Grade 7/8 Benchmark Proficiencies to Master

I. NUMBER SENSE

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STI.1	name, write, count, and order numbers up to billions and trillions				
STI.2	know >, ≥, <, ≤, =, ≠, and use these symbols appropriately when comparing numbers or writing number sentences up to 9 ,999,999,999,999				
STI.3	construct, read, and write numbers through 9,999,999,999,999				
STI.4	rewrite a given number in standard, expanded, factored, and exponential form, when given one of the forms				
STI.5	use ordinal and cardinal numbers in real life situations explain their relationship to one another				
STI.6	use mental math to cube numbers to 5				
STI.7	estimate the square root of a given number to the nearer whole number or a range of numbers				
STI.8	estimate the square root of a number by placing it between two known square roots e,g, $\sqrt{81}$ $\sqrt{91}$ $\sqrt{100}$				
STI.9	understand raising to a power and taking square roots as an inverse relationship				
STI.10	extend the order of operations to include exponents and grouping symbols with and without the use of calculators				
STI.11	estimate sums, differences, products, or quotients by using techniques e.g.. clustering numbers, averaging a set of numbers, rounding, using multiples of a number				
STI.12	do prime factorization of whole numbers				
STI.13	use prime numbers to identify the LCM, or GCF of two or three given numbers				
STI.14	read and use roman numerals I,V,X,L,C,D,M				
STI.15	identify the place value of a digit in a decimal up to the $100,000^{th}$’’s place				
STI.16	read, write, and order decimals up the 100,000ths place, and rewrite in standard, in fraction, in word, or in expanded form, given one of the forms				
STI.17	show that decimals are fractions with denominators of 10ths, 100ths, 1000ths, 10,000ths, or 100,000ths				
STI.18	round to the nearer 1, 10, 100, 1,000, 10,000, 100,000, 1,000,000, or to the 10th, 100th, $1,000^{th,}$ $10,000^{th}$, $100,000^{th}$.				
STI.19	rename fractions/mixed numbers as terminating or repeating decimals				
STI.20	add, subtract, multiply and divide decimals				

I. NUMBER SENSE (Continued)

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q1	Q2	Q3	Q4
STI.21	mentally multiply decimal numbers by a power of ten				
	understand the relationship between natural and whole numbers, integers, rational, irrational, and real numbers				
STI.22	convert with ease decimals and percents into fractions from one to another				
STI.23	use powers and scientific notation as alternate ways of writing numbers				
STI.24	explore powers and scientific notation using a scientific calculator				
STI.25	read, write, compare decimals in scientific notation				
STI.26	rename fractions /mixed numbers as terminating or repeating decimals				
STI.27	convert terminating decimals into reduced fractions				
STI.28	compare and order, add, subtract, and multiply, and divide rational numbers with unlike denominators, and reduce to lowest terms				
STI.29	add and subtract fractions by using factoring to find common denominators e.g. 2/28 + 1/49; the common denominator is 7*7*4 or 196				
STI.30	solve problems involving percents using more than one strategy				
STI.31	know the relationship between rates, proportions, and percents and give examples in real life				
STI.32	represent a ratio as a fraction, as a decimal, and as a percent				
STI.33	solve problems using ratios and recognize their use in daily life				
STI.34	describe and solve situations involving ratios, proportions, and percents e.g. the price of a shirt at 30% off is $26. what was the original price?				
STI.35	solve problems that involve discounts, mark ups, commissions				
STI.36	use proportions and algebraic equations to solve percent problems				
STI.37	compute single interest				
STI.38	compute compound interest				
STI.39	compute the absolute values of integers				
STI.40	explore absolute values in the context of distance				
STI.41	understand the relationship between natural, whole numbers, integers, rational, irrational, and real numbers				
STI.42	explain in own words the meaning of addition, subtraction, multiplication, division, fraction, decimal, percent, ratio, proportion				
STI.43	explain in own words the meaning of whole numbers, integers, rational numbers, irrational numbers, real numbers, ordinal numbers, nominal numbers, and cardinal numbers				
STI.44	use a fraction calculator or scientific calculator to solve problems and verify solutions or estimates				

