Montana Math

High School

Core Numeric Reasoning Standards MT.HS.CORE.NUM

REAL. The Real Number System MT.HS.CORE.NUM.REAL

1. Use reasoning to establish properties of integer exponents, including scientific notation. MT.HS.CORE.NUM.REAL.1
2. Represent and perform operations within very large and very small numbers using scientific notation. MT.HS.CORE.NUM.REAL.2
3. Define, manipulate, interpret, and compare real numbers presented through different representations, including both rational and irrational numbers and apply comparisons in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.NUM.REAL.3

Core Algebraic and Functional Reasoning Standards MT.HS.CORE.ALG

FUN. Understand Functions and Expressions MT.HS.CORE.ALG.FUN

1. Interpret parts of an expression, such as terms, factors, and coefficients. MT.HS.CORE.ALG.FUN.1
2. Understand the definition of a function and distinguish between functions and relations. MT.HS.CORE.ALG.FUN.2
3. Represent functions using tables, graphs with appropriate scales and labels, equations, and verbal situations, while using technology strategically by: MT.HS.CORE.ALG.FUN.3
   a. *Represent functions using tables, graphs with appropriate scales and labels, equations, and verbal situations, while using technology strategically by* understanding that different representations highlight different aspects of functions, and choosing the representation that is appropriate for the context. MT.HS.CORE.ALG.FUN.3.A
   b. *Represent functions using tables, graphs with appropriate scales and labels, equations, and verbal situations, while using technology strategically by* comparing properties of two functions, including when each is represented in a different way. MT.HS.CORE.ALG.FUN.3.B
4. Use function notation, evaluate functions, and interpret statements that use function notation in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.FUN.4
5. Identify the domain and range of a function, including considering the constraints imposed by context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.FUN.5

6 Understand that a graph of an equation in two variables is the set of all of its solutions plotted in a coordinate plane. MT.HS.CORE.ALG.FUN.6

7 Understand that expressions can be rewritten in equivalent forms to make different characteristics or features visible. MT.HS.CORE.ALG.FUN.7

8 Rearrange literal equations to highlight quantities of interest. MT.HS.CORE.ALG.FUN.8

LIN. Linear Functions and Expressions MT.HS.CORE.ALG.LIN

1 Understand that linear functions have a constant rate of change. MT.HS.CORE.ALG.LIN.1

2 Understand slope as a rate of change and y-intercept as initial value. MT.HS.CORE.ALG.LIN.2

3 Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.ALG.LIN.3

a *Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* identifying the rate of change and initial value in each representation. MT.HS.CORE.ALG.LIN.3.A

b *Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* converting between representations. MT.HS.CORE.ALG.LIN.3.B

c *Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* writing equations for a line perpendicular or parallel to a given line that passes through a given point. MT.HS.CORE.ALG.LIN.3.C

4. Understand that linear equations can be represented in multiple forms and the specific features of each form by: MT.HS.CORE.ALG.LIN.4
    a. *Understand that linear equations can be represented in multiple forms and the specific features of each form by* choosing the form strategically when writing an equation based on given information and intended use. MT.HS.CORE.ALG.LIN.4.A
    b. *Understand that linear equations can be represented in multiple forms and the specific features of each form by* converting between slope-intercept, point-slope, and standard form symbolically. MT.HS.CORE.ALG.LIN.4.B
    c. *Understand that linear equations can be represented in multiple forms and the specific features of each form by* understanding the relationship between slope-intercept form, the rate of change, and the initial value. MT.HS.CORE.ALG.LIN.4.C
    d. *Understand that linear equations can be represented in multiple forms and the specific features of each form by* understanding the relationship between point-slope form, the rate of change, and a given point. MT.HS.CORE.ALG.LIN.4.D
    e. *Understand that linear equations can be represented in multiple forms and the specific features of each form by* understanding the relationship between standard form and the x- and y-intercepts. MT.HS.CORE.ALG.LIN.4.E
5. Understand that a solution to a system of equations is a coordinate pair that makes both equations true. MT.HS.CORE.ALG.LIN.5
6. Solve systems of linear equations by graphing, substitution, and elimination, including systems with zero, one, or infinite solutions, while using technology and representations strategically. MT.HS.CORE.ALG.LIN.6

