****



SUGGESTED

**INSTRUCTIONAL**

**PLANNING GUIDE**

*for the Mississippi College- and Career-Readiness Standards*

**q Mathematics**

|  |
| --- |
| **Algebra II** |

The Mississippi State Board of Education, the Mississippi Department of Education, the Mississippi School for the Arts, the Mississippi School for the Blind, the Mississippi School for the Deaf, and the Mississippi School for Mathematics and Science do not discriminate on the basis of race, sex, color, religion, national origin, age, or disability in the provision of educational programs and services or employment opportunities and benefits. The following office has been designated to handle inquiries and complaints regarding the non‑discrimination policies of the above mentioned entities: Director, Office of Human Resources, Mississippi Department of Education, 359 North West Street, P.O. Box 771, Jackson, MS  39205‑0771,  (601)359-3513.

**Mississippi Department of Education**359 North West Street

P. O. Box 771

Jackson, Mississippi 39205-0771

(601) 359-3513

[www.mdek12.org](http://www.mdek12.org)

|  |  |
| --- | --- |
| **MISSISSIPPI DEPARTMENT OF EDUCATION** | |
| **Carey M. Wright, Ed.D.**  State Superintendent of Education | |
| **Nathan Oakley, Ph.D.**  Chief Academic Officer | |
| **Wendy Clemons**  Executive Director, Office of Secondary  Education/Dropout Prevention & Professional Development | **Tenette Smith, Ed.D.**  Executive Director, Office of Elementary  Education and Reading |
| **Marla Davis, Ph.D.** State Director of Curriculum and Instruction | **Elise Brown**  Director of Online Professional Development  Mathematics Professional Development Coordinator (6-12) |
| **Tommisha Johnson** K-12 Mathematics Content Director | **Amy Pinkerton**  Mathematics Professional Development Coordinator (K-5) |

**Special Acknowledgements**

Bailey Education Group

The Kirkland Group

Ranella Howard Anderson (Jackson Public Schools)

**INTRODUCTION**

The unprecedented, nationwide school closures in the spring of 2020 due to the COVID-19 pandemic have created a shift in how districts plan for school re-entry. Instead of the traditional brick-and-mortar planning, administrators are now identifying models that will support a variety of instructional delivery scenarios as they plan for school reopening. The traditional methods of planning and delivery are nearly impossible to implement as a stand-alone model; instead, innovative educators are developing and identifying strategies and resources to support a variety of distance learning scenarios as part of their plans. When using new models of delivery, it is important to recognize that the traditional approach to remediation—providing work better suited for earlier grades—may be insufficient. Instead, the conventional approach to remediation will likely compound the problem educators are trying to correct. According to a 2018 study, [The Opportunity Myth[[1]](#footnote-2)](https://tntp.org/assets/documents/TNTP_The-Opportunity-Myth_Web.pdf), the approach of “meeting students where they are”, while often well-intended, only widens the achievement gap. Instead of remediation, teachers and administrators are encouraged to look toward acceleration methods to support student growth and close the gaps.

**PURPOSE**

The purpose of the *Suggested Mississippi College- and Career-Readiness Standards Instructional Planning Guides* is to provide a *SUGGESTED* guide to assist teachers in planning rigorous, coherent lessons that focus on the critical content of each grade level. Providing curriculum guidance through intentional standard grouping and consideration for the time needed to address different objectives, should encourage consistent instruction that fully aligns to the Mississippi College- and Career-Readiness Standards. The use of this guide can also foster collaborative planning across schools and districts throughout the state.

**DEVELOPMENT**

The following planning and subsequent grouping of standards were determined through a collaborative process among state-level content specialists. By connecting standards through common conceptual understandings and relationships, the expectation is that conceptual connections will promote a cohesive process and avoid the teaching of standards in isolation. Additionally, it promotes a deeper understanding and a more authentic acquisition of mathematical knowledge and skills. The Standards for Mathematical Practices (SMPs) presented are those suggested to be highlighted within the respective standard; however, this does not exclude the inclusion of other SMPs. The standards determined as “**priority**” have been bolded and are standards identified as critical to the mastery of other standards. A standard’s “**priority**” status does *NOT* have a direct correlation with test item frequency. Additionally, some standards may appear multiple times throughout the course with a portion of the standard highlighted to depict that only that portion of the standard is to be taught within that unit.