II. ALGEBRA and FUNCTIONS

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q1	Q2	Q3	Q4
STII.1	determine the rule and identify missing numbers in a sequence of numbers or a table of number pairs related by combinations of addition, subtraction, multiplication, or division				
STII.2	apply formulas for %, rate, and distance to solve problems				
STII.3	make a table of ordered pairs, graph the equation, and interpret the results				
STII.4	describe and represent relationships with tables, graphs in the coordinate plane				
STII.5	analyze tables, graphs, and rules to determine functional relationships				
STII.6	graph simple quadratic functions: e.g. $y = 2x^2$; $y = -3x^2$				
STII.7	graph simple cubic functions e.g. $y = 2x^3$; $y = -y^3$				
STII.8	use simple quadratic and cubic functions in solving problems e.g. given y is two times the square of x;. then if x = 2, what does y equal?				
STII.9	find values from volumes of 3-dimensional shapes for values of edge lengths. e.g. what is the volume of a cube with edge length 2 or what is the volume of an equilateral triangular prism with height 6 and base side equal to 2				
STII.10	understand the meaning of slope of a line graphically e.g. $y = 2x$ versus $y = 5x$ versus…				
STII.11	understand the meaning of slope as vertical change (change in y value) per unit of horizontal change (change in x value)				
STII.12	understand the meaning of slope as "rise over run"				
STII.13	understand the meaning of slope by plotting values of quantities whose ratios are the same (e.g. feet to inches 12",1_; 24_, 2' or circumference to diameter, or number of items to cost)				
STII.14	fit a line to the slot and note the slope				
STII.15	explore and complete triangular and square number patterns e.g. 1,1,3,6,10,15; 1,4,9,16				

II. ALGEBRA and FUNCTIONS (Continued)

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STII.16	use variables and appropriate operations to write an expression that represents a verbal description the square of c is increased by the product of 4 times c				
STII.17	use variables and equations or inequalities to write expressions that represent a verbal description e.g. if x is less than 3 times the value of y, and if y is 12, what are the value of x? Mary is twice as old as Jose, and Mary is three years younger then Renee, if Renee is five years old, how old is Jose?				
STII.18	use the correct order of operations to evaluate algebraic expressions e.g. $3(xy - 2+3y) = $ if $x = 2$, $y = 3$				
STII.19	use algebraic terminology correctly (terms, variable, coefficient, constant, equation, inequality, expression				
STII.20	demonstrate a knowledge of properties used to simplify expressions (commutative, associative, distributive, identity, inverse				
STII.21	understand the terms "base" and "exponent"				
STII.22	compute problems with positive whole number exponents and interpret as repeated multiplication e.g. $3^3 = 3\times3\times3$				
STII.23	compute problems using negative whole number exponents and interpret as repeated division or multiplying by a multiplicative inverse e.g. $3^{-3} = 1/3 * 1/3 * 1/3$				
STII.24	understand whole number exponents e.g. compute $2^3 = ?$; $2^0 = ?$; $2^{-1} = ?$				
STII.25	evaluate and simplify expressions involving whole number exponents e.g. $3^2 + 2^{-3} = ?$; $a^4/a^2 = ?$ $a^3 * a^4 = ?$				
STII.26	multiply and divide rational numbers that have exponents e.g. $3^3/4^2$ divided by $2^{2/}1 = ?$				
STII.27	understand the meaning of a monomial e.g. $3a$; $4a^2b$				
STII.28	multiply monomials e.g. $3a * 12a^2b$				
STII.29	divide monomials e.g. $3ab^2/9ab$				
STII.30	raise monomials to powers e.g. $(3ab)^2 = ?$				
STII.31	take roots of monomials e.g. $\sqrt{9a^2b^4}$; $3\sqrt{8a^6}$				

