

Grade 6 Benchmark Proficiencies to Master

I. NUMBER SENSE

By the end of the Grade 6, 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
	Integers				
STI.1	name, write, count, and order numbers up to billions				
STI.2	know $>$, \geq , $<$, \leq , $=$, \neq and use them appropriately when comparing numbers or writing number sentences up to 999,999,999				
STI.3	construct, read, and write numbers through 999,999,999 draw multi-digit numbers on a place value chart				
STI.4	identify the place value of a digit in a number counting up to nine digits				
STI.5	rewrite 9-digit numbers in standard, expanded, or word form when given one of the forms				
STI.6	use mental math to multiply and divide whole numbers and decimals by 10,100, or 1000				
STI.7	use mental math to square numbers up to 10				
STI.8	consistently and accurately add, subtract, and multiply large whole numbers.				
STI.9	explain the meaning of remainder in division problems				
STI.10	find a number that is 100 or 1000 less than a 5-digit or larger number.				
STI.11	know and use the divisibility rules for 2, 3, 4, 5, 6, 9, and 10.				
STI.12	from a list of numbers identify common multiples, common factors, the LCM and GCF of three given numbers.				
STI.13	select the most appropriate computation method: paper/pen, mental math, calculator, and give reason for method.				
STI.14	use a fraction or scientific calculator to compute and verify estimates and solutions and to solve problems				
STI.15	use prime numbers to identify LCM or GCF of three given numbers				
STI.16	find equivalent expressions that represent the inverse operation of a number sentence				
STI.17	use integers (zero, positive and negative natural numbers) in common situations				
STI.18	solve problems involving addition and subtraction of integers e.g. $-7 + 17 + 39 - 28$				
STI.19	solve problems involving multi-step addition and subtraction of integers e.g. $(-4) (6)$; $(-7/4) (3/-4)$				
STI.20	solve problems of multiplication and division involving integers e.g. $(-4) (6)$; $(-7/9) (3/-4)$				
STI.21	explore the idea of square and square root in the context of area of squares				

Grade 6 Benchmark Proficiencies

I. NUMBER SENSE (Continued)

By the end of the Grade 6, 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
	fractions and decimals				
STI.22	express squared or cubed numbers in standard, factored, or exponent form				
STI.23	give a solution sentence (write an equation) equivalent to a problem expressed in words				
STI.24	read and write Roman numerals I, V, X, L, C				
STI.25	explore how parts of a set can be labeled as fractions with denominators of 2, 3, 4, 5, 6, 8, , and 10				
STI.26	add, subtract, and multiply fractions with like and unlike denominators, and reduce to lowest term				
STI.27	use LCM to add fractions				
STI.28	use GCF to reduce fractions				
STI.29	explain the difference between prime and composite numbers, between GCF and LCM				
STI.30	compute the division of a whole number by a fraction/mixed number				
STI.31	interpret the remainder and write the remainder as a decimal or a fraction				
STI.32	compute the division of a fraction/mixed number by a whole number or a fraction/mixed number and reduce to the lowest terms				
STI.33	round fractions and mixed numbers to the nearer whole number				
STI.34	when solving problems, explain why a particular operation with fractions was used in a given situation				
STI.35	explain the meaning of multiplying and dividing fractions				
STI.36	Explain in own words the meaning of addition, subtraction, multiplication, division, fraction, decimal				
STI.37	identify and use equivalent fractions, decimals, and percents for halves, thirds, fourths, fifths, eighths, and tenths				
STI.38	interpret percent as part of 100 and as a means of comparing quantities of different sizes or changing sizes				
STI.39	convert decimals and percents into fractions from one to another				
STI.40	round to the nearer 1, 10, 100 , 1,000, 10,000, 100,000 or 10 th , 100 th , 1000 th , and 10,000 th place				
STI.41	divide a decimal by a whole number or a decimal				
STI.42	read, write, and order decimals up the 10,000ths place, and rewrite in standard, in fraction, in word, or in expanded form, given one of the forms				
STI.43	show that decimals are fractions with denominators of 10ths, 100ths, 1000ths, or 10,000ths				
STI.44	investigate relations between ratios, proportions, and percent				