QUAD. Quadratic Functions and Expressions MT.HS.CORE.ALG.QUAD

1. Understand that quadratic functions do not have a constant rate of change but have a constant second difference over equal intervals and identify the constant second difference in tables. MT.HS.CORE.ALG.QUAD.1
2. Represent quadratic functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.QUAD.2

3. Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by: MT.HS.CORE.ALG.QUAD.3
    a. *Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by* choosing the form strategically when writing an expression based on given information and intended use. MT.HS.CORE.ALG.QUAD.3.A
    b. *Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by* converting between factored, standard, and vertex form symbolically and using representations. MT.HS.CORE.ALG.QUAD.3.B
    c. *Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by* understanding the relationship between factored form and the zeros of the function. MT.HS.CORE.ALG.QUAD.3.C
    d. *Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by* understanding the relationship between vertex form and the vertex of the function. MT.HS.CORE.ALG.QUAD.3.D
4. Solve quadratic equations by factoring, graphing, completing the square, using inverse operations, and the quadratic formula. Use technology and representations strategically. MT.HS.CORE.ALG.QUAD.4

EXP. Exponential Functions and Expressions MT.HS.CORE.ALG.EXP

1. Understand that exponential functions have a constant common ratio over equal intervals, and identify the common ratio in tables and equations. MT.HS.CORE.ALG.EXP.1
2. Understand a as the initial value and b as the growth/decay factor for an exponential function written in standard form, y=a*b^x. MT.HS.CORE.ALG.EXP.2
3. Understand the relationship between growth/decay factor and growth/decay rate. MT.HS.CORE.ALG.EXP.3
4. Represent exponential functions using tables, graphs, equations, and verbal situations; using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.EXP.4
5. Solve exponential equations graphically, while using technology strategically. MT.HS.CORE.ALG.EXP.5

MOD. Modeling with Functions MT.HS.CORE.ALG.MOD

1. Model situations in context, with linear, quadratic, and exponential functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.ALG.MOD.1
    a. *Model situations in context, with linear, quadratic, and exponential functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* determining if a set of data is best modeled by a linear function, quadratic function, exponential function, or none, and explaining why. MT.HS.CORE.ALG.MOD.1.A
    b. *Model situations in context, with linear, quadratic, and exponential functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* understanding that there are contexts where solutions may not lie on the curve. MT.HS.CORE.ALG.MOD.1.B
2. Interpret the coefficients in a linear, quadratic, and exponential model in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.MOD.2
3. Choose and interpret measurement units in formulas, graphs, and data displays to understand problems and to guide problem-solving in modeling situations. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.MOD.3
4. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities in modeling situations. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.ALG.MOD.4

Core Data Reasoning and Probability Standards MT.HS.CORE.DATA

LIT. Quantitative Literacy MT.HS.CORE.DATA.LIT

1. Distinguish between quantitative and categorical data and use representations and analysis techniques that are appropriate for each type. MT.HS.CORE.DATA.LIT.1
2. Ask a statistical question to determine whether there appears to be an association between two variables, design and carry out an investigation, and write a persuasive argument based on the results of the investigation. MT.HS.CORE.DATA.LIT.2
3. Distinguish between association and causation. MT.HS.CORE.DATA.LIT.3

INT. Visualizing, Summarizing, and Interpreting Data MT.HS.CORE.DATA.INT

1. Use technology to organize data, including very large data sets, into a useful and manageable structure. MT.HS.CORE.DATA.INT.1
2. Represent the distribution of univariate quantitative data with plots on the real number line, choosing a format most appropriate to the data set, and representing the distribution of bivariate quantitative data with a scatter plot. MT.HS.CORE.DATA.INT.2