**RESOURCES FOR CONSIDERATION**

The resources listed below may be referenced to support classroom teachers in the development of lesson plans and instruction at the local level. This list is not meant to be exhaustive, rather it represents consultative resources that align with the Units/Themes provided in the Instructional Planning Guides. Educators are encouraged to use these resources in addition to those curriculum materials that meet the needs of the students they serve.

| High-Quality Instructional Materials (HQIM) | Instruction and Planning Resources | Standards for Mathematical Practices (SMPs) | Assessment  Resources | Professional Development |
| --- | --- | --- | --- | --- |
| * [What is MS HQIM?](https://mdek12.org/HQIM) * [MS Adopted HQIM (Textbooks)](https://www.mdek12.org/caravan2019) * [Illustrative Mathematics Algebra II Curriculum](https://curriculum.illustrativemathematics.org/HS/teachers/3/index.html) * [Big Ideas Easy Access Student Edition](https://bim.easyaccessmaterials.com/index.php?level=11.00) * [Carnegie Learning Algebra II Course Pacing](https://cdn.carnegielearning.com/assets/mathiax-pdfs/A2_TIG_SS_TEXT.pdf) * [Great Minds Teacher Resource Pack K-12](https://eurekamath.greatminds.org/teacher-resource-pack) * [Great Minds Alignment to MSCCRS](https://greatminds.org/resources/products/mississippi-standards-alignment-study) * [Kendall Hunt-Illustrative Mathematics Curriculum](https://im.kendallhunt.com/) | * [Achieve the Core Coherence Map-HS Math](https://achievethecore.org/coherence-map/HS) * [Standards Dependency and Flow View](http://jeffbaumes.github.io/standards/) * *Scaffolding Instruction for ELLs* * [Achieve the Core CCR Shifts in Mathematics](https://achievethecore.org/page/900/college-and-career-ready-shifts-in-mathematics) * [Standards Progressions for Mathematics Progression Documents](http://ime.math.arizona.edu/progressions/) * [Teacher Desmos](https://teacher.desmos.com/) * [SFUSD Manipulatives List](http://www.sfusdmath.org/manipulatives.html) * [Printable Manipulatives](https://www.mathematicalpractices.com/mp1e/content/printable-manipulatives/) * [Achieve the Core Instructional Practice Guide HS](https://achievethecore.org/content/upload/Instructional%20Practice%20Guide_Math_HS.pdf) * [Equip Exemplar Units - Algebra](https://www.achieve.org/equip/examples?field_exemplar_tags_tid%5B%5D=131&field_exemplar_tags_tid_1%5B%5D=111&field_exemplar_tags_tid_2%5B%5D=146) * [Mississippi CCRS Exemplar Lesson Plans](https://mdek12.org/ESE/math/lesson-plans) * [CPM Core Connections Algebra II Resources](https://cpm.org/cca2-additional-resources) * [CPM Algebra II Connections Additional Resources](https://cpm.org/a2c-additional-resources) * [Big Ideas Skills Review Handbook HS](https://bim.easyaccessmaterials.com/protected/content/srh/hs/) * [HCPSS Family Mathematics Support Center-Algebra II](http://hcpssfamilymath.weebly.com/algebra-2--gt.html) * [MS CCRS Scaffolding Documents](https://mdek12.org/ese/ccr) * [Access for All Guidance](https://mdek12.org/sites/default/files/documents/OAE/OAE/2019-access-for-all-guide.pdf) * [MDE Family Guides for Student Success](https://mdek12.org/OAE/OEER/FamilyGuidesEnglish)\*   (Alternative Language: [Spanish](https://mdek12.org/OAE/OEER/FamilyGuidesSpanish))  *\*This resource can be used for standards reinforcement of previous grades.