RUTHERFORD PUBLIC SCHOOLS
MATHEMATICS CURRICULUM
GRADE 4

I. INTRODUCTION

The Rutherford Public Schools embrace both the standards of the National Council of Teachers of Mathematics (NCTM) and the New Jersey State Department of Education's Core Curriculum Content Standards (NJCCS). This curriculum is developmentally appropriate and encourages students to investigate a wide variety of mathematical ideas.

> *The role of students is redirected from passive recipients to active participants, from isolated workers to team members, from listeners to investigators and reporters, and from followers to explorers and risk takers.*
> *They are asked to develop, discuss, create, model, validate, and investigate to learn math.*
>
> *NCTM Curriculum and Evaluation*
> *for School Mathematics, 1989*

The vision of the Mathematics Standards of the New Jersey State Department of Education is focused on achieving one crucial goal:

> *To enable ALL of New Jersey's children to move into the twenty-first century with the mathematical skills, understandings, and attitudes that they will need to be successful in their careers and daily lives.*
>
> *NJ Mathematics Curriculum Framework*
> *NJ Mathematics Standards, 2002*

As the student's role in the mathematics classroom has shifted, so too has the teacher's role. As teachers incorporate the NJCCS in Mathematics into their teaching, we should be able to see the following results:

> *Students excited by and interested in their activities.*
> *Students learning important mathematical concepts rather than simply memorizing and practicing procedures.*
> *Students posing and solving meaningful problems.*
> *Students working together to learn mathematics.*
> *Students writing and talking about math topics every day.*
> *Students using calculators and computers as important tools of learning.*
> *Teachers who have high expectations for ALL of their students.*
> *Students being assessed by a variety of assessment strategies, not just traditional short-answer tests.*
>
> *NJ Mathematics Curriculum Framework*
> *NJ Mathematics Standards, 2002*

II. OBJECTIVES

Note: References to the New Jersey Core Curriculum Content Standards appear as a numeral in parentheses.

A. SKILLS

The student will be able to:

1. Develop an intuitive feel for numbers and their use. (4.1)
2. Be actively involved in mathematics. (4.5)
3. Become confident in mathematical ability. (4.5)
4. Communicate mathematically. (4.5)
5. Reason mathematically. (4.5)
6. Become posers and solvers of math problems. (4.5)
7. Connect mathematics to other learning. (4.5)
8. Use calculators, computers, manipulatives, and other mathematical tools as a routine part of learning. (4.5)
9. Develop spatial sense and explore spatial relationships. (4.2)
10. Develop an understanding of numerical relationships. (4.1)
11. Develop an understanding of an be able to use measurements. (4.2)
12. Use estimation. (4.1)
13. Develop and understanding of patterns, relationships and functions. (4.3)
14. Develop an understanding of statistics and probability. (4.4)
15. Develop an understanding of algebraic concepts. (4.3)
16. Apply concepts and methods of discrete mathematics. (4.4)
17. Develop an understanding of the conceptual building blocks of calculus. (4.4)

B. CONTENT

The student will:

1. Have an understanding of the following math vocabulary words: (4.1,4.2,4.3,4.4,4.5)

Acute Angle	Cup	Equation	Associative Property
Addend	Cylinder	Equivalent Decimal	of X
Angle	Decimal	Equivalent Fractions	Hexagon
AM	Decimal point	Estimate	Horizontal
Area	Decimeter	Event	Hundredth
Array	Degree	Expanded Form	Impossible
Average	Degrees Fahrenheit	Expression	Inch
Bar Graph	Degrees Celsius	Fact family	Intersecting lines
Calendar	Denominator	Factor	Inverse operations
Capacity	Diameter	Foot (ft)	Kilogram
Cardinal	Difference	Fraction	Less than (<)
Centimeter	Digit	Frequency table	Line
Circle Graph	Dimension	Frequency	Line graph
Closed Figure	Dividend	Gallon (gal)	Line segment
Cone	Divisor	Gram (gm)	Line of symmetry
Congruent Figures	Double Bar Graph	Greater than (>)	Linear units
Cube	Elapsed Time	Associative Property of +	Liter (l)

