

MATHEMATICS VERTICAL ARTICULATION TOOL (MVAT)
2016 Mathematics Standards of Learning – Probability and Statistics
Kindergarten-Algebra II Progression

All K-8 Mathematics SOL for the Probability and Statistics strand are represented in this document. All End-of-Course Mathematics SOL are **NOT** represented.
 KEY TO COLORED BOXES: **ES** = K-5 Prior Knowledge Concepts; **MS** = 6-8 Prior Knowledge Concepts; **HS** = 9-12 Prior Knowledge Concepts; N/A = No Concepts Listed

Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra 1	Related to Algebra 2	Measures of Central Tendency
					5.17a						given a practical context, will describe mean, median, and mode as measures of center.
					5.17b						given a practical context, will describe mean as fair share.
					5.17c						given a practical context, will describe the range of a set of data as a measure of spread.
					5.17d						given a practical context, will determine the mean, median, mode, and range of a set of data.
						6.11a					represent the mean of a data set graphically as the balance point.
						6.11b					determine the effect on measures of center when a single value of a data set is added, removed, or changed.
										AII.10	represent and solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.
										AII.11a	identify and describe properties of a normal distribution.
										AII.11b	interpret and compare z -scores for normally distributed data.
										AII.11c	apply properties of normal distributions to determine probabilities associated with areas under the standard normal curve.
										AII.12	compute and distinguish between permutations and combinations.

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K-8 Cross-Strand Connections – Measures of Central Tendency

Number and Number Sense Connections

Computation and Estimation Connections

- [4.4d](#) - create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication, and single-step practical problems involving division with whole numbers.
- [5.7](#) - simplify whole number numerical expressions using the order of operations.

Measurement and Geometry Connections

Patterns, Functions, and Algebra Connections

- [6.12a](#) - represent a proportional relationship between two quantities, including those arising from practical situations
- [6.12b](#) - determine the unit rate of a proportional relationship and use it to find a missing value in a ratio table
- [6.12d](#) - make connections between and among representations of a proportional relationship between two quantities
- [7.10e](#) - make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs.
- [6.12c](#) - determine whether a proportional relationship exists between two quantities

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra 1	Related to Algebra 2	Outcomes and Probability
		<u>2.14</u>									use data from probability experiments to predict outcomes when the experiment is repeated.
			<u>3.14</u>								investigate and describe the concept of probability as a measurement of chance and list possible outcomes for a single event.
				<u>4.13a</u>							determine the likelihood of an outcome of a simple event.
				<u>4.13b</u>							represent probability as a number between 0 and 1, inclusive.
				<u>4.13c</u>							create a model or practical problem to represent a given probability.
					<u>5.15</u>						determine the probability of an outcome by constructing a sample space or using the Fundamental (Basic) Counting Principle.
							<u>7.8a</u>				determine the theoretical and experimental probabilities of an event.
							<u>7.8b</u>				investigate and describe the difference between the experimental probability and theoretical probability of an event.
								<u>8.11a</u>			compare and contrast the probability of independent and dependent events
								<u>8.11b</u>			determine probabilities for independent and dependent events.

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K-8 Cross-Strand Connections – Outcomes and Probability

Number and Number Sense Connections

- **3.2a** - Name and write fractions and mixed numbers represented by a model
- **3.2b** - Represent fractions and mixed numbers with models and symbols
- **4.2a** - Compare and order fractions and mixed numbers, with and without models
- **4.2c** - Identify the division statement that represents a fraction, with models and in context
- **5.2b** - Compare and order fractions, mixed numbers, and/or decimals in a given set, from least to greatest and greatest to least
- **6.2b** - Compare and order positive rational numbers
- **7.1c** - Compare and order rational numbers
- **7.2** - Solve practical problems involving operations with rational numbers
- **8.1** - Compare and order real numbers

Computation and Estimation Connections

- **5.6b** - Solve single-step practical problems involving multiplication of a whole number, limited to 12 or less, and a proper fraction, with models
- **6.5a** - Multiply and divide fractions and mixed numbers
- **6.5b** - Solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of fractions and mixed numbers

