Minnesota Mathematics

Grade 6

Data Analysis

1 **Data Sciences: Identify, formulate and investigate statistical questions by collecting data considering cultural perspectives, analyzing and interpreting data and communicating the results.**

1 Recognize a statistical question as one that anticipates variability in the data, compares differences between groups and collects categorical or numerical data related to the question, and accounts for it in the answer. (MP2) ✣ 6.1.1.1

2 Design and conduct investigations and experiments to gather data, while considering cultural perspectives, to answer statistically investigative questions considering variability and justifying choice of variables. (MP3, MP6) ✣ $ # ☼ 6.1.1.2

3 Identify, determine and interpret measures of center (mean and median) and measures of variability (range, interquartile range, mean-absolute deviation) to answer a statistically investigative question, summarizing the distribution of data using the measures of center and variability. (MP1, MP2) $ μ 6.1.1.3

4 Create a visualization about a data set to describe patterns, highlight relationships or illustrate features of the distribution of the data to answer or help answer their statistically investigative question.Visualizations should represent the data in appropriate ways, including tables, dot plots, stem- and-leaf plots, histograms and box plots while incorporating any other relevant information that helps to tell a story about the data. (MP5, MP6) # 6.1.1.4

5 Compare and communicate competing explanations for data trends observed, considering cultural perspectives and reasonable alternatives given the variability in findings. (MP3, MP6) ☼ 6.1.1.5

2 **Chance and Uncertainty: Apply and explain the concepts of probability to interpret data, generate questions, predict and make informed decisions to solve problems and communicate ideas.**

1 Determine the sample space (set of possible outcomes) for a given experiment. Sample space may be determined by the use of tree diagrams, tables or pictorial representations. (MP1) ☼ 6.1.2.1

2 Determine the theoretical probability of an event using the ratio between the size of the event and the size of the sample space. Represent probabilities as percentages, fractions and decimals between 0 and 1 inclusive. (MP4) 6.1.2.2

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3 Calculate experimental probabilities from experiments where the theoretical probability is known, recognizing that there may be differences between theoretical and experimental probability. Represent the probabilities as percentages, fractions and decimals between 0 and 1 inclusive. Use experimental probabilities to make predictions when actual probabilities are unknown. (MP4) # ☼ 6.1.2.3

Spatial Reasoning

3 Measurement: Investigate measurement using a variety of tools, units, systems, processes and techniques in various cultures. Explain and reason with attributes, estimations and formulas to communicate measurement(s) and relationships effectively. Justify decisions and consider the reasonableness of the measurement.

1 Calculate the measurements of the surface area of rectangular and triangular prisms using appropriate units. Justify the formulas used. Justification may involve decomposition, nets or other models. (MP1, MP3) ✣ # ☼ 6.2.3.1

2 Calculate the measurement of the volume of prisms (including triangular and nonrectangular prisms) using appropriate units. Justify the formulas used. Justification may involve decomposition or other models. (MP1, MP7) ✣ # ☼ 6.2.3.2

3 Solve situations in various contexts involving conversion of time, weights, capacities and lengths within measurement systems using appropriate units. (MP4, MP5) ✣ ☼ 6.2.3.3

4 Estimate time, weights, capacities, lengths and dollar amounts using benchmarks in measurement systems with appropriate units. (MP1) ✣ $ ☼ 6.2.3.4

5 Find the area of special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and other shapes. Apply these techniques in contextual mathematical situations. (MP2, MP5) ☼ 6.2.3.5

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4 Geometry: Analyze characteristics of geometric shapes to make mathematical arguments and justifications about geometric relationships. Use visualization and geometric modeling to compare, solve problems and communicate ideas.

1 Determine missing angle measures in a triangle using the fact that the sum of the interior angles of a triangle is 1800. Use models to illustrate this fact. (MP8, MP2) ✣ ☼ 6.2.4.1

2 Decompose polygons into triangles to investigate the sum of the interior angles of polygons. (MP1, MP7) # 6.2.4.2

3 Draw polygons in the coordinate plane given coordinates for the vertices. Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in contextual situations. (MP4, MP7) ☼ 6.2.4.3

Patterns and Relationships

5 Number Relationships: Describe/Interpret and use quantities, relationships between and representations of quantities and number systems. Describe and elate operations. Use strategies and procedures accurately, efficiently and lexibly. Assess the reasonableness of the results.

