

This list follows the Secondary 1 Panoramath program

Unit #	Section Title	Specifics Lessons	Game Link (Description)
1.1 Digits & Numbers	Numeration System	-Place value	http://www.math-play.com/Place-Value-Millionaire/place-value-millionaire.html
		-Base-ten system	
	Reading & Writing Numbers	- Expanded form	http://www.free-training-tutorial.com/place-value-games.html#3digits
	Number Order	-Number lines	http://www.brainpop.com/games/battleshipnumberline/
		-“Less than” and “Greater than”	http://www.mathwire.com/games/contig.pdf (dice game and students order the numbers they roll)
1.2 It Just Comes Naturally!	Addition & Subtraction	-Sum	http://www.math-play.com/math-racing-subtracting-integers-game/math-racing-subtracting-integers-game.html (adding and subtracting integers)
		-Difference	
	Properties of Addition	-Commutativity	
		-Associativity	
		-Identity Element	http://www.interdidactica.info/index.php?lan=en&game=mt001
	Mental Computation Strategies	-Decomposing	http://www.math-play.com/The-24-Game/The-24-Game.html
		-Compensating	
		-other properties	http://www.math-play.com/rational-and-irrational-numbers-game/rational-and-irrational-numbers-game.html
1.3 Eating Well, Sharing Well	Multiplication & Division	-Product	http://www.missmaggie.org/scholastic/roundtheworld_eng_launcher.html multiplication game
		-Quotient	
	Properties of Multiplication and Mental Computation	-Communativity	
		-Assosiativity	
		-Identity Element	
		-Zero product	
		-Distributivity	
	Different Types of Quotients	-Integer	http://www.math-play.com/multiplying-and-dividing-integers-game.html
		-Mixed	
		-Decimal	
1.4 For Greater Precision	Estimation	-Estimation	- http://mrnussbaum.com/sal-play
	Rounding	-Rounding	https://www.youtube.com/watch?v=3afU6JQG15I
	Mental	-Rounding	http://www.softschools.com/mathg.jsp

	Computation Strategies		
		-Using representative numbers	
		-Compatible	
1.5 A Population With Greater Variability	Census, Population and Variables	-Statistics	
		-Census	http://www.coolmath.com/reference/math-dictionary-D.html Online math dictionary
		-Population	
		-Variable	
		-Qualitative	
		-Quantitative	
	Range	-Range	
	Tables	-Features of tables	
	Bar Graphs and Broken-Line Graphs	-Features	http://nces.ed.gov/nceskids/createagraph/default.aspx http://shodor.org/interactivate/activities/BarGraph/
		-Uses of each	http://www.mcwdn.org/Graphs/BarGraphQuiz.html
	Circle Graph	-Features & uses	http://www.mcwdn.org/Graphs/CircleGraph.html
2.1 Top Right	Exponential Notation	-Base, power, exponent	- http://www.mathgametime.com/games/otter-rush-exponents-game - http://www.ezschool.com/Games/Math/exponents/Exponents.html - http://www.xpmath.com/forums/arcade.php?do=play&gameid=95
		-Exponents 2 and 3	- http://www.math-play.com/square-root-game.html (Square Roots) - http://www.crctlessons.com/Perfect-Squares/perfect-squares-game.html (Perfect Squares)
		-Exponents 0 and 1	
2.2 Division Without Remainder	Properties of Divisibility	-Properties of 2 through 25	- http://www.math-play.com/Factors-Millionaire/Factors-Millionaire.html - http://www.mathslice.com/ol_dvsbl.php
	Prime and Composite Numbers	-Prime and composite #s	- http://www.mathnook.com/math/skill/primecompositegames.php (Various games) - http://www.sheppardsoftware.com/mathgames/numbers/fruit_shoot_prime.htm -
	Factorization	-Factorization	http://www.hoodamath.com/mobile/games/flappyfactors.html (Fly the bird through the factor)
		-Prime factorization	- http://www.mathplayground.com/factortrees.html -
2.3 What Do They Have in Common?	Common Divisors and Common Multiples	-Greatest common divisor (GCD)	- http://www.mathplayground.com/factortrees.html - http://www.fun4thebrain.com/beyondfacts.html
		-Lowest common multiple (LCM)	- http://www.mathplayground.com/factortrees.html - http://www.fun4thebrain.com/beyondfacts.html
		GCD & LCM diagram	- http://www.softschools.com/math/factors/greatest_common_factor/gcf_with_ven_n_diagram/ - http://www.softschools.com/math/factors/least_common_multiples/lcm_with_ven