3. Understand that standard deviation measures the variability of a data distribution, and calculate standard deviation using technology. MT.HS.CORE.DATA.INT.3
4. Interpret differences in the shape, center, and spread of quantitative data distributions, in context, accounting for possible effects of outliers on measures of central tendency and variability. MT.HS.CORE.DATA.INT.4
5. Compare and contrast two or more quantitative data distributions, using shape, center, and spread in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.CORE.DATA.INT.5
6. Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.DATA.INT.6
    a. *Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* using technology strategically, represent two quantitative data distributions on scatter plots. MT.HS.CORE.DATA.INT.6.A
    b. *Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* describing verbally how the variables are related. MT.HS.CORE.DATA.INT.6.B
    c. *Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* using technology to find the least-squares regression line (line of best) fit for two quantitative variables. MT.HS.CORE.DATA.INT.6.C
    d. *Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* understanding that the line of best fit minimizes the square of the residuals. MT.HS.CORE.DATA.INT.6.D
    e. *Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* understanding correlation as a measure of linear association and using technology, compute the correlation coefficient of a linear relationship. MT.HS.CORE.DATA.INT.6.E

7 Analyze the relationship between two categorical variables in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.DATA.INT.7

a *Analyze the relationship between two categorical variables in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* summarizing categorical data for two categories in two-way frequency tables and visual representations. MT.HS.CORE.DATA.INT.7.A

b *Analyze the relationship between two categorical variables in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* interpreting relative frequencies for categorical data in context. MT.HS.CORE.DATA.INT.7.B

c *Analyze the relationship between two categorical variables in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* identifying possible associations and trends in categorical data. MT.HS.CORE.DATA.INT.7.C

PROB. Probability MT.HS.CORE.DATA.PROB

1 Understand the concept of a sample space and describe events as subsets of a sample space. MT.HS.CORE.DATA.PROB.1

2 Understand the concepts of conditional probability and independence in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.DATA.PROB.2

a *Understand the concepts of conditional probability and independence in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* determining whether two events, A and B, are independent by using two-way tables, tree diagrams, and/or Venn diagrams, and interpreting the answer in context. MT.HS.CORE.DATA.PROB.2.A

b *Understand the concepts of conditional probability and independence in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* computing the conditional probability of event A given event B by using two-way tables, tree diagrams, and/or Venn diagrams, and interpreting the answer in context. MT.HS.CORE.DATA.PROB.2.B

Core Geometric Reasoning Standards MT.HS.CORE.GEOM

TRANS. Transformations MT.HS.CORE.GEOM.TRANS

1 Represent transformations in the plane using a variety of methods. MT.HS.CORE.GEOM.TRANS.1

2 Define the congruence of two and show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other by: MT.HS.CORE.GEOM.TRANS.2

   a *Define the congruence of two and show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other by* using the definition of congruence in terms of rigid motions to show that two triangles are congruent if, and only if, corresponding pairs of sides and corresponding pairs of angles are congruent. MT.HS.CORE.GEOM.TRANS.2.A

   b *Define the congruence of two and show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other by* verifying that two triangles are congruent if, but not only if, the following groups of corresponding parts are congruent: angle-side-angle (ASA), side-angle-side (SAS), and side-side-side (SSS). MT.HS.CORE.GEOM.TRANS.2.B

3 Define the similarity of two figures in terms of similarity transformations by: MT.HS.CORE.GEOM.TRANS.3

   a *Define the similarity of two figures in terms of similarity transformations by* verifying that two triangles are similar if, and only if, corresponding pairs of sides are proportional and corresponding pairs of angles are congruent. MT.HS.CORE.GEOM.TRANS.3.A

   b *Define the similarity of two figures in terms of similarity transformations by* using the properties of similarity transformations to establish the angle-angle (AA) criterion for two triangles to be similar. MT.HS.CORE.GEOM.TRANS.3.B

