

Hopatcong Borough Schools

Math Curriculum

Grade One

2004

Grade One
Math
2004

DESCRIPTION:

The grade one math curriculum will focus on five major topics. First, numbers and numerical operations will focus on adding, subtracting, mental math, estimation, understanding the number system and how numbers relate to each other. Second, geometry and measurement will focus on geometric properties, spatial sense and measurement units. Third, patterns and algebra will focus on creating and extending patterns, creating tables and graphs to represent data and problem solving. Fourth, data analysis, probability, and discrete mathematics will focus on reading, understanding, and interpreting data, probability, listing and counting. Fifth, mathematical processes will focus on problem solving, communication, connections, reasoning, representations, and technology.

CORE CURRICULUM CONTENT STANDARDS:

- 4.1 All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.**
- 4.2 All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.**
- 4.3 All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.**
- 4.4 All students will develop an understanding of the concepts and techniques of data analysis, probability, and discrete mathematics, and will use them to model situations, solve problems, and analyze and draw appropriate inferences from data.**
- 4.5 All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.**

CUMULATIVE PROGRESS INDICATORS:

By the end of **Grade 1**, students will:

4.1 Number and Numerical Operations

A. Number Sense

1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (**unless otherwise noted, all indicators for grade 1 pertain to these sets of numbers as well**).

- * Whole numbers through one hundred

- * Ordinals

- * Fractions ($1/2, 1/3, 1/4$)

2. Demonstrate an understanding of whole number place value concepts.

3. Understand that numbers have a variety of uses.

4. Count and perform simple computations with coins.

- * Amounts up to \$1.00 (using cents notation)

5. Compare and order whole numbers.

B. Numerical Operations

1. Develop the meanings of addition and subtraction by concretely modeling and discussing a large variety of problems.

- * Joining, separating, and comparing

2. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as counting on and near doubles.) and then commit them to memory.

3. Construct, use, and explain procedures for performing addition and subtraction calculations with:

- * Pencil-and-paper

- * Mental math

- * Calculator

4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.

- * Addition of 2-digit numbers without regrouping.

- * Subtraction of 2-digit numbers without borrowing.

5. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation depending on the context and numbers.

6. Check the reasonableness of results of computations.

7. Understand and use the inverse relationship between addition and subtraction.

C. Estimation

1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.

2. Determine the reasonableness of an answer by estimating the result of computations (e.g., $15=16$ is not 211)

3. Explore a variety of strategies for estimating both quantities (e.g., the number of marbles in a jar) and results of computation.

4.2 Geometry and Measurement

A. Geometric Properties

1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.

- * Inside/outside, above/below, between
- * Smaller/larger/same size, wider/narrow, longer/shorter
- * Congruence (i.e., same size and shape)

2. Use concrete objects, drawing, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.

- *3D figures – cube, sphere, cone, cylinder
- *2D figures – square, rectangle, circle, triangle

3. Describe, identify and create instances of line symmetry.

4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.

B. Transforming Shapes

1. Use simple shapes to make designs, patterns, and pictures.

2. Combine and subdivide simple shapes to make other shapes.

C. Coordinate Geometry

1. Give and follow directions for getting from one point to another on a map or grid.

D. Units of Measurement

1. Directly compare and order objects according to measurable attributes.

- *Attributes – length, weight, capacity, time, temperature

2. Recognize the need for a uniform unit of measure.

3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems.

- * Length – inch, foot, centimeter
- *weight – pound
- *Capacity – pint
- *Time – second, minute, hour, day, week, month, year
- *Temperature – degrees Fahrenheit

4. Estimate measures.

4.3 Patterns and Algebra

A. Patterns

1. Recognize, describe, extend, and create patterns.

- * Using concrete materials (manipulatives), pictures, rhymes, & whole numbers
- * Descriptions using words or symbols (e.g., “add two” or +2)
- * repeating patterns
- * Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number (e.g., skip counting forward or backward)

B. Functions and Relationships

1. Use concrete and pictorial models of function machines to explore the basic concept of a function.

C. Modeling

1. Recognize and describe changes over time (e.g., temperature, height)

2. Construct and solve simple open sentences involving addition or subtraction.

- * Result unknown (e.g., $6-2=_$ or $_=3+5$)

* Part unknown (e.g., $3 + _ = 8$)

D. Procedures

1. Understand and apply (but don't name) the following properties of addition:

* Commutative (e.g., $5 + 3 = 3 + 5$)

* Zero as the identity element (e.g., $7 + 0 = 7$)

* Associative (e.g., $7 + 3 + 2$ can be found by first adding either $7 + 3$ or $3 + 2$)

4.4 Data Analysis, Probability, and Discrete Mathematics

A. Data Analysis

1. collect, generate, record, and organize data in response to questions, claims, and curiosity.