			n_diagram/
2.4 To Avoid Any Confusion	Order of Operations	-BEDMAS	- http://www.math-play.com/Order-of-Operations-Millionaire/order-of-operations-millionaire.html - http://mrnussbaum.com/orderops-play/ - http://www.mathplayground.com/order_of_operations.html
	Sequence of Operations	-Writing a single expression	- http://www.math-play.com/Algebraic-Expressions-Millionaire/algebraic-expressions-millionaire.html
	Average	-Calculating average	- http://www.kidsmathgamesonline.com/numbers/meanmedianmode.html (Mean, Median, Mode)
3.1 More or Less	Integers	-Positive integers	http://www.hoodamath.com/games/integer.html (Section of games on Integers)
		-Negative integers	http://www.math-play.com/Integers-Jeopardy/Integers-Jeopardy.html
		-Opposite numbers	https://www.sheppardsoftware.com/mathgames/integers/FS_Integer_subtraction.htm
	Order	-Number lines	http://www.funbrain.com/brain/MathBrain/MathBrain.html
3.2 A Good Plan	Cartesian Plane	-Cartesian Plane	http://www.mathplayground.com/locate_aliens.html
		-Origin	
		-Quadrants	http://www.hoodamath.com/games/graphinggala.html
		-Coordinates	http://www.ixl.com/math/grade-8/coordinate-graphs-as-maps http://www.flashymaths.co.uk/swf/alien.swf
		-Axes (x and y)	
3.3 Opposites Attract	Addition & Subtraction	-Addition of integers	http://www.arcademics.com/games/orbit-integers/orbit-integers.html http://www.xpmath.com/forums/arcade.php?do=play&gameid=82
		-Subtraction of integers	http://www.arcademics.com/games/orbit-integers/orbit-integers.html http://www.xpmath.com/forums/arcade.php?do=play&gameid=82
3.4 A History of Signs	Multiplication & Division	-Rules	http://www.arcademics.com/games/integer-warp/integer-warp.html
	Exponentiation	-Exponents	http://www.math-play.com/Exponents-Jeopardy/Exponents-Jeopardy.html
4.1 Going in Circles	Edges	Lines, Rays, Segments etc	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/line_shoot.htm
	Angle	-Side	
		-Vertex	
		-Arc	
		-Angle	- http://jmathpage.com/JIMSGeometryangles.html (Various Games) - http://www.mathplayground.com/alienangles.html - http://www.what2learn.com/angles-in-circles-game/
		-Acute, Obtuse, Right etc.	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/triangles_shoot.htm
	Rotation	-Geometric transformation	http://www2.smarttutor.com/player/swf/Geometry_Transformations_L4_V1_T3a.swf
		-Centre, angle, direction etc.	
		-Congruent figures	http://www.xpmath.com/forums/arcade.php?do=play&gameid=84
4.2 In a Straight Line	Parallel Lines	-Notation	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/line_shoot.htm

	Translation	- Geometric transformation	http://www2.smarttutor.com/player/swf/Geometry_Transformations_L4_V1_T3a.swf
		-Slope, direction, length	
4.3 When You Really Think About It	Perpendicular Lines	-Perpendicular	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/line_shoot.htm
		-Right angle	
	Reflection	-Geometric transformation	
		-line of reflection	- http://www.primaryresources.co.uk/online/reflection.swf - http://www.innovationslearning.co.uk/subjects/maths/activities/year3/symmetry/s_hape_game.asp
		-Perpendicular	
		-Midpoint	
	Symmetrical Figures	-Symmetry	- http://www.innovationslearning.co.uk/subjects/maths/activities/year3/symmetry/s_hape_game.asp
	Perpendicular Bisector	-Axis of symmetry of the segment	
	Angle Bisector	-Axis of symmetry of the segment	
4.4 From Every Angle	Sum of the Measures of the Interior Angles of a Triangle	-180 degrees	- http://www.math-play.com/Angles-Jeopardy/Angles-Jeopardy.html - http://www.what2learn.com/home/examgames/maths/angles1/
	Complementary and Supplementary Angles	-Complementary angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
		-Supplementary angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
	Transversal Lines	-Vertically opposite angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
	Alternate Interior Angles	- Alternate interior angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
	Alternate Exterior Angles	-Alternate exterior angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
	Corresponding Angles	-Congruent angles	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.what2learn.com/home/examgames/maths/angles2/
5.1 In Whole or in Part	Fractions	-Fraction Sense	http://www.math-play.com/Fractions-Jeopardy/fractions-jeopardy.html http://illuminations.nctm.org/Activity.aspx?id=4148
		-Reducing	
	Percentage	-Denominator 100	http://www.ictgames.com/equivalence.html
	Mixed Numbers	-Mixed to Fractions	
		-Fractions to	