Grade 6 Benchmark Proficiencies

I. NUMBER SENSE (Continued)

By the end of the Grade 6, 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
	fractions and decimals				
STI.45	make use of ratio, proportion, and percent in a wide variety of application				
STI.46	use proportions to solve problems e.g. if 15 students use 4 calculators, how many calculators are used by 90 students				
STI.47	know how to use cross multiplication as a method for solving proportions				
STI.48	explain the relationship between cross multiplication and multiplying both sides of an equation				
STI.49	compare and order decimals, mixed numbers, positive and negative numbers by placing them on a number line				
STI.50	solve percent problems involving discounts, interest earned, tips				
	money				
STI.51	read and write money amounts up to \$ 100,000,000				
STI.52	determine the coins and bills which represent a given amount of money (to \$100)				
STI.53	assemble coins and bills to represent a given amount up to \$10,000				
STI.54	handle and identify all coins, including half dollars				
STI.55	make change for purchases for less than \$1000				
STI.56	determine when to overestimate or underestimate				
STI.57	read and write checks				
STI.58	estimate the value of a given collection of monies and the expected amount of change				

Grade 6 Benchmark Proficiencies to Master

II. ALGEBRA and FUNCTIONS

By the end of the Grade 6, 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.1	use variables to stand for a given number or amount				
STII.2	write and solve simple linear equations e.g. $8y - 4 = 14$ $y = ?$				
STII.3	write and evaluate algebraic expressions using up to three variables e.g. Maria is twice as old as Jose; Jose is two years older than Pedro. Pedro is 5 years old, how old is Maria?				
STII.4	evaluate expressions using order of operations:				
STII.5	commutative, associative, distributive, and identity properties				
STII.6	be able to justify each step when using the properties to solve equations				
STII.7	convert one unit of measurement to another (ft. to inches) or use formulas for conversions e.g. centigrade $\times 9 = (\text{Fahrenheit} - 32) \times 5$				
STII.8	explore the meaning of rate (rate is a measure of one quantity per unit value of another quantity) e.g. Maria travels 3 miles in 10 minutes, how far does he travel in one hour;. Juan types 8 words in 5 seconds, how many words does he type in 5 minutes				
STII.9	solve problems involving distance, time, average speed, rate				
STII.10	use variables in the following formulas describing geometric quantities $p=2w + 2l$; $c=2r$; $a=_bh$ e.g. if the length of a rectangle is twice its width, find the perimeter of the rectangle and express the answer in terms of width				

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III. MEASUREMENT and GEOMETRY

By the end of the Grade 6, 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	find time equivalencies: second, minute, hour, day, week, month, year, decade, century, mellenium				
STIII.2	explore time across time zones and discuss the impact on real life situations				
STIII.3	estimate the length, weight, capacity, and temperature of given objects in customary and metric units				
STIII.4	work with equivalent measure in customary and metric units of length, weight, capacity, and temperature				
STIII.5	estimate and add, subtract, multiply, or divide measures and rename when appropriate				
STIII.6	convert freely between like measuring systems (customary and metric)				
STIII.7	draw and identify points, lines, line segments, rays, and angles and squares				
STIII.8	describe and explain the similarities and differences among parallel, intersecting, and perpendicular lines				
STIII.9	classify all quadrilaterals and discuss real life examples				
STIII.10	classify and describe triangles by their sides and angles				
STIII.11	draw quadrilaterals from given information e.g. a quadrilateral with equal sides				
STIII.12	draw triangles from given information e.g. a right triangle; a right isosceles triangle				
STIII.13	calculate the perimeter of quadrilaterals using standard units of measurement				
STIII.14	given an area or a perimeter, draw various shapes				
STIII.15	use formulas to find the perimeter and the area of parallelograms, rectangles, squares, and triangles				
STIII.16	draw and identify the center, radius, and diameter of a circle				
STIII.17	explain the meaning of pi and know the common equivalencies: 3.14 or 22/7				
STIII.18	explore the relationship between the diameter of a circle and its circumference				
STIII.19	discover and use the formula for calculating the area of a circle				
STIII.20	discover and use the formula for calculating circumference of a circle				
STIII.21	using estimates for π , calculate the circumference and compare with actual measurements				
STIII.22	explore strategies for calculating the surface area of pyramids, including cubes, and record the answer in square units				
STIII.23	know and use formulas for volume of triangular prisms				
STIII.24	know and use formulas for volumes of cylinders				