ARG. Geometric Arguments, Reasoning, and Proof MT.HS.CORE.GEOM.ARG

1 Investigate, conjecture, prove theorems, and communicate the proofs in a variety of ways by: MT.HS.CORE.GEOM.ARG.1

a Prove theorems about lines and angles. Theorems include: vertical angles are congruent, when a transversal crosses parallel lines alternate interior angles are congruent and corresponding angles are congruent, and the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints. MT.HS.CORE.GEOM.ARG.1.A

b Prove theorems about triangles. Theorems include: the sum of the measures of the interior angles of a triangle is 180?, the Pythagorean Theorem, the base angles of isosceles triangles are congruent, and a line parallel to one side of a triangle divides the other two sides proportionally. MT.HS.CORE.GEOM.ARG.1.B

c Prove theorems about parallelograms and other quadrilaterals. Theorems include: necessary and sufficient conditions for rectangles, parallelograms, rhombi, and kites. MT.HS.CORE.GEOM.ARG.1.C

d Prove theorems about circles. Theorems include: the relationship between central, inscribed, and circumscribed angles, inscribed angles on a diameter are right angles, and the radius of a circle is perpendicular to the tangent where the radius intersects the circle. MT.HS.CORE.GEOM.ARG.1.D

MEAS. Measurement, Problem Solving, and Geometric Modeling MT.HS.CORE.GEOM.MEAS

1 Use the Pythagorean Theorem to calculate distance in the coordinate plane. MT.HS.CORE.GEOM.MEAS.1

2 Derive the equation of a circle of a given center and radius using the Pythagorean Theorem. MT.HS.CORE.GEOM.MEAS.2

3 Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by: MT.HS.CORE.GEOM.MEAS.3

a *Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by* deriving and applying the trigonometric ratios in special right triangles. MT.HS.CORE.GEOM.MEAS.3.A

b *Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by* using trigonometric ratios and the Pythagorean Theorem to solve right triangles. MT.HS.CORE.GEOM.MEAS.3.B

4 Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.CORE.GEOM.MEAS.4

a *Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* modeling and solving problems with 2D shapes by using the perimeter and area of polygons, circles, and composite shapes with portions removed. MT.HS.CORE.GEOM.MEAS.4.A

b *Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* modeling and solving problems with 3D solids by using surface area and volume of solids, including composite solids and solids with portions removed. MT.HS.CORE.GEOM.MEAS.4.B

c *Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* deriving and applying the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor. MT.HS.CORE.GEOM.MEAS.4.C

Core Plus Number and Quantity Standards MT.HS.PLUS.NUM

REAS. Numeric Reasoning MT.HS.PLUS.NUM.REAS

1 Extend the properties of exponents to rational exponents, including converting between exponential and radical form. MT.HS.PLUS.NUM.REAS.1

2 Understand there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b as real numbers by: MT.HS.PLUS.NUM.REAS.2

a *Understand there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b as real numbers by* adding, subtracting, multiplying, and dividing complex numbers. MT.HS.PLUS.NUM.REAS.2.A

b *Understand there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b as real numbers by* finding the conjugate of a complex number. MT.HS.PLUS.NUM.REAS.2.B

Core Plus Algebraic and Functional Reasoning Standards MT.HS.PLUS.ALG

FUN. Functions, Expressions, and Inequalities MT.HS.PLUS.ALG.FUN

1 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(k x)$, and $f(x + k)$ for specific values of k (both positive and negative). MT.HS.PLUS.ALG.FUN.1

2 Understand the relationship between a function and its inverse. MT.HS.PLUS.ALG.FUN.2

POLY. Polynomial Functions MT.HS.PLUS.ALG.POLY

1. Understand polynomials are created by multiplying linear factors. MT.HS.PLUS.ALG.POLY.1
2. Understand that polynomial expressions can be represented in both factored and standard form, and the specific features of each form by: MT.HS.PLUS.ALG.POLY.2
    a. *Understand that polynomial expressions can be represented in both factored and standard form, and the specific features of each form by* choosing the form strategically based on given information and intended use when writing an expression. MT.HS.PLUS.ALG.POLY.2.A
    b. *Understand that polynomial expressions can be represented in both factored and standard form, and the specific features of each form by* converting between factored and standard form symbolically and using representations (e.g., area model). MT.HS.PLUS.ALG.POLY.2.B
    c. *Understand that polynomial expressions can be represented in both factored and standard form, and the specific features of each form by* interpreting the relationship between the factored form of the expression and the zeros of the function. MT.HS.PLUS.ALG.POLY.2.C
3. Graph polynomial functions with and without the use of technology, by identifying zeros, relative maxima and minima, and end behavior. MT.HS.PLUS.ALG.POLY.3
4. Solve quadratic equations that have complex solutions, and understand why the solutions form a conjugate pair. MT.HS.PLUS.ALG.POLY.4