Mass	Ordered pairs	Ordinal	Simplest form
Mean	Outcomes	Predict	Solid figure
Median	Ounce (oz)	Probability	Square
Meter(m)	Parallel lines	Product	Square pyramid
Mile (mi)	Parallelogram	Property of 1 for X	Square unit
Milliliter (ml)	Partial product	Pulse	Standard form
Mixed numbers	Quadrilateral	Quart(qt)	Stem-and-leaf plot
Mixed decimals	Pentagon	Quotient	Sum
Mode	Perimeter	Radius	Survey
Multiple	Period	Range	Tally
Negative numbers	Perpendicular lines	Ray	Tangram
Net	Pictograph	Rectangle	Tenth
Normal	Pint (pt)	Rectangular prism	Tessellation
Numeration system	Place value	Reflection (flip)	Three dimensional
Numerator	Plane	Remainder	Ton (T)
Obtuse triangle	Plane figure	Rhombus	Transformation
Octagon	PM	Right angle	Translation (slide)
One-dimensional	Point	Rotation(turn)	Trapezoid
Open figure	Point Symmetry	Scale	Triangle
Opposites	Polygon	Schedule	24 hour clock
Commutative Prop of X	Pound (lb)	Similar figures	Two dimensional
Variable	Venn diagram	Vertex	Vertical
Volume	Written form	x-Coordinate	Yard
y-coordinate	Zero Product Property		

2. Perform Addition and Subtraction computations by: (4.1, 4.3)

a. Adding three or more 1 digit numbers with regrouping (Associative Property of +)
b. Adding up to five digit numbers with and without regrouping.
c. Adding more than two addends with and without regrouping.
d. Estimating sums and differences by using rounding.
e. Subtracting up to five digit numbers with and without regrouping.
f. Subtracting across zeros with regrouping.
g. Solving problems involving addition and subtraction.

3. Understand place value to 100,000,000 by: (4.1, 4.3)

a. Exploring how ones, tens, hundreds, and thousands are related.
b. Identifying place value.
c. Recognizing, writing, comparing, and understanding numbers to hundred millions.
d. Using different names for the same number.
e. Using ordinal numbers through 100th.
f. Estimating numbers to the nearest 10, 100, or 1000.
g. Solving problems involving place value.

4. Understand the concept of multiplication and division by: (4.1,4.3)

a. Using the Commutative, Associative, Zero and One Property of Multiplication.
b. Multiplying two, three and four digit numbers by one-digit numbers with and without
        regrouping
c. Identifying and using the patterns of nines.
d. Commiting multiplication and division facts to memory.
e. Recognizing that multiplication and division are inverse operations.
f. Finding factors.

g. Dividing by 0 and 1.
h. Multiplying multiples of 10, 100 and 1000 by one digit numbers.
i. Identifying patterns using mental math.
j. Estimating products of two and three digit numbers.
k. Multiplying two and three digit numbers by multiples of 10.
l. Multiplying two and three digit numbers by two digit numbers.
m. Exploring division using place value materials.
n. Estimate quotients.
o. Dividing by 1 and 2 digit divisors with remainders.
p. Solving problems involving multiplication and division.

4. Build an understanding of time by: (4.1)

a. Reading and interpreting a calendar.
b. Identifying a time as AM or PM.
c. Telling time to the nearest minute using numbers and words.
d. Choosing a reasonable unit for a given activity.
e. Finding elapsed time in hours, minutes, days, weeks, months, and years.
f. Solving problems involving time.

5. Analyze data by: (4.4)

a. Collecting, organizing, and presenting data.
b. Making a pictograph, bar graph, and line graph.
c. Using ordered pairs to find points on a grid.
d. Finding the median, range, and mean (average) of data.
e. Finding the probability of an event.
f. Making tree diagrams to show all possible outcomes.

6. Become familiar with Geometric concepts by: (4.2)

a. Distinguishing between plane and solid figures.
b. Identifying polygons and their properties.
c. Finding area by counting units as well as by multiplying.
d. Identifying line segments, lines, and rays.
e. Identifying types of angles.
f. Identifying parts of a circle.
g. Identifying relationships between lines.
h. Differentiating between similar and congruent figures.
i. Transforming a figure by sliding, flipping, or turning.
j. Identifying the properties of solid figures.
k. Calculate volume in cubic units.
l. Solving problems involving geometry.