		Mixed	
	Equivalent Fractions	-Fraction Strips	
5.2 Can They Be Compared	Comparing Fractions	-Ordering	http://www.pearsonschool.com/live/images/custom/envisionmath_ca/games/dragon17.swf
	Common Denominators	-Common denominators	
		-LCM	
5.3 One Thing's For Sure...It's Impossible	Random Experiment	-Random	http://www.math-play.com/Probability-Game.html
		-Chance	http://www.harcourtschool.com/activity/probability_circus/
	Enumerating	-Tree Diagram	
	Experimental Probability	-Experimental probability equation	http://www.subtangent.com/maths/coindice.php
	Theoretical Probability	-Theoretical probability equation	http://www.glencoe.com/sites/common_assets/mathematics/im1/concepts_in_motion/interactive_labs/M3_10/M3_10_dev_100.html
	Events	-Subset	
		-Elementary (single outcome)	http://studyjams.scholastic.com/studyjams/jams/math/probability/probability-fraction.htm
	Types of Events	-Impossible	
		-Probable	
		-Certain	
5.4 A One-in-a-100 Chance	Addition & Subtraction of Fractions	-Common Denominator	http://www.math-play.com/adding-and-subtracting-fractions-game.html - http://www.mathplayground.com/ASB_Speedway.html
		-LCM	
	Probability of an Event	-Probability equation	
5.5 Half a quarter	Multiplication	-Multiplication of fractions	
	Reduction of Fractions	-Simplifying fractions	
	Percentage of a Number	-Percentage of a number	http://www.math-play.com/changing-fractions-to-percents.html
5.6 Head or Tails	Random Experiment	-Product of Probabilities	
5.7 Inverting to Divide	Reciprocal of a Fraction	-Reciprocals	- http://primarygamesarena.com/Fractions-Activity3120
	Integer Exponents	-Negative exponents	- http://www.mangahigh.com/en-us/math_games/number/exponents/negative_exponents
	Division	-Division of fractions	
6.1 Another Form of	Decimal Notation	-Decimals as fractions	- http://mrnussbaum.com/death-decimals/

Notation			
	Decimal Fraction	-Denominator of power of 10	
	Place Value	-Place Value	- http://www.math-play.com/football-math-decimals-place-value/football-math-decimals-place-value.html
	Order	-Ordering decimals	- http://www.sheppardsoftware.com/mathgames/decimals/CompareDecimals.htm - http://www.sheppardsoftware.com/mathgames/decimals/BalloonPopDecimals1.htm
	Converting Forms	-Fraction to decimal	- http://mrnussbaum.com/death-decimals/ - http://www.math-play.com/Changing-Fractions-and-Decimals-to-Percents/changing-fractions-and-decimals-to-percents-millionaire.html - http://www.arcademics.com/games/puppy-chase/puppy-chase.html
		-Decimal to fractions	- http://mrnussbaum.com/death-decimals/ - http://www.math-play.com/Changing-Fractions-and-Decimals-to-Percents/changing-fractions-and-decimals-to-percents-millionaire.html - http://www.arcademics.com/games/puppy-chase/puppy-chase.html
		-Decimal to percent	http://www.xpmath.com/forums/arcade.php?do=play&gameid=32 - http://www.math-play.com/Changing-Fractions-and-Decimals-to-Percents/changing-fractions-and-decimals-to-percents-millionaire.html
		-Percent to decimal	http://www.xpmath.com/forums/arcade.php?do=play&gameid=30 - http://www.math-play.com/Changing-Fractions-and-Decimals-to-Percents/changing-fractions-and-decimals-to-percents-millionaire.html
		-Percent to fraction	- http://www.math-play.com/Changing-Fractions-and-Decimals-to-Percents/changing-fractions-and-decimals-to-percents-millionaire.html - http://www.math-play.com/changing-fractions-to-percents.html
6.2 What's the Point	Addition & Subtraction	-Adding decimals	- http://www.math-play.com/adding-decimals-game.html http://www.arcademics.com/games/hungry-puppies/hungry-puppies.html
		-Subtracting decimals	- http://www.math-play.com/subtracting-decimals-game.html
6.3 Another Way of Doing Things	Multiplication	-Multiplying decimals	- http://www.math-play.com/multiplying-decimals-game.html
	Properties of Division	-Properties of division	
	Division	-Division of decimals	
6.4 An Effective System	Geometry (International System of Units) (SI)	-Metres as base unit	- http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm - http://www.sheppardsoftware.com/mathgames/measurement/MeasurementMeters.htm - http://www.mangahigh.com/en/maths_games/shape/units_of_measurement/metric_units