* | * [Illustrative Mathematics Understanding the Standards for Mathematical Practices (SMPs)](http://tasks.illustrativemathematics.org/practice-standards/) * [Inside Mathematics Mathematical Practice Standards](https://www.insidemathematics.org/common-core-resources/mathematical-practice-standards) * [Inside Mathematics Mentors of Mathematical Practice](https://www.insidemathematics.org/common-core-resources/mentors-of-mathematical-practice) | * [Desmos Graphing Calculato](https://www.desmos.com/calculator)r * [MDE Desmos Calculator Support](https://www.mdek12.org/ese/Desmos-Calculator-Support) * [Inside Mathematics Performance Tasks 2-HS](https://www.insidemathematics.org/performance-assessment-tasks) * [Illustrative Mathematics Grade HS Tasks](http://tasks.illustrativemathematics.org/HS) * [MARS Mathematics Assessment Project (6-HS)](https://www.map.mathshell.org/index.php) * [Goalbook Pathways Grade HS](https://goalbookapp.com/pathways/?ref=topic#!/browse-topics/math/9-12) * [Khan Academy HS Algebra 2](https://www.khanacademy.org/math/algebra2) | * [MDE Professional Development Resources](https://www.mdek12.org/OPD/home) * [SchoolKit and IM Video Lessons](http://schoolkitgroup.com/video-algebra/) * [MARS Prototype Professional Development Modules](https://www.map.mathshell.org/pd.php) * [NCTM Professional Development Resources](https://www.nctm.org/Conferences-and-Professional-Development/Professional-Development-Resources/) * [NCTM Math Forum](https://www.nctm.org/mathforum/) * [Great Minds (Eureka) Webinars](https://eurekamath.greatminds.org/webinar-library) * [Using Manipulatives in the Classroom](https://www.teachervision.com/professional-development/using-manipulatives) * [Learn Desmos](https://learn.desmos.com/) |
| Applets, Demos, Interactives, and Virtual Manipulatives | | | | |
| * [CPM Tiles](https://technology.cpm.org/general/tiles/) * [Didax Virtual Manipulatives](https://www.didax.com/math/virtual-manipulatives.html) * [Didax Free Activity Guides for Virtual Manipulatives](https://www.didax.com/virtual-manipulatives-activities) * [GeoGebra Virtual Manipulatives](https://www.geogebra.org/m/NPDu3rCm) * [Geometry Playground](https://www.maa.org/press/periodicals/loci/resources/geometry-playground) * [Houghton Mifflin and Harcourt iTools](https://www-k6.thinkcentral.com/content/hsp/math/hspmath/na/common/itools_int_9780547584997_/main.html) * [Interactive Mathematics Applications](https://www.intmath.com/help/interactive-math-applications.php) * [Interactivate Tools](http://www.shodor.org/interactivate/tools/) * [Key Curriculum Geometers Sketchpad](https://www.keycurriculum.com/training) * [Mathed Applets](https://www.mathed.page/applets.html) * [Mathies Learning Tools](https://www.mathies.ca/learningTools.php#gsc.tab=0) * [Mathigon Polypad](https://mathigon.org/polypad) * [Math Playground Math Manipulatives](https://www.mathplayground.com/math_manipulatives.html) * [Mathsbot Manipulatives](https://mathsbot.com/manipulativeMenu) * [McGraw Hill (Glencoe) Virtual Manipulatives](http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html) * [National Library of Virtual Manipulatives](http://nlvm.usu.edu/en/nav/vlibrary.html) * [NCTM Illuminations Interactives](https://illuminations.nctm.org/) | | | | |

