots
- Demonstrate an understanding of the properties of arithmetic operations on rational numbers such as associative, commutative, and distributive properties
- Use the inverse relationships of addition and subtraction, multiplication and division, and finding square roots to simplify computations and solve problems
- Estimate and compute with fractions, integers, decimals, and percents
- Determine when an estimate rather than an exact answer is appropriate and apply in problem situations
- Select and use appropriate operation such as addition, subtraction, multiplication, division, and positive integer exponent to solve problems with rational numbers

- Compare, order, estimate, and translate among integers, fractions and mixed numbers, decimals, and percents
- Use ratios and proportions in the solution of problems involving unit rates, scale drawings, and reading of maps
- Represent numbers in scientific notation and use that notation in problem situations
- Apply the rules of positive integer exponents to the solution of problems

B. Patterns, Relations and Algebra

The students will:

- Extend, represent, analyze and generalize a variety of patterns with tables, graphs, words, and symbols
- Evaluate simple algebraic expressions for given variable values
- Demonstrate an understanding of the identity property
- Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations
- Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph
- Identify the positive, negative, zero, or undefined slope
- Apply the concept of slope to the solution of problems
- Identify the roles of variables within the slope y-intercept equation for $y = mx + b$
- Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models and graphs
- Explain and analyze both quantitatively and qualitatively, using pictures, graphs, charts or equations how to transform one variable in a formula into another
- Use linear equations to model and analyze problems involving proportional relationships
- Use tables and graphs to represent and compare linear growth patterns
- Evaluate simple algebraic expressions for given variable values

C. Measurement

The students will:

- Select, convert, and use appropriate units of measurement or scale
- Given the formulas, convert from one system of measurement to another
- Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including

those of area and perimeter, circumference of parallelograms, trapezoids and circles

- Use ratio and proportion in the solution of problems involving similar figures
- Given the formulas, determine the surface area, and volume of rectangular prisms, cylinders, and spheres plane figures and indirect measurement
- Use models, graphs, and formulas to solve simple problems involving rates

D. Geometry

The students will:

- Analyze, apply and explain the relationship between the number of sides and the sums of the interior and exterior angle measures of polygons
- Classify figures in terms of congruence and similarity and apply these relationships to the solution of problems
- Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal
- Demonstrate an understanding of the Pythagorean theorem
- Use a straightedge, compass, or other tools to formulate and draw geometric figures
- Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure
- Identify three-dimensional figures by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.
- Recognize and draw two-dimensional representations of three-dimensional objects

E. Data Analysis, Statistics and Probability

The students will:

- Describe the characteristics and limitations of a data sample
- Identify different ways of selecting a sample
- Select, create, interpret, and utilize various tabular and graphical representations of data,
- Find, describe, and interpret appropriate measures of central tendencies
- Use tree diagrams, tables, organized lists, and basic and area models to compute probabilities for simple compound events

TEACHING STRATEGIES

- Teacher directed lessons

- Whole class activities
- Working with a partner
- Lessons with oral, visual and tactile strategies to address learning styles
- Make connections by reading books, including, but not limited to *The Greedy Triangle* by Marilyn Burns and *Sir Circumference and the First Round Table* by Cindy Neuschwander

ASSESSMENT

- *John Collins Writing Program*
- Group projects
- Journal writing
- Homework
- Tests and quizzes
- Critical Thinking Problems
- Midterm and Final

RESOURCES

- *Pre-Algebra* Glencoe McGraw Hill
- Internet websites including, but not limited to Mathforum.org, NCTM.org, Brainpop.com
- Manipulatives including, but not limited to Cuisinaire Rods, Pattern Blocks, Geoboards, graphing white boards, dice and plastic money
- Computer applications including, but not limited to Microsoft Powerpoint and Excel
- Smart Board

Mathematics
Algebra

PURPOSE:

The purpose of Algebra I is to build upon the skills learned in Pre-Algebra. The course places more emphasis on an algebraic approach to problem solving. Students learn to link abstract numeric, verbal, graphic and symbolic representations to the problem solving process.

OUTCOMES:

A. Number Sense and Operations

The students will:

- Identify and use the properties of operations on real numbers
- Identify the existence of the identity and inverse elements for operations
- Identify the existence of n th roots of positive real numbers for any positive integer n ; the inverse relationship between taking the n th root of and the n th power of a positive real number; and the density of the set of rational numbers in the set of real numbers
- Simplify numerical expressions, including those involving positive integer exponents or the absolute value
- Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator
- Use estimation to judge the reasonableness of results of computations and solutions to problems involving real numbers

B. Patterns, Relations and Algebra

The students will:

- Describe, complete, extend and analyze, generalize linear, quadratic, and exponential functional relationships
- Use properties of the real number system to judge the validity of equations and inequalities
- Demonstrate an understanding of relations and functions by identifying the domain, range, dependent, and independent variables of functions
- Translate between different representations of functions and relations
- Demonstrate an understanding of the relationship between various representations of a line

- Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line
- Find a linear equation describing a line from a graph or a geometric description of the line
- Explain the significance of a positive, negative, zero, or undefined slope
- Find linear equations that represent lines either perpendicular or parallel to a given line and through a point
- Add, subtract and multiply polynomials
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring, identifying and canceling common factors in rational expressions and applying the properties of positive integer exponents
- Find solutions to quadratic equations by factoring, completing the square, or using the quadratic formula
- Demonstrate an understanding of the equivalence of the factoring, square or quadratic methods
- Solve equations and inequalities including those involving absolute value of linear expressions and apply to the solution of problems
- Solve everyday problems that can be modeled using linear, reciprocal, quadratic, or exponential functions
- Apply appropriate tabular, graphical, or symbolic methods to the solution
- Calculate simple and compound interest
- Solve everyday problems that can be modeled using systems of linear equations or inequalities

C. Geometry

The students will:

- Demonstrate an understanding of the Pythagorean theorem
- Identify trigonometric ratios of sine, cosine, and tangent

D. Data Analysis, Statistics and Probability

The students will:

- Select, create, and interpret an appropriate graphical representation for a set of data and use appropriate statistics
- Approximate a line of best fit given a set of data such as, but not limited to, a scatter plot
- Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data

- Differentiate between continuous and discrete data and ways to represent them
- Find and analyze appropriate measures of central tendency
- Compute probabilities for simple compound events

TEACHING STRATEGIES

- Break down abstract concepts into concrete steps
- Build upon prior knowledge when introducing concepts
- Teacher directed lessons
- Whole class activities
- Working with a partner
- Lessons with oral, visual and tactile strategies to address learning styles
- Make connections by reading books
- Cooperative group work

ASSESSMENT;

- *John Collins Writing Program*
- Homework
- Oral performances
- Observe students as they work
- Tests and quizzes
- Word problems
- Critical thinking problems
- Midterm and final

RESOURCES

- *Algebra One Glencoe McGraw Hill*
- Internet websites including, but not limited to Mathforum.org, NCTM.org, Brainpop.com
- Manipulatives including but not limited to Cuisinaire Rods, Pattern Blocks, Geoboards, graphing white boards, dice and plastic money
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