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III. MEASUREMENT and GEOMETRY (Continued)

By the end of the Grade 6, 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.25	explain the similarity of the volume of triangular prisms and rectangular prisms				
STIII.26	build models of 3-dimensional figures found in real life				
STIII.27	construct a circle with a given center and a given radius, or a given diameter				
STIII.28	identify a direction, the distance, and/or location using a political map containing a key, a scale, and a compass				
STIII.29	identify and construct parallel, intersecting, and perpendicular lines				
STIII.30	identify lines of symmetry in various geometric figures and in real life				
STIII.31	identify, match, and create congruent and similar figures, such as triangles, squares, rectangles, and octagons, using graph paper, patterns, and geoboards				
STIII.32	explore the relationship between doubling the size of a square and other regular polygons, and the corresponding increase in area				
STIII.33	estimate angles and use a protractor to verify estimate				
STIII.34	know the sum of the measures of the interior angles of all quadrilaterals and triangles				
STIII.35	identify vertical, adjacent, complementary and supplementary angles				
STIII.36	describe vertical, adjacent, complementary and supplementary angles				
STIII.37	use the properties of complementary and supplementary angles to solve problems				
STIII.38	match 3-dimensional figures that have the same shape and same size, <i>and</i> that have the same shape but are a different size				
STIII.39	construct scale drawing				
STIII.40	identify geometric patterns and position of objects involving rotation, translation, or reflection				
STIII.41	explore patterns that result from combinations of reflections, rotations, or translations of geometric figures				

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IV. STATISTICS, DATA ANALYSIS, and PROBABILITY

By the end of the Grade 6, 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	collect and organize data and represent with a pictograph, bar graph, histogram, circle graph, line graph, tally chart, array, table				
STIV.2	read and interpret the data in a variety of charts to identify patterns, know trends, draw conclusions, and make predictions				
STIV.3	draw conclusions and make recommendations based on data analysis and critique the conclusions and recommendations of others				
STIV.4	compute the mean, median, mode, and range of a set of numbers				
STIV.5	understand changes in the mean, median, and mode when the data changes				
STIV.6	understand changes in mean, median, mode when outliers are included or excluded				
STIV.7	know whether to use mean, mode, or median to a specific situation or problem				
STIV.8	construct scale drawings				
STIV.9	identify different ways of taking a sample (random, responses to a survey, convenience) and decide which method is best suited to a given problem				
STIV.10	compare different samples of a given population with the entire population and decide situations when the sample should be used e.g. height of trees in a forest				
STIV.11	identify data with sampling errors, and explain why the sample (or the diagram) is biased or in error				
STIV.12	analyze statistical data, identify the conclusion, and in sample cases, verify the results				
STIV.13	analyze data diagrams or charts and explain why the way a question was asked could influence the results, or why the way the results were presented, could influence the conclusions				
STIV.14	investigate, display, and record all possible arrangements of given data or a given set of events				
STIV.15	design and take a simple survey, record findings, discuss outcomes, and draw conclusions				
STIV.16	predict outcomes using combinations and permutations, and explain actual outcomes				
STIV.17	express the probability of simple events; e.g. getting an even number when tossing a die				
STIV.18	express the probability of compound events; e.g. the probability of tossing 2 coins and getting exactly 2 heads				
STIV.19	represent outcomes for compound events using tables, grids, tree diagrams				

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IV. STATISTICS, DATA ANALYSIS, and PROBABILITY (Continued)