| **TERM 1**  **UNIT OF STUDY**  (REAL-WORLD APPLICATION) **q** | **MS CCR STANDARDS q** | **STANDARDS FOR MATHEMATICAL  PRACTICE (SMPs) q** | CORE ACADEMIC **VOCABULARY TERMS q** |
| --- | --- | --- | --- |
| **Unit 1: Real Number System**  Students can apply their knowledge learned in this unit: to quickly calculate tips and discounts mentally while shopping, to build a foundation for advanced mathematics course such as Calculus, and to observe patterns and relationships in courses such as science and social studies. | N-RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 51/3 to be the cube root of 5 because we want [51/3] 3 = [51/3] 3 to hold, so [51/3] 3 must equal 5. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 7** Look for and make use of structure. | Cube Root  Radical  Rational Exponents  Rational Numbers |
|  | **N-RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.** | * **SMP 7** Look for and make use of structure. | Expressions  Properties of Exponents  Radicals  Rational Exponents |
| **Unit 2: Linear Equations and Inequalities**  Students can use linear equations to model real-world scenarios such as sailing.  Students can apply their knowledge learned in this unit: in future math classes such as Calculus and Statistics and in career fields such as health, chemistry, physics, and economics. | | A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Equations  Exponential Function Inequalities  Linear Function  Quadratic Function  Rational Function Variable |
|  | | A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [Note this standard appears in previous courses with a slight variation in the standard language.] | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Coordinate Axes  Dependent Variable Equation  Independent Variable  Variable |
|  | | **N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. | Quantity |
|  | | **A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Constraint  Equation  Inequality  Solutions  System of Equations  System of Inequalities |
| **Unit 3: Systems of Equations and Inequalities**  Students will use their knowledge of linear systems learned in this unit in other courses such as Chemistry, Physics and Economics. Students can use their knowledge of linear systems and inequalities outside of school to organize fund raisers, plan trips, and spend/budget their money wisely. Businesses use linear programming to maximize profits, give budgets and handle other constraints that exist. | | **A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Constraint  Equation  Inequality  Solutions  System of Equations  System of Inequalities |
|  | | **A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [Note this standard appears in previous courses with a slight variation in the standard language.]** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Coordinate Axes  Dependent Variable Equation  Independent Variable  Variable |
|  | | A-REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Solution Set  System of Linear Equations  Variables |
| **Unit 4: Expression Structure**  A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.  Students can use their knowledge of algebraic expressions to model the total points scored in sports games such as basketball, football, hockey, etc. | | **A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2) (x2 + y2).** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. | Coefficient  Difference of Squares  Expression  Factor  Term  Variable |
|  | | **A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. \***  **A-SSE.3c Use the properties of exponents to transform expressions for exponential functions. For example, the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 7** Look for and make use of structure. | Equivalent Exponential Functions  Expressions  Properties of Exponents |
|  | | **A-SSE.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1) and use the formula to solve problems. *For example, calculate mortgage payments*. \*** | * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Common Ratio  Finite Geometric Series |
|  | | A-APR.6 Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Rational Expression |
| **Unit 4: Polynomials**  (Students will use their knowledge of polynomials learned in this unit in future math courses such as College Algebra and Trigonometry. Students will use their knowledge of polynomials learned in this unit to solve real life problems in physics, graphic arts, computer science and engineering. Knowledge learned in this unit can help to predict the value of stocks and maximize or minimize volume and area.  Doctors use polynomials to model blood flow.) | | A-APR.2 Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 8** Look for and express regularity in repeated reasoning. | Binomial  Distributive Property  Factor  FOIL Method  Monomial  Polynomial  Remainder  Remainder Theorem  Trinomial |
|  | | A-APR.3 Identify zeros of polynomials when suitable factorizations are available and use the zeros to construct a rough graph of the function defined by the polynomial. | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 8** Look for and express regularity in repeated reasoning. | Factor  Polynomial  Polynomial Function Zero of a Polynomial |
|  | | A-APR.4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2)2 = (x2 – y2)2 + (2xy)2 can be used to generate Pythagorean triples. | * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Polynomial Identities  Pythagorean Triple |
|  | | **A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 - y4 as (x2)2 - (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 - y2) (x2 + y2).** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. | Coefficient  Difference of Squares  Expression  Factor  Term  Variable |
| **Unit 6: Operations with Complex Numbers**  (In high school, students will be exposed to yet another extension of the number system, when the real numbers are augmented by the imaginary numbers to form the complex numbers. Students will utilize their knowledge of performing arithmetic operations to complex numbers.) | | N-CN.1 Know there is a complex number I, such that i2 = –1, and every complex number has the form a + bi with a and b real. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 6** Attend to precision. | Complex Number System  Imaginary Number  Real Number |
|  | | N-CN.2 Use the relation i2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Associative Property  Commutative Property  Complex Number  Distributive Property |
| **Unit 7: Quadratic Equations in One Variable**  (Students identify zeros of polynomials, including complex zeros of quadratic polynomials, and make connections between zeros of polynomials and solutions of polynomial equations. Quadratic equations can be used to find the maximum power generated by automobiles and watercraft. Students can use their knowledge of quadratic equations learned in this unit to create a quadratic equation to find out the amount of time it takes for water to fall from the top to the bottom of a waterfall.) | | **A-REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 7** Look for and make use of structure. | Complex Zeros  Polynomial Equation  Quadratic Equation  Root  Solution  X-Axis  Y-Axis  Zero of A Solution |
|  | | **A-REI.4 Solve quadratic equations in one variable.**  **A-REI.4b Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Completing the Square  Complex Solutions Factoring  Quadratic Equation  Quadratic Formula  Solution  Square Roots  Variable |
|  | | **A-CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. \*** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Equation  Inequality  Quadratic Function Solution |
|  | | N-CN.7 Solve quadratic equations with real coefficients that have complex solutions. | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 7** Look for and make use of structure | Complex Solutions Quadratic Equation  Real Coefficients  Solution |