III. MEASUREMENT and GEOMETRY

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STIII.1	estimate, add, subtract time, and determine the passage of time to the second				
STIII.2	find time equivalencies: second, minute, hour, day, week, month, year, decade, century, millennium				
STIII.3	explore which of two measurements is more precise, and explain why				
STIII.4	explore the formulas used to convert from Fahrenheit to Celsius, and vice versa				
STIII.5	compare weights, capacities, measure, time, temperature within/between measurement systems e.g. 30-miles/hour = ____feet/second				
STIII.6	draw and identify points, lines, line segments, rays, and angles, using geometric language and symbols				
STIII.7	identify attributes that describe geometric figures and classify accordingly				
STIII.8	determine the perimeter, circumference, and area, of all quadrilaterals, triangles, circles, and trapezoids				
STIII.9	calculate the surface area of a rectangular prism, a cylinder, and a pyramid				
STIII.10	understand and use formulas to compute the volume of prisms and cylinders				
STIII.11	estimate and compute the surface area and volume of complex shapes by breaking down to basic geometric shapes				
STIII.12	build models of a pyramid, cylinder, and cone, and explore calculating the volume				
STIII.13	identify elements of geometric figures: altitudes, diagonals, angle bisectors, perpendicular bisectors, central angles, radii, diameters, chords of circles				
STIII.14	construct elements of geometric figures altitudes, diagonals, angle bisectors, perpendicular bisectors, central angles, radii, diameters, chords of circles				
STIII.15	construct 2-dimensional patterns for 3-dimensional models e.g. cylinders, prisms, cones				
STIII.16	identify diagonals and height of 3-dimensional objects				
STIII.17	draw a transversal across two parallel lines and discover the relationship of the eight angles formed				
STIII.18	know and understand the Pythagorean theorem and its converse				
STIII.19	use the Pythagorean theorem to find the length of a missing side of a right triangle				
STIII.20	verify the Pythagorean theorem by measurement				

III. MEASUREMENT and GEOMETRY (Continued)

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: **A= 75% or more of the students B=about half C=fewer than 25%**	**Q 1**	**Q 2**	**Q 3**	**Q 4**
STIII.21	describe skew lines, planes				
STIII.22	describe how planes may intersect and show in real life				
STIII.23	demonstrate an understanding of congruency, when two figures are congruent				
STIII.24	identify lines of symmetry and angles of rotation in various geometric figures and in real life				
STIII.25	translate and reflect basic geometric figures on a grid				
STIII.26	construct and read drawings to a scale				
STIII.27	find area and perimeter of geometric figures that are placed on a grid				

Grade 7/8 Benchmark Proficiencies to Master

IV. STATISTICS, DATA ANALYSIS, and PROBABILITY

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STIV.1	know various ways to display data sets: box and whisker plot, stem and leaf plot, histogram				
STIV.2	know how to compute the minimum, lower quartile, median, upper quartile, maximum of a data set				
STIV.3	use a histogram, stem and leaf plot, box and whisker plat to display a data set				
STIV.4	represent ordered pairs on a scatter gram and describe any relationship that may exist between the two variables e.g. amount of food eaten and weight; time spent on homework and grade on a test				
STIV.5	collect and organize data and represent with a pictograph, bar graph, double bar graph, histogram, circle graph, line graph, tally chart, array, table, and scatter plot				
STIV.6	select and defend the most appropriate choice of representation				
STIV.7	develop and interpret frequency tables				
STIV.8	identify patterns, know trends, draw conclusions, and make predictions based on interpretations of collected data				
STIV.9	draw conclusions and make predictions based on data analysis and critique the conclusions and recommendations of others				
STIV.10	identify a direction, distance, and/or location using a political map containing a key, a scale, and a compass				
STIV.11	understand scale models and make scale drawings				

V. MATHEMATICAL REASONING

By the end of the Grade 7/8, students will be able to...

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STV.1	*understand how to approach a problem*				
	identifying relationships				
	distinguishing relevant from irrelevant information				
	identifying sequence of steps to be taken to solve a multi-step problem				
	prioritizing information				
	observing patterns				
	know how to break a problem into smaller parts				
STV.2	extend the application of previously learned strategies to solve multi-step problems (include: draw sketches, organize data in tables or graphs, or use algebraic equations, break the problem into simpler parts, or use non routine strategies)				
STV.3	use previously learned methods of deriving a solution to solve similar problems				
STV.4	formulate and explain conjectures based on a mathematical question or problem				
STV.5	understand the difference between inductive reasoning (make generalizations based on observations and patterns) and deductive reasoning (a conclusion that follows given premises				
STV.6	estimate unknown quantities graphically and solve by mathematical techniques e.g. how many "m and m's" are in a given jar?				
STV.7	use numbers, symbols, words, charts, lists, tables, models, diagrams to explain a problem				
STV.8	integrate concepts and techniques from different areas of mathematics				
STV.9	make sensible, reasonable estimates, validate and generalize the estimates				
STV.10	work cooperatively to apply strategies in problem solving situations				
STV.11	verify, justify, and interpret results of a problem				
STV.12	apply generalized solutions and strategies to new problems				
STV.13	identify needed and given information in a problem situation as well as irrelevant information				
STV.14	explain a solution logically and clearly using precise calculations and correct mathematical terms, language, and symbols				
STV.15	determine whether an exact or an approximate answer is required				
STV.16	give answers to specified degrees of accuracy				

