Minnesota Mathematics

Grade 5

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 Notice and describe patterns in data-rich situations or given related data sets that are descriptive and comparative. Ask meaningful statistical questions that can be answered with data. (MP7) ✜ 5.1.1.1

2 Compare and contrast between qualitative and quantitative data. (MP3, MP6) ✜ 5.1.1.2

3 Collect and organize data to answer statistical questions and analyze measures of center (mean and median) and variability (range). Represent data in a variety of ways, including technology. (MP5) # μ 5.1.1.3

4 Critically analyze data visualizations using measures of center and variability, including but not limited to double- bar graphs, line graphs and line plots to support a claim and solve situations. (MP3, MP7) $ # 5.1.1.4

5 Compare and contrast different data displays to determine how the visualizations impact analysis and interpretation. (MP3, MP8) # 5.1.1.5

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 List outcomes from a probability experiment in a frequency table. (MP4) ☼ 5.1.2.1

2 Use a frequency table to record results from an experiment to make predictions. Place predictions on a number line from 0 to 1. (MP4) # ☼ 5.1.2.2

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 Develop, justify and use formulas to determine the area of parallelograms and triangles. Find the areas of polygons that can be decomposed into parallelograms and triangles. (MP3) # µ 5.2.3.1

2 Estimate the area of two-dimensional shapes, both polygons and non-polygons, using tools such as dot or grid paper. (MP1, MP5) 5.2.3.2

3 Use unit cubes to measure volume. Describe a unit cube as a cube with side length 1 unit that is said to have “one cubic unit” of volume and can be used to measure volume. (MP5, MP6) 5.2.3.3

4 Use various strategies to measure the volume and surface area of three-dimensional shapes made of a collection of unit cubes. (MP5, MP6) ✣ ☼ 5.2.3.4

5 Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. Show that the volume is the same by unit cubes as by multiplying the edge lengths (l x w x h) or by multiplying the height by the area of the base. (MP3, MP8) ☼ 5.2.3.5

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 Classify and describe prisms and pyramids by their defining attributes and the number of edges, faces, vertices and bases. (MP1, MP6) ✣ ☼ 5.2.4.1

2 Recognize, draw and compare different nets for prisms, pyramids, cylinders and cones. (MP1) 5.2.4.2

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 Multiply two multi-digit numbers using an efficient strategy. Strategies include decomposing factors into factors, decomposing factors into sums or using an area model. Justify the chosen strategy using properties of operations and place value. (MP1, MP7) µ 5.3.5.1

2 Divide multi-digit numbers by a one-digit or two-digit divisor using efficient and generalizable procedures based on knowledge of place value and the properties of operations that may include partial quotients and standard algorithms. Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction, a mixed number or a decimal. (MP7) 5.3.5.2

3 Consider the context of a problem involving division to select the most useful form of the quotient and the remainder. (MP2) $ ☼ 5.3.5.3

4 Solve multi-step contextual situations requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology and the context of the situation to assess the reasonableness of results. (MP4) ✜ $ ☼ 5.3.5.4

5 Generate equivalent fractions of the forms = *bb nn xx bb aa aa ÷ nn* and = and justify relationships using visual *bb bb ÷ nn* models. (MP3) µ 5.3.5.5

6 Given a value, mentally find 0.1 more or 0.1 less, 0.01 more or 0.01 less and 0.001 more or 0.001 less than the number. Justify reasoning by referencing a visual model. (MP2, MP3) $ 5.3.5.6

7 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in 1 the place to its right and of what it represents in 10 the place to its left. (MP2, MP7) $ 5.3.5.7

8 Recognize and flexibly generate equivalences between fractions and decimals to the thousandths place and justify using visual models, place value language and symbols. (MP3, MP7) $ 5.3.5.8

9 Compare and order decimal values to the thousandths. Justify using place value language and visual models. (MP3, MP4) $ 5.3.5.9

10 Estimate sums and differences of fractions and mixed numbers to the nearest half. Justify reasoning using benchmarks. (MP3) 5.3.5.10

11 Fluently add and subtract fractions with unlike denominators (including mixed numbers) and justify using equivalent fractions, visual models and the number line. (MP3) $ µ 5.3.5.11

12 Estimate sums and differences of decimals. (MP2) $ 5.3.5.12

13 Solve contextual situations using addition and subtraction of positive rational numbers represented as fractions (including mixed numbers) or decimals using visual models, equations and properties of operations. (MP4) ✜ $ ☼ 5.3.5.13

14 Represent multiplication of a whole number of *aa* fractional groups, *nn* x , using visual models, *bb* including a number line, and explain how the picture shows the product. (MP3) $ 5.3.5.14

15 Represent contextual multiplication situations of a *aa* fractional amount of a whole number amount, of a *bb* group of n, using visual models, including a number line, and explain how the picture shows the product. (MP3) $ 5.3.5.15

16 Represent contextual measurement situations using *aa* division of the form *nn* ÷ ◆ ◆ where n is the total *bb aa* and is the amount per group. Use a visual model *bb* and explain how the picture shows the number of groups. (MP3) $ 5.3.5.16

17 Solve multi-step contextual situations using addition and subtraction of positive rational numbers. Use various strategies, including the inverse relationships between operations and the context of the situation, to assess the reasonableness of results. (MP4) ✣ $ ☼ 5.3.5.17

18 Use the four operations to compare and contrast different ways of paying and receiving payments. Identify the advantages and disadvantages of each method of payment, including checks, credit cards, debit cards and electronic payments. (MP1, MP7) $ 5.3.5.18

19 Use the four operations to create an individual or group budget based on wants and needs and explore examples of debt and manageability of debt and its long-term impact. (MP1, MP7) $ 5.3.5.19

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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.**

1 Use relational thinking to find a missing value in an open number sentence with addition and subtraction of fractions and decimal expressions. Determine if the equation is true or false and justify the reasoning. (MP3) $ # 5.3.6.1

2 Make conjectures and justifications about numerical expressions involving parentheses and the four operations using the properties of operations, properties of algebra, decomposition and composition to generate equivalent numerical expressions. (MP3) $ 5.3.6.2

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 a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system. (MP4) ☼ 5.3.7.1

2 Identify and explain apparent relationships between two patterns from given rules, using tables or ordered pairs on a coordinate system. (MP7, MP8) 5.3.7.2

3 Represent contextual situations by graphing whole and half number points in the first quadrant of the coordinate plane. Interpret coordinate values of points in the context of the situation. (MP4) ✜ $ ☼ 5.3.7.3

4 Use ratio tables with whole numbers to solve situations with additive and multiplicative reasoning. Interpret multiplication as scaling. (MP2) ✜ $ µ ☼ 5.3.7.4

5 Develop an explicit rule that generalizes a visual pattern relating the figure number with the number of items in that figure. Use the rule to find the number of items in figure n. (MP7, MP8) 5.3.7.5