* Data collection from students' everyday experiences

* Data generated from chance devices, such as spinners and dice

2. Read, interpret, construct, and analyze displays of data.

* Pictures, tally chart, pictograph, bar graph, Venn diagram

* Smallest to largest, most frequent (mode)

B. Probability

1. Use chance devices like spinners and dice to explore concepts of probability.

* Certain, impossible

* More likely, less likely, equally likely

2. Provide probability of specific outcomes.

* Probability of getting specific outcomes when a coin is tossed, when a die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five)

* When picking a marble from a bag with three red marbles and four blue marbles, the probability of getting a red marble is three out of seven

C. Discrete Mathematics – Systematic Listing and counting

1. Sort and classify objects according to attributes.

* Venn diagrams

2. Generate all the possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants).

D. Discrete Mathematics Vertex-Edge Graphs and Algorithms

1. Follow simple sets of directions (e.g., from one location to another, or from a recipe).

2. Color simple maps with a small number of colors.

3. Play simple two-person games (e.g., tic-tac-toe) and informally explore the idea of what the outcome should be.

4.5 Mathematical Processes

A. Problem Solving

1. Learn mathematics through problem solving, inquiry, and discovery.

2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3).

* Open-ended problems

* Non-routine problems

* Problems with multiple solutions

* Problems that can be solved in several ways

3. Select and apply a variety of appropriate problem-solving strategies (e.g., .try a simpler problem or make a diagram.) to solve problems.
4. Pose problems of various types and levels of difficulty.
5. Monitor their progress and reflect on the process of their problem solving activity.

B. Communication

1. Use communication to organize and clarify their mathematical thinking.
 - * Reading and writing
 - * Discussion, listening, and questioning
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.
3. Analyze and evaluate the mathematical thinking and strategies of others.
4. Use the language of mathematics to express mathematical ideas precisely.

C. Connections

1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.
4. Apply mathematics in practical situations and in other disciplines.
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.

D. Reasoning

1. Recognize that mathematical facts, procedures, and claims must be justified.
2. Use reasoning to support their mathematical conclusions and problem solutions.
3. Select and use various types of reasoning and methods of proof.
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.
5. Make and investigate mathematical conjectures.
 - * Counterexamples as a means of disproving conjectures
 - * Verifying conjectures using informal reasoning or proofs.
6. Evaluate examples of mathematical reasoning and determine whether they are valid.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.
 - * Concrete representations (e.g., base-ten blocks or algebra tiles)
 - * Pictorial representations (e.g., diagrams, charts, or tables)
 - * Symbolic representations (e.g., a formula)
 - * Graphical representations (e.g., a line graph)
2. Select, apply, and translate among mathematical representations to solve problems.
3. Use representations to model and interpret physical, social, and mathematical phenomena.

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.

2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).
5. Use computer software to make and verify conjectures about geometric objects.
6. Use computer-based laboratory technology for mathematical applications in the sciences.

Activities

Number and Numerical Operations

Suggested activities that address this standard may include but are not limited to the following:

1. Give each student a chart numbered 0-100 with random missing numbers. Have students fill in the blanks with the correct number.
2. Open a classroom store and have students use coins up to one dollar to purchase small items.
3. Keep boxes labeled ones, tens and hundreds at the calendar. Each day add one straw to the ones box. On the tenth day bundle the straws and add them to the tens box. Show the place value of each number outside the labeled box.
4. Check their paper and pencil work on a calculator or computer.
5. List everyone's birthday on a chart. Have the students make a graph to show how many students were born in each month.
6. Have the class complete a worksheet with basic addition problems. When completed, pass out different color unifix cubes. Have the students check their work by using the unifix cubes to represent each number sentence. For example, $1+6=7$ would be demonstrated with one red cube linked to six blue cubes.
7. Students will complete chapters 1, 2, 3, 4, 5, 7, 8, 10, 11, and 14 in The McGraw-Hill Mathematics book.
8. Have a daily estimation chart in the classroom. Each day fill the jar with a different amount of items and have the students each make a guess.

9. Fill a jar with water and have the students estimate how many cups of water are in the jar.
10. Show the class a large illustration of a pumpkin patch. Estimate how many pumpkins are there. Discuss strategies such as counting groups of tens, and more or less than.

Geometry and Measurement

Suggested activities that address this standard may include but are not limited to the following:

1. Using attributes blocks, students will sort shapes into various piles based on the number of sides and the number of corners.
2. Using peg boards and rubber bands, students will make the shape that teacher names.
3. Demonstrate different geometric shapes. Have the students go on a classroom scavenger hunt finding everyday items in the classroom for each shape.
4. Cut out tangram shapes on the Ellison machine. Have students make a picture of an animal but gluing the cut out shapes onto construction paper. Name your geometric animal.
5. Give each student paper shapes (circles, squares, rectangles, triangles) Instruct each student to fold the shape in half and cut down the middle. Have students explore what new, symmetrical shapes they have made.
6. Have students trace a circle using a stencil. Tell them to color the circle to resemble something that shape (example: basketball, wheel). Repeat the process with other geometric shapes.
7. Play simon says using position words.
8. Dictate directions while students draw a picture. (example: draw a dog under a tree, draw a car in front of a bike).
9. Name several everyday activities(example: making dinner, writing your name, watching a movie, writing a book) Have students name the unit of time each activity would take (seconds, minutes, hours, days, weeks, months, years)
10. Use a paperclip as a non standard unit of measure. Estimate how many paperclips long a particular object is. Measure it using the paper clip.