VI. NCTM STANDARD
MATHEMATICAL CONNECTIONS

By the end of the Grade 7/8, students will be able to…

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STVI.1	write and spell correctly all vocabulary and expressions learned in math classes				
STVI.2	write and spell correctly numbers to 10,000 in order				
STVI.3	listen for mathematical ideas and words in literature				
STVI.4	explore and describe in words simple and complex patterns in nature, music, art, poetry, and science				
STVI.5	read, interpret, and construct all sorts of graphs, maps with legends and scales				
STVI.6	using a map, locate the approximate latitude and longitude coordinates of given cities				
	use a fraction or a scientific calculator to:				
STVI.7	find the cost of selected items (in dollars and cents)				
STVI.8	count by a fraction (ex: counting by eighth's)				
STVI.9	change fractions to decimals and vice versa				
STVI.10	find decimal patterns on a calculator				
STVI.11	simplify fractions on a calculator				
STVI.12	follow the order of operations on a fraction calculator				
STVI.13	perform operations with mixed numbers				
STVI.14	find the mean and median of a series of numbers				
STVI.15	change from fractions, to decimals, to percents				
STVI.16	explore adding, subtracting, multiplying, and dividing fractions				
	use a computer software programs to:				
STVI.17	draw shapes, patterns, pictures				
STVI.18	draw congruent 2-dimensional figures, using the copy and paste function of a computer drawing program				
STVI.19	copy and flip a figure to create a design that has a line of symmetry				
STVI.20	construct parallel, perpendicular, and intersecting lines				
STVI.21	graph and calculate data				
STVI.22	explore converting a vertical bar into a line graph, pictograph, histogram, scatter gram, circle graph, and horizontal bar				
STVI.23	explore calculating the mean, median, and mode of a series of numbers				
STVI.24	explore working with a data base or spreadsheet to organize and calculate sums, differences, products, quotients, and averages				
STVI.25	use a spread sheet format decimal data, find decimal equivalents for common fractions				
STVI.26	explore inserting a graph into a word processing report				

VII . NCTM STANDARD
MATHEMATICS AS COMMUNICATION

By the end of the Grade 7/8, students will be able to…

	Degree of mastery: A= 75% or more of the students B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
STVII.1	use mathematical language and representations with appropriate accuracy (include geometry and measurement representations and terms, numerical tables and equations, simple algebraic equations and formulas, charts, graphs, and diagrams)				
STVII.2	organize work, explain facets of a solution orally and in writing label drawings, and use other techniques to make meaning clear to the audience				
STVII.3	use mathematical language to make complex situations easier to understand				
STVII.4	show ideas or solutions in a variety of ways, including words, numbers, equations, symbols, pictures, charts, graphs, tables, diagrams, and by building with a variety of concrete materials				
STVII.5	explain strategies, show evidence used in solving problems, justify statements and defend work				
STVII.6	demonstrate understanding of concepts by explaining ideas not only to teachers but to fellow students or younger children				
STVII.7	use speech, writing, labeling, drawing, and other techniques to make meaning clear to others				
STVII.8	demonstrate comprehension of mathematics from reading assignments and from other sources				
STVII.9	think and talk about math using verbs such as: analyze solve, decide, evaluate, classify, create, predict, estimate, compare, plan, organize, collect, record, represent, interpret, investigate, construct, explore, present, persuade, demonstrate, explain, defend, consider, conduct, persist, simplify, conclude, research, envision, brainstorm, etc.				
STVII.10	read a problem carefully and restate or illustrate it without reference to the original problem				
STVII.11	present ideas appropriately, when instructed to respond to a particular audience or for a particular purpose				
STVII.12	set goals and plan to reach them				