GRADE 7 MATHEMATICS CURRICULUM

Renewed 8/2006

LEARNING OUTCOME	NJCCCS
4.1 Number and Numerical Operations	**4.1…**
Constructs meaning for: 1- Rational Numbers	A.1
2- Percents	A.1
3- Whole Numbers with Exponents	A.1
4- Absolute Value	B
Understands that all fractions can be represented as either 1- a Terminating Decimal 2- a Repeating Decimal	A.6
Demonstrates a sense of the relative magnitudes of numbers and compares and orders numbers	A.2, A.4
Understands and uses ratios, proportions and percents (including percents greater than 100 and less than 1) to calculate: 1- Amount of Increase/Decrease 2- Discount 3- Sales Tax 4- Markup 5- Commission 6- Royalty 7- Simple Interest 8- Compound Interest	A.3
Uses paper-pencil methods, mental math, <u>calculators</u> to complete the following: 1- Converts fractions to equivalent terminating decimals 2- Converts fractions to equivalent repeating decimals 3- Converts terminating decimals to equivalent fractions 4- Converts repeating decimals to equivalent fractions 5- Performs addition of positive and negative numbers (real numbers) 6- Performs subtraction of positive and negative numbers (real numbers) 7- Performs multiplication of positive and negative numbers (real numbers) 8- Performs division of positive and negative numbers (real numbers) 9- Calculates powers of whole numbers 10- Simplifies a numerical expression using the standard algebraic order of operations, including parentheses and exponents 11- Calculates permutations using a list 12- Calculates combinations using a list 13- Calculates a factorial 14- Calculates combinations using a formula 15- Calculates permutations using a formula	A.6 A.6 A.6 A.6 B.1 B.1 B.1 B.1

16- Performs conversion between whole numbers, fractions, decimals and percents (math minutes)	B.2 B.3 4.4.C.1 4.4.C.1 4.4.C 4.4.C.1 4.4.C.1 A.5
Uses equivalent representations of fractions, decimals and percents to estimate	C.1
4.2 Geometry and Measurement:	**4.2...**
Applies concepts involving Polygons: 1- Quadrilaterals a- squares b- rectangles c- parallelograms d- trapezoids e- rhombi 2- Regular polygons	A.1
Applies concept of similarity 1- Using proportions to find missing measures 2- Scale drawings 3- Models of 3D objects	A.2
Use logic and reasoning to make and support conjectures about geometric objects	A.3
Applies transformations 1- Finds image given pre-image 2- Recognizes sequence of transformations needed to map one figure onto another 3- ... result in images congruent to the pre-image: a- Reflections b- Rotations c- Translations d- Dilations (stretching/shrinking)	B.1
Uses coordinate grid (four quadrants) to 1- represent geometric concepts 2- model and quantify transformations (e.g. translate right 4 units)	C.1 C.2
Uses appropriate units and strategies to measure: 1- perimeter a- creates geometric figures by combining triangles, rectangles and circles or parts of circles 2- area a- creates geometric figures by combining triangles, rectangles and	E.1 E.1

circles or parts of circles b- estimates using grids 3- volume a- prism b- cylinder c- pyramid d- cone e- recognizes the volume of a pyramid/cone = 1/3 the volume of a prism/cylinder with the same base and height (e.g. uses rice to compare volumes with same base and height)	E.2
Uses and identifies measurement tools and units: Incorporates estimation 1- Length: Ruler: fraction of inch (½, ¼, 1/8, 1/16 and smaller), mile, centimeter, decimeter, kilometer 2- Area: Ruler/Graph paper: Square units 3- Volume: Cubic units (using rice or cubes) 4- Weight: Scale: Ounce, gram 5- Capacity: Cubes: Fluid ounce, cup, gallon and milliliter	D.2
Recognizes all measurements are approximations	D.3
Solves problems involving different units of measurement within a measurement system (e.g.4'3"+7'10"=12'1")	D.1
4.3 Patterns and Algebra:	4.3…
Recognizes, describes, extends and creates patterns with Whole Numbers, Rational Numbers and Integers using: 1- tables 2- verbal rules 3- symbolic rules 4- graphs 5- simple equations/expressions 6- finite and infinite sequences 7- generating sequences with a calculator to repeatedly apply a formula	A.1
Describes general behavior of functions and analyzes how a change in one quantity can result in a change in another using 1- graphs 2- charts 3- equations involving two variables	B.1, C.1
Uses patterns, relations, symbolic algebra and linear functions to model situations (e.g. growth situations, such as population growth and compound interest)using 1- manipulatives	C.2