	Relationships Between SI Units of Length	-Base-10 system	
	Multiplication by Power of 10 Greater or Less Than 1	-Multiplication by power of 10 greater or less than 1	
	Division by Power of 10 Greater or Less Than 1	-Division by power of 10 greater or less than 1	
7.1 And Next	Numerical Series	-Term	
		-Rank	
	Patterns	-Patterning	http://www.coolschool.ca/samples/avalanche.swf
	Types of Representations	-In words	
		-Drawings	
		-Table of values	
		-Graph	
	Arithmetic Progressions	-2nd degree differences	
7.2 Follow the Rules	Rules of a Series	-Variable	
		-Rules of a series	http://hotmath.com/hotmath_help/games/kp/kp_hotmath_sound.swf
		-Algebraic expressions (intro)	- http://www.math-play.com/Evaluating-Expressions-Basketball-Game/Evaluating-Expressions-Basketball-Game.html
	Rule of Arithmetic Progression	-Common difference	http://www.coolschool.ca/samples/avalanche.swf
	Numerical Value of an Algebraic Expression	-Numerical value of an algebraic expression	
7.3 Get in Rank	Equations	-Solving algebraic equations	- http://www.mathplayground.com/XDetectives/XDetectives.html - http://www.math-play.com/soccer-math-one-step-equations-game/one-step-equations-game.html - http://www.math-play.com/One-Step-Equation-Game.html - http://www.math-play.com/equation-word-search/equation-word-search.html - http://www.mangahigh.com/en-us/games/algebrameltdown
	Solving Equations Using Trial-and-Error	-Trial & error	http://hotmath.com/hotmath_help/games/kp/kp_hotmath_sound.swf
	Solving Equations Using the Inverse-Operations Method	-Inverse operations	

8.1 Under Every Angle	Polygon	-Polygon	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/PolygonShapesShoot.htm
		-Sides	
		-Vertex	
		-Interior angle	
		-Regular polygon	
		-Convex polygon	
	Sum of the Measures of the Interior Angle of - a Triangle	-180 degrees	- http://www.what2learn.com/home/examgames/maths/angles1/ - http://www.mangahigh.com/en/maths_games/shape/understanding_properties_of_shape/the_angles_inside_a_triangle
	Classification of Triangles	-Types of triangles	- http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/triangles_shoot.htm
	Perimeter	-Perimeter of polygon	
	Median	-Median of a triangle	
		-Centre of gravity	
8.2 In All Four Corners	Quadrilateral	-Quadrilateral (4 sides)	- http://www.xpmath.com/forums/arcade.php?do=play&gameid=84 - http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/QuadShapesShoot.htm
		-Diagonal	
		-Properties of quadrilaterals	- http://teams.lacoe.edu/documentation/classrooms/amy/geometry/6-8/activities/quad_quest/quad_quest.html - http://www.mangahigh.com/en/maths_games/shape/quadrilaterals/recognise_quadrilaterals
	Sum of the Measures of the Interior Angles of a Quadrilateral	-360 degrees	- http://www.softschools.com/math/geometry/quadrilaterals/quadrilateral_angles/
	Properties of Convex Quadrilaterals	-Properties of convex quadrilaterals	
8.3 Being in Shape	Classification of Polygons	-Types of polygons	- http://www.math-play.com/types-of-polygons.html - http://www.softschools.com/math/geometry/polygons/regular_polygons/ - http://www.mathcats.com/explore/polygonplayground.html
	Sum of the Measures of the Interior Angles of a Polygon	-Sum of measures equation	
	Exterior Angles of a Convex Polygon	- Exterior angles of a convex polygon	
Other Sources			
2-D Measurement	Perimeter	2-D shapes	http://www.funbrain.com/cgi-bin/poly.cgi -

			http://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/PerimeterShapesShoot.htm
	Area	Square	- http://www.mangahigh.com/en/mathsgames/shape/length_area_and_volume/area_of_quadrilaterals
		Rectangle	- http://www.mangahigh.com/en/mathsgames/shape/length_area_and_volume/area_of_quadrilaterals
		Parrallelogram	- http://www.mangahigh.com/en/mathsgames/shape/length_area_and_volume/area_of_quadrilaterals
		Triangle	- http://www.mangahigh.com/en/mathsgames/shape/length_area_and_volume/area_of_a_triangle
		Trapezoid	- http://www.mangahigh.com/en/mathsgames/shape/length_area_and_volume/area_of_quadrilaterals
		Complex Shapes	