7. Use measurement to: (4.2v)

a. Estimating and measuring length or distance using inches, centimeters and non-standard units.
b. Estimating and measuring length, capacity, and mass using customary and metric units.
c. Choosing the appropriate unit from customary and metric units.
d. Finding the perimeter of a region.
e. Converting units by multiplication and division.
f. Solving problems involving measurement.

8. Investigate fractions and mixed numbers by: (4.1, 4.3, 4.4)

a. Reading and writing fractions as parts of a whole and parts of a group.
b. Exploring equivalent fractions using models.
c. Finding an equivalent fraction in simplest form.
d. Comparing fractions.
e. Exploring mixed numbers.
f. Estimating fractions.
g. Adding and subtracting of fractions with common denominators.
h. Adding and subtracting mixed numbers.
i. Identify a length to the nearest inch.
j. Identifying possible combinations and arrangements using key combinations.
k. Using fractions to express probability.
l. Solving problems involving fractions.

9. Investigate decimals by: (4.1,4.3)

a. Reading and identifying decimals with tenths and hundredths.
b. Relating fractions to decimals.
c. Rounding and estimating decimals.
d. Comparing and ordering decimals.
e. Estimating sums and differences of decimals.
f. Adding and subtracting decimals.
g. Solving problems involving decimals.

10. Use the following strategies for problem solving and recognize where to use appropriately: (4.4, 4.5)

a. Four step problem solving process.
b. Making and using a table
c. Finding patterns
d. Drawing a picture
e. Analyze for too much or too little information
f. Writing a number sentence.
g. Analyzing data to make decisions.
h. Make a graph, grid, or model.
i. Solve open-ended questions.

III. PROFICIENCY LEVELS

This curriculum is appropriate for all students in grade 4.

IV. METHODS OF ASSESSMENT

Students will be evaluated using a diverse set of assessment tools and strategies which include:

1. Teacher observation of demonstrated competencies.
2. Teacher interview and inquiry.
3. Teacher prepared activities that promote improvement of learning.
4. Written tests.
5. Open-ended problem solution.
6. Group and cooperative work.
7. Group and individual projects.
8. Student homework correction.

9. Student assessment of his/her work.
10. Math software.

V. RESOURCES

A. TEXTBOOK

<u>Math Advantage</u>. Harcourt, Brace & Company, 1999.

B. SUPPLIES/MATERIALS

Abacus	Geoboards	Tracing paper
Balance Scale	Geometric Solids	
Base-ten blocks	Graph paper	
Calculators	Number cubes	
Calendar	Number line	
Clocks-Analog and digital	Paper clips	
Clock dials	Pattern blocks	
Compass	Place value models	
Computer	Plane figures	
Connecting cubes	Play money	
Containers	Protractor	
2 color counters	Rulers	
Cuisenaire rods	Spinners	
Decimal squares	Sticks	
Fraction Circles	Tangrams	
Fraction Squares	Tiles	

C. TECHNOLOGY

D. REFERENCES

www.hbschool.com

VI. METHODOLOGIES

Students will use technology and math manipulatives on a daily basis to explore, identify and understand mathematical concepts necessary for success in higher level grades. Through discovery exercises and teacher-guided explorations, they will discover many of the concepts for themselves. They will take an active part in using various manipulatives in cooperative learning situations, thus applying teamwork to the learning process.

VII. ACTIVITIES

Appropriate levels for each of the topics are indicated in the attached curriculum map.

VIII. INTERDISCIPLINARY CONNECTIONS

At this grade level, connections to many other disciplines are appropriate and natural. Reading and writing becomes an integral part of the mathematics process. Connections with science are frequent throughout both curriculum. Technology plays an important process in learning mathematics as well.

IX. PROFESSIONAL DEVELOPMENT

As per the PIP/100 hour statement: the teacher will continue to improve expertise through participation in a variety of professional development opportunities.

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