2- tables 3- graphs 4- verbal rules 5- algebraic expressions/equations/inequalities 6- recursive formulas (e.g. NOW-NEXT)	
Solves simple linear equations informally and graphically involving 1- multi-step 2- integer coefficients 3- real number solutions 4- variables on one or both sides of equation	D.2
Solves simple linear equations using 1- paper-and-pencil 2- calculators 3- graphing calculators 4- spreadsheets	D.2
Applies properties of operations, numbers, equations and inequalities 1- Additive Inverse 2- Multiplicative Inverse	D.4
Creates, evaluates and simplifies variable expressions 1- Order of Operations (including parentheses and exponents) 2- Substitution of a number for a variable	D.3
Uses graphing techniques on a number line to illustrate 1- Absolute Value 2- Arithmetic operations represented by vectors (e.g. "-3 + 6" is "left 3, right 6")	D.1
4.4 Data Analysis, Probability & Discrete Mathematics:	**4.4...**
Recognizes appropriate representations for sets of data and measures of central tendency (mean, median and mode) 1- Box-and-whisker plot, upper quartile, lower quartile 2- Scatter plot	A.1
Formulates and evaluates arguments based on displays and analysis of data	A.2
Uses calculators and computers to process information	A.1
Interprets probabilities as ratios, percents and decimals	B.1
Calculates probability of compound events	B
Investigates/determines probability using simulations (spinners/dice/calculators/computers) 1- Frequency 2- Relative frequency	B.2
Estimates probabilities and makes predictions based on experimental and theoretical probabilities	B.3
Analyzes probability-based games for fairness and expected value	B.4
Applies the multiplication principal of counting 1- Permutations: ordered situations with replacement (e.g. # of possible license plates) vs. ordered situations without replacement (# of possible slates of 3 class officers from a 23 student class)	C.1

2- Combinations (# of possible delegations of 3 out of 23 students) 3- Factorial notation	C C
Explores counting problems involving Venn diagrams with three attributes	C.2
Applies techniques of … in a variety of contexts 1- systematic listing 2- counting 3- reasoning	C.3
Uses vertex-edge graphs to find solutions to practical problems 1- Finding the shortest network connecting specified sites 2- Finding the shortest route on a map from one site to another 3- Finding the shortest circuit on a map that makes a tour of specified sites	D.1
4.5 Mathematics Process:	4.5…
Learns mathematics through 1- problem solving 2- inquiry 3- discovery	A.1
Solves problems of various types and difficulty level 1- open-ended 2- non-routine 3- multiple solutions 4- multiple problem solving strategies	A.2, A.4
Selects and applies a variety of problem-solving strategies: 1- try a simpler problem 2- make a diagram 3- work backwards 4- act it out 5- write an equation	A.3
Reflects on their problem solving process	A.5
Organizes, clarifies and clearly communicates mathematical thinking through 1- reading and writing 2- discussion 3- listening 4- questioning	B.1, B.2
Analyzes and evaluates the mathematical thinking and strategies of others	B.3
Uses the language of mathematics to express mathematical ideas	B.4
Recognizes recurring themes across mathematical domains (e.g. patterns in number, algebra and geometry)	C.1
Uses connections among mathematical ideas to explain concepts (e.g. 2 linear equations have a unique solution because the lines they represent intersect at a single point)	C.2
Recognizes the larger context of mathematics and applies mathematics accordingly	C.3, C.4

Makes connections between mathematical ideas and builds on one another	C.6
Traces the development of mathematical concepts over time and across cultures (world languages and social studies standards)	C.5
Recognizes that mathematical facts, procedures and claims must be justified	D.1
Uses various types of reasoning and methods of proof to support their mathematical conclusions and problem solutions	D.2, D.3
Uses reasoning, rather than answer keys, teachers or peers, to check the correctness of their solutions	D.4
Evaluates mathematical reasoning and determines validity	D.6
Makes and investigates mathematical conjectures 1- Counterexamples as a means of disproving conjectures 2- Verifying conjectures using informal reasoning or proofs	D.5
Uses representations to organize, record and communicate mathematical ideas 1- Concrete representations (e.g. base-ten blocks or algebra tiles) 2- Pictorial representations (e.g. diagrams, charts or tables) 3- Symbolic representations (e.g. a formula) 4- Graphical representations (e.g. a line graph)	E.1
Selects, applies and translates among mathematical representations to solve problems and to model and interpret physical, social and mathematical phenomena	E.2, E.3
Uses technology to gather, analyze and communicate mathematical information	F.1
Uses computer spreadsheets, software and graphing utilities to organize and display quantitative information	F.2
Uses graphing calculators and computer software to investigate properties of functions and their graphs	F.3
Uses calculators as problem-solving tools (e.g. to explore patterns, to validate solutions)	F.4
Uses computer software to make and verify conjectures about geometric objects	F.5
Uses computer-based laboratory technology for mathematical applications in the sciences	F.6