11. Measure the capacity of containers using rice and a scoop. Have students fill in estimates on a chart and then compare the actual answer.
12. Students will complete chapter 11 and 12 in The McGraw-Hill Mathematics book.
13. Keep a thermometer outside the classroom window. Check the temperature daily and record it on a chart. Analyze data at the end of each month.
14. Weigh random classroom objects on a balance scale. Predict how many cubes will equal the weight.
15. Give each student a piece of paper labeled 1 inch – 12 inches on a clipboard and a ruler. Have each student walk around the classroom and find an object that equals each measurement.

Patterns And Algebra

Suggested activities that address these standards may include but are not limited to the following:

1. Create a pattern of colors using unifix cubes.
2. Pass around a beach ball and have each student skip count by 5's as they pass the ball.
3. Clip 3 clothespins to one side of an index card. Clip two clothespins to the other side. Write number sentences to illustrate the data ($3+2=5$). Flip the index card to the other side. Write down the new number sentence ($2+3=5$). Compare the commutative properties.
4. Create AB, AAB, ABC, ABB patterns by clapping, tapping stamping feet, etc.
5. Have each student color a pattern for five minutes. When five minutes is up have them trade patterns with another student and complete the started pattern.
6. Students will complete chapters 1, 2, 3, 4, 5, 7, and 9 in The McGraw-Hill Mathematics book.

Data Analysis, Probability, and Discrete Mathematics

Suggested activities that address these standards may include but are not limited to the following:

1. Make a tally chart of how many children will buy lunch verses how many children bring their lunch. Graph the results.

2. Have students vote for their favorite movie by writing down the title and placing their response in a voting box. Tally the results.
3. Sort toys by attributes in a Venn Diagram.
4. Have students flip a coin 6 times and record the number of times it lands on heads. Discuss the probability of it landing on tails.
5. Put a red and blue cube into a bag. Have students predict which color will be pulled out first and which colors would be an impossible answer.
6. Make your favorite recipe in class and have the students follow the directions.
7. Have students each take off one shoe and place it into a pile in the middle of a circle. Sort the shoes into piles (laces/ no laces). Have students figure out by what attributes you sorted the shoes. Have students take turns making their own piles and explaining them.
8. Students will complete chapter 6 in The McGraw-Hill Mathematic book.

Mathematical Processes

Suggested activities that address these standards may include but are not limited to the following:

1. Keep a math journal.
2. Complete a “Math Problem of the Day” as a group. Have students explain how they came up with different answers.
3. Use Mathematic based literature and discuss.
4. Use computer software to sort graphic by attributes.
5. Make computer generate class graphs based on everyday experiences.
6. Have students check their work by using a calculator.
7. Use the Math Tool Chest CD-ROM.
8. Students will complete chapters 2, 3, 4, 5, 6, and 9 in The McGraw-Hill Mathematics book.

Instructional Strategies

Journal Writing

Problem of the Day

Cooperative Learning

Centers

Manipulatives

Trade Books

Overhead Projector

Transparencies

Technology

Problem Solving

Critical Thinking

Brainstorming

Reflective Thinking

Read, Write, Draw Word Problems

Teacher Presentations

Classroom Projects

Assessments

Role-Play

Games

Think-Pair-Share

Graphing

Graphic Organizers

Cross-Curricular Activities

Mini-lessons

Reproducibles & Templates

Shared Reading

Homework

Evaluation/Assessment of Students:

1. Students will complete workbook pages.
2. Students will complete book tests and post tests
3. Students will keep a math journal to enter daily problems.
4. Students will demonstrate math skills at centers.
5. Students will work in cooperative groups to solve problems.
6. Students will work independently to solve problems

7. Students will use manipulatives to problem solve.
8. Students will use technology to problem solve.
9. Students will discuss how they formed conclusions.
10. Students will complete projects.
11. Students will create pictures, graphs, and tables to represent collected data.
12. Students will complete homework assignments.
13. Students will develop a portfolio with teacher assistance.
14. Teacher observations.
15. Rubrics.

Evaluation/Assessment of Curriculum:

This course of study will be evaluated/assessed by instructional staff during the first year of implementation for the purpose of necessary revision at the end of the first year. In addition, this course of study will be reviewed according to the Five-Year Curriculum Review schedule (see attached)

Resources/Bibliography

McGraw-Hill Mathematics, 2002

Math Tool Chest, CD ROM

Math Traveler, CD ROM

www.mhschool.com