ASOL MATHEMATICS SCOPE AND SEQUENCE MATRIX: GRADE 7

***MATHEMATICS* ASOL SUMMARY MATRIX** **Based on the 2009 *Mathematics* Standards of Learning**							
Reporting Category	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**High School**
Number, Number Sense, Computation and Estimation	3M-NSCE 1 3M-NSCE 2 3M-NSCE 3 3M-NSCE 4 3M-NSCE 5 3M-NSCE 6 3M-NSCE 7	4M-NSCE 1 4M-NSCE 2 4M-NSCE 3 4M-NSCE 4 4M-NSCE 5	5M-NSCE 1 5M-NSCE 2 5M-NSCE 3 5M-NSCE 4	6M-NSCE 1 6M-NSCE 2 6M-NSCE 3 6M-NSCE 4 6M-NSCE 5	7M-NSCE 1 7M-NSCE 2 7M-NSCE 3	8M-NSCE 1 8M-NSCE 2 8M-NSCE 3	
Measurement and Geometry	3M-MG 1 3M-MG 2 3M-MG 3 3M-MG 4	4M-MG 1 4M-MG 2 4M-MG 3	5M-MG 1	6M-MG 1	7M-MG 1 7M-MG 2	8M-MG 1 8M-MG 2 8M-MG 3	
Probability, Statistics, Patterns, Functions, and Algebra	3M-PSPFA 1 3M-PSPFA 2 3M-PSPFA 3	4M-PSPFA 1	5M-PSPFA 1 5M-PSPFA 2	6M-PSPFA 1 6M-PSPFA 2 6M-PSPFA 3	7M-PSPFA 1 7M-PSPFA 2 7M-PSPFA 3	8M-PSPFA 1 8M-PSPFA 2 8M-PSPFA 3 8M-PSPFA 4	
Expressions and Operations							HSM-EO 1 HSM-EO 2
Equations and Inequalities							HSM-EI 1 HSM-EI 2 HSM-EI 3
Functions and Statistics							HSM-FS 1 HSM-FS 2 HSM-FS 3 HSM-FS 4

REPORTING CATEGORIES	GRADE 7 ASOL BLUEPRINT	UNDERSTANDING THE STANDARD
Number, Number Sense, Computation and Estimation	7M-NSCE 1 (SOL 7.1)	• Negative exponents for powers of 10 are used to represent numbers between 0 and 1. (e.g., $10^{-3} = \frac{1}{10^3} = 0.001$). • Negative exponents for powers of 10 can be investigated through patterns such as: $10^2 = 100$, $10^1 = 10$, $10^0 = 1$, $10^{-1} = \frac{1}{10^1} = \frac{1}{10} = 0.1$ • A number followed by a percent symbol (%) is equivalent to that number with a denominator of 100 (e.g., $\frac{3}{5} = \frac{60}{100} = 0.60 = 60\%$). • Scientific notation is used to represent very large or very small numbers. • A number written in scientific notation is the product of two factors — a decimal greater than or equal to 1 but less than 10, and a power of 10 (e.g., $3.1 \times 10^5 = 310{,}000$ and $2.85 \times 10^{-4} = 0.000285$). • Equivalent relationships among fractions, decimals, and percents can be determined by using manipulatives (e.g., fraction bars, Base-10 blocks, fraction circles, graph paper, number lines and calculators). • A square root of a number is a number which, when multiplied by itself, produces the given number (e.g., $\sqrt{121}$ is 11 since 11 x 11 = 121). • The square root of a number can be represented geometrically as the length of a side of the square. • The absolute value of a number is the distance from 0 on the number line regardless of direction. (e.g., $\left\|\frac{-1}{2}\right\| = \frac{1}{2}$).
	7M-NSCE 2 (SOL 7.3)	• The set of integers is the set of whole numbers and their opposites (e.g., ….–3, –2, –1, 0, 1, 2, 3, …). • Integers are used in practical situations, such as temperature changes (above/below zero), balance in a checking account (deposits/withdrawals), and changes in altitude (above/below sea level). • Concrete experiences in formulating rules for adding and subtracting integers should be explored by examining patterns using calculators, along a number line and using manipulatives, such as two-color counters, or by using algebra tiles. • Concrete experiences in formulating rules for multiplying and dividing integers should be explored by examining patterns with calculators, along a number line and using manipulatives, such as two-color counters, or by using algebra tiles.
	7M-NSCE 3 (SOL 7.4)	• A proportion is a statement of equality between two ratios. • A proportion can be written as $\frac{a}{b} = \frac{c}{d}$, $a:b = c:d$, or a is to b as c is to d. • A proportion can be solved by finding the product of the means and the product of the extremes. For example, in the proportion $a:b = c:d$, a and d are the extremes and b and c are the means. If values are substituted for a, b, c, and d such