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1 Use positive and negative numbers to describe quantities having opposite directions or values, represent quantities in contexts and explain the meaning of 0 in situations including credits/debits, temperature above/below zero, elevation above/below sea level and positive/negative electric charge. (MP4, MP5) ✜ $ ☼ 6.3.5.1

2 Locate positive and negative rational numbers on a number line. Plot ordered pairs of positive and negative rational numbers on a coordinate grid. (MP4, MP6) $ 6.3.5.2

3 Interpret statements of inequality (<, >, =) as statements about the relative position of two numbers on a number line, including positive and negative rational numbers in various forms. (MP1) ☼ $ 6.3.5.3

4 Factor whole numbers. Express a whole number as a product of prime factors with exponents. Identify a prime number as a whole number greater than one whose only factors are one and itself. (MP7, MP8) 6.3.5.4

5 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers, from 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor. (MP2, MP8) 6.3.5.5

6 Understand the absolute value of a rational number as its distance from 0 on the number line. Interpret absolute value as magnitude for a positive or negative quantity in context. (MP4, MP7) $ 6.3.5.6

7 Estimate solutions to situations with whole numbers, fractions and decimals and use the estimates to assess the reasonableness of the results in the context of the situation. (MP2) ✜ $ ☼ 6.3.5.7

8 Multiply and divide fractions and mixed numbers using visual models to represent the situation leading towards generalizable algorithms. (MP2) 6.3.5.8

9 Solve mathematical situations requiring arithmetic, including multiplication and division, with decimals, fractions and mixed numbers, explaining the solution pathway. Interpret quotients in the context of the situation. (MP3, MP4) $ µ ☼ 6.3.5.9

10 Solve situations using the concept of a unit rate bb associated with a ratio aa: bb with $bb \neq 0$ in context, including constant speed and unit pricing to make purchase decisions. (MP4) ✜ $ ☼ 6.3.5.10

11 Solve percent situations using visual models including tables of equivalent ratios, tape diagrams or double number lines. Apply concepts of percentage including discounts, markups, tips and commission. Situations can include identifying the part given a whole and the percentage, and identifying the percentage given the part and the whole. (MP4, MP7) ✜ µ ☼ 6.3.5.11

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6 **Equivalence and Relational Thinking: Use concepts and properties of equivalence and relational thinking to represent and compare numerical expressions, proportional relationships, algebraic expressions and equations.**

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1. Generate equivalent numerical expressions involving positive rational numbers and justify why expressions are equivalent. (MP1, MP3) 6.3.6.1
2. Determine equivalences among fractions, decimals and percentages involving rational numbers. Convert between equivalent representations. (MP7) $ 6.3.6.2
3. Represent mathematical situations using expressions, equations and inequalities involving variables and positive rational numbers. (MP4) $ ☼ 6.3.6.3
4. Solve one-step equations, including equations of the form $xx + pp = qq$ and $ppxx = qq$ for cases in which p, q and x are all positive rational numbers. Use number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results. (MP3, MP4) 6.3.6.4
5. Identify and use ratios to compare quantities. Understand that comparing quantities using ratios is not the same as comparing quantities using subtraction. (MP1) $ ☼ 6.3.6.5
6. Solve ratio and rate situations, including mixtures and concentrations, by modeling with tables of equivalent ratios, tape diagrams, double number lines or equations. (MP4, MP7) ✜ μ ☼ 6.3.6.6

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7. **Patterns and Relationships: Represent and connect mathematical patterns and relationships using verbal descriptions, generalizations, tables and graphs. Use representations to generate questions, make predictions and solve mathematical problems.**
    1. Use variables to represent two quantities in a situation that change in relationship to one another. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the equation. (MP2, MP8) $ μ 6.3.7.1