| **TERM 2**  **UNIT OF STUDY**  (REAL-WORLD APPLICATION) **q** | **MS CCR STANDARDS q** | **STANDARDS FOR MATHEMATICAL  PRACTICE (SMPs) q** | CORE ACADEMIC **VOCABULARY TERMS q** |
| --- | --- | --- | --- |
| **Unit 8: Linear and Quadratic Simple Systems**  Students develop the structural similarities between the system of polynomials and the system of integers. | A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = -3x and the circle x2 + y2 = 3. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Intersection Point Linear System  Quadratic System |
|  | A-REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. | Intersection Point Solution Set  System of Linear Equations  Variable |
| **Unit 9: Quadratic Functions**  Functions are an important tool for analyzing real world problems. Students will use their knowledge of quadratic functions learned in this unit in other courses such as Chemistry, Physics, Economics, and other advanced math courses.  Students can use their knowledge of quadratic functions learned in this unit to describe data such as the “path” of a football that has been kicked into the air. | **F-IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \***  **F-IF.7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.** | * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Axis of Symmetry  Graph  Maximum Value  Minimum Value Quadratic Function  Roots  Vertex  Vertex Form of a Quadratic Function  Discriminant |
|  | **F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*** | * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Function  Maximum Value Quadratic Function |
| **Unit 10: Function Sequence**  Functions describe situations where one quantity determines another. Students will use their knowledge learned in this unit in future math classes such as Precalculus, Calculus, and in Physics classes to model patterns. Students can apply their knowledge within this unit outside of school to calculate the growth of financial investments. | **A-REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = *f*(x) and y = *g(*x) intersect are the solutions of the equation *f*(x) = *g(*x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f*(x) and/or *g(*x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Absolute Value Function  Approximation Exponential Function  Function  Intersection  Linear Function  Logarithmic Function  Polynomial Function  Rational Function  Solution  Solution Set  X-Coordinates |
|  | **F-IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by *f(*0) = *f*(1) = 1, *f*(n+1) = *f*(n) + *f*(n-1) for n ≥ 1.** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure.   **SMP 8** Look for and express regularity in repeated reasoning. | Domain  Integer  Fibonacci Sequence Recursive  Sequence  Subset |
|  | **F-BF.1 Write a function that describes a relationship between two quantities. \***  **F-BF.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Function  Quantity |
|  | **F-BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. \*** | * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Arithmetic Sequence  Explicit Formula  Geometric Sequence  Recursive  Recursive Formula Sequence |
| **Unit 11: Exponential Functions**  Students synthesize and generalize what they have learned about a variety of function families. They extend their work with exponential functions to include solving exponential equations with logarithms and solving problems involving compound interest.  Students will use their knowledge of exponential functions learned in this unit in future math courses such as Statistics and Business Calculus and scientific fields such as biology, sociology, which require collecting, organizing, and analyzing data. | S-ID.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. \*  S-ID.6a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Data  Exponential Function Line of Best Fit  Linear Function  Quadratic Function  Scatter Plot  Variable |
|  | **F-LE.5** Interpret the parameters in a linear or exponential function in terms of a context. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. | Exponential Function Linear Function  Parameter |
|  | **F-IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. \***  **F-IF.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.** | * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Coordinate Plane  Exponential Function Function  Graph  X-Axis  X-Coordinates  Y-Axis  Y-Coordinates |
|  | **F-IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.**  **F-IF.8b Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth and decay.** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. | Equivalent  Exponential Function  Expression  Function  Properties of Exponents  Rate of Change |
|  | **F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.** | * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Function  Maximum |
|  | F-LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Exponential Function  Input  Ordered Pair  Output |
|  | F-LE.4 For exponential models, express as a logarithm the solution to abct = d where *a*, *c*, and *d* are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. \* | * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Base  Exponent  Exponential Form Exponential Model  Logarithm  Solution |
|  | F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. | Exponential Function Linear Function  Parameter |
|  | **F-BF.1 Write a function that describes a relationship between two quantities. \***  **F-BF.1b Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Base  Exponent  Exponential Decay  Exponential Function  Function  Quantity |
|  | F-BF.3 Identify the effect on the graph of replacing *f*(x) by *f*(x) + k, k *f*(x), *f*(kx), and *f*(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. | * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Even Function  Graph  Odd Function |
|  | **A-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning | Coefficient  Equation  Linear Equation  Linear Inequality  Solution  Variable |
|  | **A-REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = *f*(x) and y = *g(*x) intersect are the solutions of the equation *f*(x) = *g(*x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f*(x) and/or *g(*x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Absolute Value Function  Approximation Exponential Function  Function  Intersection  Linear Function  Logarithmic Function  Polynomial Function  Rational Function  Solution  Solution Set  X-Coordinates |
|  | **A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. \***  **A-SSE.3c Use the properties of exponents to transform expressions for exponential functions. For example, the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 7** Look for and make use of structure. | Equivalent Exponential Functions  Expressions  Properties of Exponents |
|  | **A-CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. \*** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Equation  Inequality  Quadratic Function Solution |
| **Unit 12: Comparing Exponential, Linear, and Quadratic Functions**  (Collectors use exponential functions to model the value of rare items. Inverse functions are used to find prices before taxes, discounts, and extra charge.  Students will use their knowledge learned in this unit in future math courses such as Calculus and Statistics and other classes such as Health, Chemistry, Physics and Economics.) | **F-IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. | Domain  Exponential Function  Linear Function  Parameter  Quadratic Function  Range  Transformation |
|  | **F-IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Axis of Symmetry  Decreasing Function  Function  Increasing Function  Interval Notation  Quantity  Relative Maximum  Relative Minimum  Symmetry  X-Intercept  Y-Intercept |
|  | S-ID.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. \*  S-ID.6a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Data  Exponential Function Line of Best Fit  Linear Function  Quadratic Function  Scatter Plot  Variable |
|  | F-LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 8** Look for and express regularity in repeated reasoning. | Exponential Function  Graph  Linear Function  Polynomial Function Quadratic Function  Quantity  Table |
|  | **A-REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = *f*(x) and y = *g(*x) intersect are the solutions of the equation *f*(x) = *g(*x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f*(x) and/or *g(*x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. \*** | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Absolute Value Function  Approximation Exponential Function  Function  Intersection  Linear Function  Logarithmic Function  Polynomial Function  Rational Function  Solution  Solution Set  X-Coordinates |
|  | F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. | Exponential Function Linear Function  Parameter |
|  | F-IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. | * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Algebraic Expression  Function  Maximum  Quadratic Function |
|  | F-BF.3 Identify the effect on the graph of replacing *f*(x) by *f*(x) + k, k *f*(x), *f*(kx), and *f*(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. | * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Even Function  Graph  Odd Function |
|  | F-BF.4 Find inverse functions.  F-BF.4a Solve an equation of the form *f*(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, *f*(x) =2x3 or *f*(x) = (x+1)/(x-1) for x ≠ 1. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Equation  Expression  Inverse Function  Solution |

