Minnesota Mathematics

Grade 7

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 Formulate statistical investigative questions with data collection, keeping cultural perspectives in mind, which compare differences between groups, require a sample of a population and use categorical and/or numerical data. (MP3, MP6) $ ✜ 7.1.1.1

2 Describe how statistics can be used to gain information about a population by examining a sample of the population. Explain how generalizations about a population are valid only when the sample is representative of that population and that random sampling tends to produce representative samples and support valid inferences. (MP2) ✜ ☼ 7.1.1.2

3 Make inferences using statistics about population parameters based on a random sample from that population. (MP3) 7.1.1.3

4 Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, variability and overall shape. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. Justify the choice of measures of center and variability, the shape of the data distribution and the context in which the data were gathered. (MP1, MP7) 7.1.1.4

5 Create a visualization about a data set, organizing and presenting the data in appropriate ways, including in tables, circle graphs and histograms, and incorporating any other relevant information that helps to tell a story about the data. (MP5, MP6) # μ 7.1.1.5

6 Compare and communicate competing explanations for data trends observed, considering cultural perspectives and reasonable alternatives given the variability in findings and sampling methods. (MP3, MP6) 7.1.1.6

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 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as fractions, decimals and percentages. (MP2) 7.1.2.1

2 Approximate the probability of a chance event, where the theoretical probability is unknown, by collecting data and observing its long-run frequency. Represent the probabilities as percentages, fractions and decimals between 0 and 1 inclusive. Use approximate probabilities to make predictions when actual probabilities are unknown. (MP4) # ☼ 7.1.2.2

3 Recognize that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space where the compound event occurs. (MP1) 7.1.2.3

4 Represent sample spaces for compound events by decomposing the events using methods such as organized lists, tables and/or tree diagrams. For an event described in everyday language, identify the outcomes in the sample space that compose the event. (MP5) # 7.1.2.4

5 Design and use a simulation within a computational tool to generate frequencies for compound events. # 7.1.2.5

6 Find probabilities of compound events using organized lists, tables, tree diagrams and/or simulation via a computational tool. (MP5) # μ ☼ 7.1.2.6

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 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π. (MP1, MP2) ✣ ☼ 7.2.3.1

2 Calculate the circumference and area of circles to solve situations in various contexts. (MP4, MP6) ✣ μ ☼ 7.2.3.2

3 Calculate the arc length and area of sectors of circles (given the central angle) to solve situations in various contexts. (MP4, MP7) ✣ ☼ 7.2.3.3

4 Calculate the surface area and volume of cylinders. Justify the formulas used. (MP3, MP8) ✣ ☼ 7.2.3.4

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 Graph and describe translations and reflections of figures on a coordinate grid. Determine the coordinates of the vertices of the figure after the transformation. Describe the properties of congruency when performing translations and reflections. (MP8) 7.2.4.1

2 Describe the properties of similarity, distinguishing between similarity and congruency, compare geometric figures for similarity and determine scale factors. (MP1, MP6) ✜ ☼ 7.2.4.2

3 Apply scale factors, length ratios and area ratios to determine side lengths and areas of similar geometric figures. (MP5) 7.2.4.3

4 Use proportional reasoning and ratios to solve situations involving scale drawings and conversions of measurement units. (MP2, MP4) ✜ $ ☼ 7.2.4.4

Patterns and Relationships

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

1 Know that every rational number can be written as the ratio of two integers and as a terminating or repeating decimal. Recognize that π is not rational but that it can be approximated by 22 rational numbers such as and 3.14. (MP8) 7.3.5.1

2 Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line. Recognize that the opposite of the opposite of a number is the number itself, such as –(–3) = 3. Recognize that 0 is its own opposite. (MP7) 7.3.5.2

3 Compare positive and negative rational numbers expressed in various forms using the symbols <, > , = , ≤ , ≥ . (MP4) $ 7.3.5.3

4 Recognize subtraction of rational numbers as adding the additive inverse, $pp - qq = pp + (-qq)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in contexts. (MP7, MP8) ✜ $ ☼ 7.3.5.4

5 Create a budget using positive and negative rational numbers for an event and calculate what percentage of the total budget each category comprises. Justify choices of the allocation of the available resources. (MP1, MP4, MP5) ✜ $ µ ☼ 7.3.5.5

6 Solve mathematical situations involving adding, subtracting, multiplying and dividing positive and negative rational numbers that are integers, fractions and terminating decimals. Use efficient and generalizable procedures. Raise positive rational numbers to whole-number exponents. (MP4) $ ☼ 7.3.5.6

7 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (MP1, MP4) $ ☼ 7.3.5.7

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.**

1 Use properties of algebra to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents. Properties of algebra include associative, commutative and distributive laws. (MP1) 7.3.6.1

2 Represent and solve contextual situations resulting in two-step equations and inequalities involving variables and positive/negative rational numbers. Graph the solution set of the inequality and interpret the solution in context. (MP4, MP5) $ ☼ 7.3.6.2

3 Evaluate algebraic expressions, including expressions containing rational numbers, absolute value and whole number exponents, by applying computational hierarchy of operations at specified values of their variables. (MP7) # 7.3.6.3

4 Solve multi-step situations involving proportional relationships in numerous contexts using models, such as tables of equivalent ratios involving scaling up and down, tape diagrams, double number lines or equations. (MP4, MP7) ✜ $ µ ☼ 7.3.6.4

5 Solve multi-step financial literacy situations including simple interest, tax, markups and markdowns, tips and commissions, fees, percent increase and decrease and percent error. Distinguish between sales tax and income tax for earned wages. Situations include finding the whole, the part and the percent. (MP7, MP8) $ µ ☼ 7.3.6.5

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 Represent proportional relationships with tables, verbal descriptions, symbols, equations and graphs. Translate from one representation to another. Determine the unit rate (constant of proportionality or rate of change) given any of these representations. (MP4, MP5) ✜ $ ☼ 7.3.7.1

2 Express a relationship between two variables, the independent (x) and the dependent (y), as yy proportional if it can be written in the form = xx kk or yy = $kkxx$. Distinguish proportional relationships from non-proportional relationships, including relationships where the x and y value are not 0. (MP8) $ 7.3.7.2

3 Determine whether two quantities are in a proportional relationship by testing for equivalent ratios in a table or graphing on a coordinate plane and by observing whether the graph is a straight line through the origin. Use graphing technology to examine the relationship between the unit rate and the line for a given situation. (MP1) ✜ µ ☼ 7.3.7.3