Measurement and Geometry Connections

Patterns, Functions, and Algebra Connections

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra 1	Related to Algebra 2	Data Representation and Interpretation
<u>K.11a</u>											collect, organize, and represent data.
<u>K.11b</u>											read and interpret data in object graphs, picture graphs, and tables.
	<u>1.12a</u>										collect, organize, and represent various forms of data using tables, picture graphs, and object graphs.
	<u>1.12b</u>										read and interpret data displayed in object graphs, picture graphs, and tables, using the vocabulary <i>more</i> , <i>less</i> , <i>fewer</i> , <i>greater than</i> , <i>less than</i> , and <i>equal to</i> .
		<u>2.15a</u>									collect, organize, and represent data in pictographs and bar graphs.
		<u>2.15b</u>									read and interpret data represented in pictographs and bar graphs.
			<u>3.15a</u>								collect, organize, and represent data in pictographs or bar graphs.
			<u>3.15b</u>								read and interpret data represented in pictographs and bar graphs.
				<u>4.14a</u>							collect, organize, and represent data in bar graphs and line graphs.
				<u>4.14b</u>							interpret data represented in bar graphs and line graphs.
				<u>4.14c</u>							compare two different representations of the same data.
					<u>5.16a</u>						given a practical problem, will represent data in line plots and stem-and-leaf plots.
					<u>5.16b</u>						given a practical problem, will interpret data represented in line plots and stem-and-leaf plots.
					<u>5.16c</u>						given a practical problem, will compare data represented in a line plot with the same data represented in a stem-and-leaf plot.
						<u>6.10a</u>					given a practical problem, will represent data in a circle graph.
						<u>6.10b</u>					given a practical problem, will make observations and inferences about data represented in a circle graph.

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						<u>6.10c</u>					given a practical problem, will compare circle graphs with the same data represented in bar graphs, pictographs, and line plots.
							<u>7.9a</u>				given data in a practical situation, will represent data in a histogram.
							<u>7.9b</u>				given data in a practical situation, will make observations and inferences about data represented in a histogram.
							<u>7.9c</u>				given data in a practical situation, will compare histograms with the same data represented in stem-and-leaf plots, line plots, and circle graphs.
								<u>8.12a</u>			represent numerical data in boxplots.
								<u>8.12b</u>			make observations and inferences about data represented in boxplots.
								<u>8.12c</u>			compare and analyze two data sets using boxplots.
								<u>8.13a</u>			represent data in scatterplots.
								<u>8.13b</u>			make observations about data represented in scatterplots.
								<u>8.13c</u>			use a drawing to estimate the line of best fit for data represented in a scatterplot.
									<u>A.9</u>		collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of linear and quadratic functions.
										<u>AIL.9</u>	collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of quadratic and exponential functions.

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K-8 Cross-Strand Connections – Data Representation and Interpretation

Number and Number Sense Connections

- **K.2a** - Compare and describe one set as having more, fewer, or the same number of objects as the other set(s)
- **K.2b** - Compare and order sets from least to greatest and greatest to least
- **1.2b** - Compare two numbers between 0 and 110 represented pictorially or with concrete objects, using the words *greater than*, *less than* or *equal to*
- **1.2c** - Order three or fewer sets from least to greatest and greatest to least
- **2.1c** - Compare and order whole numbers between 0 and 999
- **3.1c** - Compare and order whole numbers, each 9,999 or less
- **4.1b** - Compare and order whole numbers expressed through millions
- **4.3a** - Read, write, represent, and identify decimals expressed through thousandths
- **4.3c** - Compare and order decimals
- **5.2b** - Compare and order fractions, mixed numbers, and/or decimals in a given set, from least to greatest and greatest to least
- **6.2b** - Compare and order positive rational numbers
- **6.4** - Recognize and represent patterns with whole number exponents and perfect squares
- **7.1c** - Compare and order rational numbers
- **8.1** - Compare and order real numbers

Computation and Estimation Connections

Measurement and Geometry Connections

- **6.8a** - Identify the components of the coordinate plane

Patterns, Functions, and Algebra Connections

- **6.12a** - Represent a proportional relationship between two quantities, including those arising from practical situations
- **6.12c** - Determine whether a proportional relationship exists between two quantities
- **6.12d** - Make connections between and among representations of a proportional relationship between two quantities using verbal descriptions, ratio tables, and graphs
- **7.10a** - Determine the slope, m , as rate of change in a proportional relationship between two quantities and write an equation in the form $y = mx$ to represent the relationship
- **7.10e** - Make connections between and among representations of a proportional or additive relationship between two quantities using verbal descriptions, tables, equations, and graphs
- **8.16a** - Recognize and describe the graph of a linear function with a slope that is positive, negative, or zero
- **8.16d** - Graph a linear function given the equation $y = mx + b$ form
- **8.16e** - Make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs

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