| **TERM 3**  **UNIT OF STUDY**  (REAL-WORLD APPLICATION) **q** | **MS CCR STANDARDS q** | **STANDARDS FOR MATHEMATICAL  PRACTICE (SMPs) q** | CORE ACADEMIC **VOCABULARY TERMS q** |
| --- | --- | --- | --- |
| **Unit 13: Trigonometric Functions**  (Building on their previous work with functions, and on their work with trigonometric ratios and circles in Geometry, students now use the coordinate plane to extend trigonometry to model periodic phenomena.  Students will use their knowledge learned in this unit in future math courses such as Precalculus, and in scientific fields such as astronomy, forensics, geology, and engineering.) | F-TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. | * **SMP 6** Attend to precision. | Angle  Angle Measure  Arc Length  Degrees  Pi  Radian Measure  Radians  Unit Circle |
|  | F-TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 6** Attend to precision. | Angle  Adjacent Side  Coordinate Plane  Cosine  Counterclockwise  Hypotenuse  Opposite Side  Pi  Radian Measure  Real Number  Sine  Tangent  Trigonometric Function  Unit Circle  X-Axis  Y-Axis |
| **Unit 14: Expressing Geometric Properties with Equations**  (Students will apply their knowledge of equations to translate between the geometric description and the equation for a conic section. Knowledge learned in this unit can be applied to future math classes and other subject area classes such as Chemistry, Physics and Economics. This skill can be used outside of the classroom in careers such as engineering, architecture, astronomy, photography, and communications.) | G-GPE.2 Derive the equation of a parabola given a focus and directrix. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Directrix  Equation  Focus  Parabola |