EXP. Exponential and Logarithmic Functions MT.HS.PLUS.ALG.EXP

1. Understand logarithmic functions as the inverse of exponential functions. MT.HS.PLUS.ALG.EXP.1
2. Understand why e is defined as the natural base. MT.HS.PLUS.ALG.EXP.2
3. Understand that exponential and logarithmic functions can be represented using multiple forms by: MT.HS.PLUS.ALG.EXP.3
    a. *Understand that exponential and logarithmic functions can be represented using multiple forms by* expressing exponential functions in the form $f(x)=ab^x$ and $f(x)=Pe^{(rt)}$. MT.HS.PLUS.ALG.EXP.3.A
    b. *Understand that exponential and logarithmic functions can be represented using multiple forms by* expressing logarithmic functions in base 10 and base e. MT.HS.PLUS.ALG.EXP.3.B
4. Graph logarithmic and exponential functions with and without the use of technology by identifying intercepts, asymptotes, and end behavior. MT.HS.PLUS.ALG.EXP.4
5. Solve exponential and logarithmic equations using inverse operations with and without the use of technology. MT.HS.PLUS.ALG.EXP.5

TRIG. Trigonometric Functions MT.HS.PLUS.ALG.TRIG

1. Understand how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers by: MT.HS.PLUS.ALG.TRIG.1
   a. *Understand how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers by* defining the sine and cosine functions in terms of the unit circle. MT.HS.PLUS.ALG.TRIG.1.A
   b. *Understand how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers by* defining the tangent, cotangent, secant, and cosecant functions in terms of sine and cosine. MT.HS.PLUS.ALG.TRIG.1.B
2. Understand and use the radian measure of an angle, and convert between degree and radian measures. MT.HS.PLUS.ALG.TRIG.2
3. Graph trigonometric functions with and without the use of technology by: MT.HS.PLUS.ALG.TRIG.3
   a. *Graph trigonometric functions with and without the use of technology by* graphing sine and cosine functions, identifying period, midline, and amplitude. MT.HS.PLUS.ALG.TRIG.3.A
   b. *Graph trigonometric functions with and without the use of technology by* graphing tangent functions, identifying period and asymptotes. MT.HS.PLUS.ALG.TRIG.3.B
4. Solve trigonometric equations with and without the use of technology. MT.HS.PLUS.ALG.TRIG.4
5. Apply the Law of Sines and the Law of Cosines to find unknown measurements in non-right triangles. MT.HS.PLUS.ALG.TRIG.5

MOD. Modeling MT.HS.PLUS.ALG.MOD

1. Model situations in context with polynomial, exponential, logarithmic, and trigonometric functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: MT.HS.PLUS.ALG.MOD.1
   a. *Model situations in context with polynomial, exponential, logarithmic, and trigonometric functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* determining if a set of data is best modeled by a polynomial, exponential, logarithmic, or trigonometric function or none, and explaining why. MT.HS.PLUS.ALG.MOD.1.A
   b. *Model situations in context with polynomial, exponential, logarithmic, and trigonometric functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by* understanding that there are contexts where solutions may not lie on the curve. MT.HS.PLUS.ALG.MOD.1.B

2 Interpret the coefficients in a polynomial, exponential, logarithmic, and trigonometric model in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. MT.HS.PLUS.ALG.MOD.2

3 Use and interpret units correctly in modeling situations. MT.HS.PLUS.ALG.MOD.3

4 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities in modeling situations. MT.HS.PLUS.ALG.MOD.4