By the end of the Grade 6, 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.20	understand when the probability of disjoint events is the sum of the probabilities, and when the probability of one event followed by another is the product of probabilities e.g. if a coin and a die are tossed, what is the probability of a tail followed by a six e.g. if a die is tossed what is the probability of getting a 6 or an odd number				
STIV.21	understand the difference between dependent and independent events e.g. find the probability of drawing a jack or a red card from a deck of cards e.g. find the probability of drawing a jack or a ten from a deck of cards				
STIV.22	estimate future events (number of car accidents in a city) using data of previous information				
STIV.23	represent probabilities as ratios, proportions, decimals and percents				
STIV.24	verify the reasonableness of the probabilities computed				
STIV.25	know that if p is the probability of an event, occurring, then 1-p is the probability of an event not occurring				

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V. MATHEMATICAL REASONING

By the end of the Grade 6, 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				
STV.2	read a problem carefully and restate or illustrate it without reference to the original problem				
STV.3	expand the repertoire of notations and methods for symbolizing a problem statement and the solution process				
STV.4	extend the application of previously learned strategies to solve multi-step problems, to include drawing sketches, organizing data in tables or graphs, or using algebraic equations, breaking the problem into simpler parts, or using non routine strategies				
STV.5	use numbers, symbols, words, charts, lists, tables, models, diagrams to explain a problem				
STV.6	integrate concepts and techniques from different areas of mathematics				
STV.7	know how to break a problem into simpler parts				
STV.8	make sensible, reasonable estimates, validate and generalize the estimates from the context of the problem				
STV.9	estimate unknown quantities graphically, and solve by arithmetic or algebraic techniques e.g. how many beans are in a jar				
STV.10	work cooperatively to apply strategies in problem solving situations				
STV.11	verify, justify, and interpret results of a problem				
STV.12	explain a solution logically and clearly, using precise calculations and correct mathematical terms, language and symbols				
STV.13	determine whether an exact or approximate answer is required				
STV.14	give answers to a specified degree of accuracy				
STV.15	use previous methods of deriving a solution to solve similar problems				
STV.16	generalize solutions and strategies to new problems				
STV.17	formulate and explain conjectures based on a mathematical question or problem				
STV.18	know when estimating is appropriate/is not appropriate				
STV.19	explain the reasonableness of estimated quantities				

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**VI. NCTM STANDARD
MATHEMATICAL CONNECTIONS**

By the end of the Grade 6, 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				
	use a fraction or a scientific calculator to:				
STVI.5.	find the cost of selected items (in dollars and cents)				
STVI.6.	count by a fraction (ex: counting by eighth's)				
STVI.7.	change fractions to decimals and vice versa				
STVI.8.	find decimal patterns on a calculator				
STVI.9.	explore simplifying fractions on a calculator				
STVI.10.	explore following the order of operations on a fraction calculator				
STVI.11.	explore performing operations with mixed numbers				
STVI.12.	find the mean and median of a series of number				
STVI.13.	explore changing from fractions, to decimals, to percents				
	use a computer and drawing program to:				
STVI.14.	draw shapes, patterns, pictures				
STVI.15.	draw congruent 2-dimensional figures, using the copy and paste function of a computer drawing program				
STVI.16.	copy and flip a figure to create a design that has a line of symmetry				
	use a computer software program or a graphic calculator to:				
STVI.17.	calculate and graph data				
STVI.18.	explore converting a vertical bar into a line graph, pictograph, histogram, scatter gram, circle graph, and horizontal bar				
STVI.19.	explore calculating the mean, median, and mode of a series of numbers				
STVI.20.	explore working with a data base or spreadsheet to organize and calculate sums, differences, products, quotients, and averages				
STVI.21.	explore inserting a graph into a word processing report				
STVI.22.	explain the reasonableness of estimated quantities				

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**VII . NCTM STANDARD
MATHEMATICS AS COMMUNICATION**

By the end of the Grade 6, 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.	understand oral and written directions for appropriate mathematical activities				
STVII.2.	think and talk about math using <i>verbs</i> 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.3.	verbalize mathematical thinking and explain activities				
STVII.4.	explain reasoning and solutions not only to teachers, but also to peers and younger students				
STVII.5.	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.6.	explain strategies and show evidence used in solving problems				
STVII.7.	explain the reasonableness of estimated quantities				
STVII.8.	present ideas appropriately, when instructed to respond to a particular audience or for a particular purpose				
STVII.9.	set goals and plan to reach them				