| **TERM 4**  **UNIT OF STUDY**  (REAL-WORLD APPLICATION) **q** | **MS CCR STANDARDS q** | **STANDARDS FOR MATHEMATICAL  PRACTICE (SMPs) q** | CORE ACADEMIC **VOCABULARY TERMS q** |
| --- | --- | --- | --- |
| **Unit 15: Probability and Statistics**  (Students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions.  Statistics help to provide the necessary tools for describing the variances that occurs in data and to make informed decisions based on the data. Students can use their knowledge of probability and statistics learned in this unit to form a solid foundation for studies in advanced statistics and to calculate and report appropriate measures when analyzing data. Students can find probabilities involved in games and events.) | S-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. | Experiment  Observational Studies  Randomization Sample Survey |
|  | S-IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. | Data  Margin of Error  Population Mean  Proportion  Random Sampling Sample Survey  Simulation Model |
|  | S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 8** Look for and express regularity in repeated reasoning. | Experiment  Data  Parameters Randomized  Simulations |
|  | S-IC.6 Evaluate reports based on data. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Data |
|  | S-IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. \* | * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. | Inference  Parameters  Population  Random Sample Statistics |
|  | S-IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. *Would a result of 5 tails in a row cause you to question the model?* \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Consistent  Probability  Results  Simulation |
|  | **S-ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. \*** | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Area Under A Curve  Data Set  Estimate  Mean  Normal Distribution  Percentage  Population  Standard Deviation  Statistics |
|  | S-ID.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. \*  S-ID.6a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. | * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Data  Exponential Model Function  Line of Best Fit  Linear Model Quadratic Model  Quantitative  Scatter Plot  Variables |
|  | S-CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Categories  Complement  Events  Intersection  Outcome  Sample Space  Subset  Union |
|  | S-CP.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities and use this characterization to determine if they are independent. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Events  Independent  Probability  Product |
|  | S-CP.3 Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.\* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure | Conditional Probability  Independent  Probability |
|  | S-CP.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results*. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 2** Reason abstractly and quantitatively. * **SMP 3** Construct viable arguments and critique the reasoning of others. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. * **SMP 8** Look for and express regularity in repeated reasoning. | Conditional Probability  Data  Estimate  Event  Frequency Table  Independent Event  Random Sample  Random Selection Sample Space |
|  | S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 4** Model with Mathematics. * **SMP 6** Attend to precision. * **SMP 8** Look for and express regularity in repeated reasoning. | Conditional Probability  Independent |
|  | S-CP.6 Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A and interpret the answer in terms of the model. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 7** Look for and make use of structure. | Conditional Probability  Fraction  Outcome |
|  | S-CP.7 Apply the Addition Rule, P (A or B) = P(A) + P(B) – P (A and B) and interpret the answer in terms of the model. \* | * **SMP 1** Make sense of problems and preserve in solving them. * **SMP 4** Model with Mathematics. * **SMP 5** Use appropriate tools strategically. * **SMP 6** Attend to precision. * **SMP 7** Look for and make use of structure. | Addition Rule  Event  Outcome  Probability |

***\* Modeling Standards***

1. *https://tntp.org/assets/documents/TNTP\_The-Opportunity-Myth\_Web.pdf* [↑](#footnote-ref-2)