Core Plus Data and Reasoning Standards MT.HS.PLUS.DATA

NORM. Nomal Distribution MT.HS.PLUS.DATA.NORM

1 Determine if a data set is normally distributed. MT.HS.PLUS.DATA.NORM.1

2 Use technology to find the mean and standard deviation of a normally distributed data set and apply the empirical rule to estimate population percentages. MT.HS.PLUS.DATA.NORM.2

3 Estimate areas under a normal curve to solve problems in context, using calculators, spreadsheets, and tables as appropriate. MT.HS.PLUS.DATA.NORM.3

DES. Experimental Design MT.HS.PLUS.DATA.DES

1 Describe the purposes of and differences among sample surveys, experiments, and observational studies and explain how randomization relates to each. MT.HS.PLUS.DATA.DES.1

2 Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect by: MT.HS.PLUS.DATA.DES.2

a *Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect by* explaining the consequences, due to uncontrolled variables, of non-randomized assignment of subjects to groups in experiments. MT.HS.PLUS.DATA.DES.2.A

b *Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect by* evaluating where bias, including sampling, response, or nonresponse bias, may occur in surveys, and whether results are representative of the population of interest. MT.HS.PLUS.DATA.DES.2.B

3 Evaluate the effect of sample size on the expected variability in the sampling distribution of a sample statistic by: MT.HS.PLUS.DATA.DES.3

a *Evaluate the effect of sample size on the expected variability in the sampling distribution of a sample statistic by* simulating a sampling distribution of sample means from a population with a known distribution, observing the effect of the sample size on the variability. MT.HS.PLUS.DATA.DES.3.A

b *Evaluate the effect of sample size on the expected variability in the sampling distribution of a sample statistic by* demonstrating that the standard deviation of each simulated sampling distribution is the known standard deviation of the population divided by the square root of the sample size. MT.HS.PLUS.DATA.DES.3.B

INF. Statistical Inference Using Simulation MT.HS.PLUS.DATA.INF

1 Distinguish between a statistic and a parameter and use statistical processes to make inferences about population parameters based on statistics from random samples from that population. MT.HS.PLUS.DATA.INF.1

2. Estimate a population parameter from a representative sample by: MT.HS.PLUS.DATA.INF.2
    a. *Estimate a population parameter from a representative sample by* understanding why the sample statistic is the best estimate for the associated population parameter. MT.HS.PLUS.DATA.INF.2.A
    b. *Estimate a population parameter from a representative sample by* understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by: MT.HS.PLUS.DATA.INF.2.B
        i. *Estimate a population parameter from a representative sample by understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by* using resampling with replacement from an observed sample to produce a sampling distribution. MT.HS.PLUS.DATA.INF.2.B.I
        ii. *Estimate a population parameter from a representative sample by understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by* verifying that a sampling distribution is centered at the population mean and approximately normal if the sample size is large enough. MT.HS.PLUS.DATA.INF.2.B.II
        iii. *Estimate a population parameter from a representative sample by understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by* verifying that 95% of sample means are within two standard deviations of the sampling distribution from the population mean. MT.HS.PLUS.DATA.INF.2.B.III
        iv. *Estimate a population parameter from a representative sample by understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by* creating and interpreting a 95% confidence interval based on an observed mean from a sampling distribution. MT.HS.PLUS.DATA.INF.2.B.IV
3. Use data from a randomized experiment to test the hypothesis that two groups are equal by: MT.HS.PLUS.DATA.INF.3
    a. *Use data from a randomized experiment to test the hypothesis that two groups are equal by* interpreting the difference or ratio between the group means as the observed effect between the groups. MT.HS.PLUS.DATA.INF.3.A
    b. *Use data from a randomized experiment to test the hypothesis that two groups are equal by* understanding that an observed effect may be due to randomization and using a randomization test (repeatedly reshuffling the observed data into new groups) to determine the probability that an observed effect is due to randomization alone. MT.HS.PLUS.DATA.INF.3.B