		as 5:12 = 10:24, then the product of extremes (5×24) is equal to the product of the means (12×10). • In a proportional situation, both quantities increase or decrease together. • In a proportional situation, two quantities increase multiplicatively. Both are multiplied by the same factor. • A proportion can be solved by finding equivalent fractions. • A rate is a ratio that compares two quantities measured in different units. A unit rate is a rate with a denominator of 1. Examples of rates include miles/hour and revolutions/minute. • Proportions are used in everyday contexts, such as speed, recipe conversions, scale drawings, map reading, reducing and enlarging, comparison shopping, and monetary conversions. • Proportions can be used to convert between measurement systems. For example: if 2 inches is about 5 cm, how many inches are in 16 cm? – $\frac{2inches}{x} = \frac{5cm}{16cm}$. • A percent is a special ratio in which the denominator is 100. • Proportions can be used to represent percent problems as follows: – $\frac{percent}{100} = \frac{part}{whole}$
Measurement and Geometry	7M-MG 1 (SOL 7.5)	• The area of a rectangle is computed by multiplying the lengths of two adjacent sides. • The area of a circle is computed by squaring the radius and multiplying that product by π ($A = \pi r^2$, where $\pi \approx 3.14$ or $\frac{22}{7}$). • A rectangular prism can be represented on a flat surface as a net that contains six rectangles — two that have measures of the length and width of the base, two others that have measures of the length and height, and two others that have measures of the width and height. The surface area of a rectangular prism is the sum of the areas of all six faces ($SA = 2lw + 2lh + 2wh$). • A cylinder can be represented on a flat surface as a net that contains two circles (bases for the cylinder) and one rectangular region whose length is the circumference of the circular base and whose width is the height of the cylinder. The surface area of the cylinder is the area of the two circles and the rectangle ($SA = 2\pi r^2 + 2\pi rh$). • The volume of a rectangular prism is computed by multiplying the area of the base, B, (length times width) by the height of the prism ($V = lwh = Bh$). • The volume of a cylinder is computed by multiplying the area of the base, B, (πr^2) by the height of the cylinder ($V = \pi r^2 h = Bh$). • There is a direct relationship between changing one measured attribute of a rectangular prism by a scale factor and its volume. For example, doubling the length of a prism will double its volume. This direct relationship does not hold true for surface area.
	7M-MG 2 (SOL 7.8)	• A rotation of a geometric figure is a turn of the figure around a fixed point. The point may or may not be on the figure. The fixed point is called the *center of rotation*. • A translation of a geometric figure is a slide of the figure in which all the points on the figure move the same distance in the same direction.

		• A reflection is a transformation that reflects a figure across a line in the plane. • A dilation of a geometric figure is a transformation that changes the size of a figure by scale factor to create a similar figure. The image of a polygon is the resulting polygon after the transformation. The preimage is the polygon before the transformation. • A transformation of preimage point A can be denoted as the image A' (read as "A prime").
Probability, Statistics, Patterns, Functions, and Algebra	7M-PSPFA 1 (SOL 7.9)	• Theoretical probability of an event is the expected probability and can be found with a formula. • Theoretical probability of an event = $\frac{\text{number of possible favorable outcomes}}{\text{total number of possible outcomes}}$ • The experimental probability of an event is determined by carrying out a simulation or an experiment. • The experimental probability = $\frac{\text{number of times desired outcomes occur}}{\text{number of trials in the experiment}}$ • In experimental probability, as the number of trials increases, the experimental probability gets closer to the theoretical probability (Law of Large Numbers).
	7M-PSPFA 2 (SOL 7.13)	• An expression is a name for a number. • An expression that contains a variable is a variable expression. • An expression that contains only numbers is a numerical expression. • A verbal expression is a word phrase (e.g., "the sum of two consecutive integers"). • A verbal sentence is a complete word statement (e.g., "The sum of two consecutive integers is five."). • An algebraic expression is a variable expression that contains at least one variable (e.g., $2x - 5$). • An algebraic equation is a mathematical statement that says that two expressions are equal (e.g., $2x + 1 = 5$). • To evaluate an algebraic expression, substitute a given replacement value for a variable and apply the order of operations. For example, if a = 3 and b = -2 then 5a + b can be evaluated as: 5(3) + (-2) = 15 + (-2) = 13.
	7M-PSPFA 3 (SOL 7.16)	• The commutative property for addition states that changing the order of the addends does not change the sum (e.g., 5 + 4 = 4+ 5). • The commutative property for multiplication states that changing the order of the factors does not change the product (e.g., $5 \cdot 4 = 4 \cdot 5$). • The associative property of addition states that regrouping the addends does not change the sum [e.g., 5 + (4 + 3) = (5 + 4) + 3]. • The associative property of multiplication states that regrouping the factors does not change the product [e.g., $5 \cdot (4 \cdot 3) = (5 \cdot 4) \cdot 3$]. • Subtraction and division are neither commutative nor associative. • The distributive property states that the product of a number and the sum (or difference) of two other numbers equals the sum (or difference) of the products of the number and each other number [e.g., $5 \cdot (3 + 7) = (5 \cdot 3) + (5 \cdot 7)$, or $5 \cdot (3 - 7) = (5 \cdot 3) - (5 \cdot 7)$]. • Identity elements are numbers that combine with other numbers without changing the other numbers. The additive

		identity is zero (0). The multiplicative identity is one (1). There are no identity elements for subtraction and division. • The additive identity property states that the sum of any real number and zero is equal to the given real number (e.g., 5 + 0 = 5). • The multiplicative identity property states that the product of any real number and one is equal to the given real number (e.g., 8 · 1 = 8). • Inverses are numbers that combine with other numbers and result in identity elements [e.g., 5 + (–5) = 0; $\frac{1}{5} \cdot 5 = 1$]. • The additive inverse property states that the sum of a number and its additive inverse always equals zero [e.g., 5 + (–5) = 0]. • The multiplicative inverse property states that the product of a number and its multiplicative inverse (or reciprocal) always equals one (e.g., $4 \cdot \frac{1}{4} = 1$). • Zero has no multiplicative inverse. • The multiplicative property of zero states that the product of any real number and zero is zero. • Division by zero is not a possible arithmetic operation. Division by zero is undefined.