# Mathematics Scope & Sequence 2018-19
# Mathematical Models with Applications

Revised: August, 2018

| First Grading Period (42 Days) | | Days |
|---|---|---|
| **Standard(s)** | **Including, but not limited to…** | |
| **Personal Finance** M.2A use rates and linear functions to solve problems involving personal finance and budgeting, including compensations and deductions<br><br>M.4A analyze and compare coverage options and rates in insurance | Solve personal finance and budgeting problems using rates and linear functions (M.2A)<br><br>Calculate compensations and deductions using rates and linear functions (M.2A)<br><br>Solve problems with rates and functions represented graphically (M.2A)<br><br>Solve problems with rates and functions represented algebraically (M.2A)<br><br>Solve problems with rates and functions represented with ordered pairs or tables (M.2A)<br><br>Analyze a variety of types of insurance, including life, health, car, homeowner's, renter's, and mortgage (M.4A)<br><br>Compare coverage options and rates in insurance (M.4A) | **9-11 Days** |
| *Textbook Sections*: 1.11, 1.12, 3.8, 5.1, 5.9 | | |
| **Standard(s)** | **Including, but not limited to…** | |
| **Personal Taxes** M.2B solve problems involving personal taxes | Describe attributes that contribute to calculating personal taxes such as federal tax, social security tax, Medicare tax, sales tax, state tax (M.2B)<br><br>Solve real world problems involving taxes such as federal tax, social security tax, Medicare tax, sales tax, state tax (M.2B)<br><br>Communicate solutions involving personal taxes using multiple representations (M.2B) | **7-9-Days** |
| *Textbook Sections*: 5.1 | | |
| *First Grading Period's curriculum continued on next page* | | |

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Banking and Investments** | M.2C analyze data to make decisions about banking, including options for online banking, checking accounts, overdraft protection, processing fees, and debit card/ATM fees<br><br>M.4B investigate and compare investment options, including stocks, bonds, annuities, certificates of deposit, and retirement plans | Compare options for online banking (M.2C)<br><br>Compare bank account options to determine the best account for a given set of circumstances including processing fees and debit card/ATM fees (M.2C)<br><br>Determine whether a person should opt into overdraft protection based on a given set of circumstances (M.2C)<br><br>Explain decisions about banking using multiple representations (M.2C)<br><br>Investigate investment options, including stocks, bonds, annuities, certificates of deposit, and retirement plans (M.4B)<br><br>Compare investment options, including stocks, bonds, annuities, certificates of deposit, and retirement plans (M.4B) | **9-11 Days** |
| | *Textbook Sections:*5.2, 5.3, 5.4, 5.10, 5.11 | | |
| | **Standard(s)** | **Including, but not limited to…** | |
| **Personal Credit** | M.3B analyze personal credit options in retail purchasing and compare relative advantages and disadvantages of each option<br><br>M.4C analyze types of savings options involving simple and compound interest and compare relative advantages of these options | Calculate simple and compound interest (M.4C)<br><br>Analyze types of savings options including savings accounts, money market accounts, and certificates of deposit (M.4C)<br><br>Analyze the interest rates, safety of returns, flexibility and liquidity of assets of savings accounts, money market accounts, and certificates of deposit (M.4C)<br><br>Analyze savings options represented numerically, graphically, and with an algebraic formula (M.4C)<br><br>Compare and contrast savings accounts, money market accounts, and certificates of deposit (M.4C)<br><br>Analyze personal credit options, including deferred payments, credit cards and personal loans (M.3B)<br><br>Analyze interest rates, term lengths, and payment timelines for personal credit options, including deferred payment, credit card, and personal loan (M.3B)<br><br>Compare advantages and disadvantages of credit options, including deferred payment, credit card, and personal loan to make informed decisions based on a given set of circumstances (M.3B) | **10-11 Days** |
| | *Textbook Sections*: 5.3, 5.8 | | |

| Second Grading Period (39 Days) | | | Days |
|---|---|---|---|
| | **Standard(s)** | **Including, but not limited to…** | |
| **Amortization** | M.3A use formulas to generate tables to display series of payments for loan amortizations resulting from financed purchases<br><br>M.3C use technology to create amortization models to investigate home financing and compare buying a home to renting a home<br><br>M.3D create amortization models to investigate automobile financing and compare buying a vehicle to leasing a vehicle | Create a table from a formula to represent a series of payments for loan amortizations (M.3A)<br><br>Create amortization models for home financing using technology (M.3C)<br><br>Explore loan amortizations from a variety of financed purchases (M.3A)<br><br>Investigate the various factors that affect home financing (M.3C)<br><br>Compare buying a home to renting a home (M.3C)<br><br>Create amortization models for vehicle financing using technology (M.3.D)<br><br>Investigate the various factors that affect automobile financing (M.3D)<br><br>Compare buying a vehicle to leasing a vehicle (M.3D) | **10-11 Days** |
| | *Textbook Sections*: 3.3, 5.5 – 5.8 | | |
| | *Second Grading Period's curriculum continued on next page* | | |

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Physical Laws and Motion** | M.5A use proportionality and inverse variation to describe physical laws such as Hook's Law, Newton's Second Law of Motion, and Boyle's Law<br><br>M.5C use quadratic functions to model motion | Calculate and compare the force, distance extended or compressed, and the stiffness of springs using Hook's Law (M.5A)<br><br>Calculate and compare the net force, mass or acceleration of objects using Newton's Second Law of Motion (M.5A)<br><br>Calculate and compare the pressures of gases, the volume of gases, and the constant using Boyle's Law (M.5A)<br><br>Compare the same gas under two different volumes and pressures using Boyle's Law (M.5A)<br><br>Explain how direct and inverse variation are applied to physical laws such as Hook's Law, Newton's Second Law of Motion, and Boyle's Law (M.5A)<br><br>Model motion, such as an object dropped, bounced, thrown, or kicked, using quadratic functions (M.5C)<br><br>Analyze quadratic data to describe motion represented in tables, graphs, and equations in standard and vertex form (M.5C)<br><br>Make predictions regarding motion based on data of quadratic functions (M.5C)<br><br>Model quadratic functions using data sets from science and engineering concepts (M.5C) | **9-10 Days** |
| | *Textbook Sections*: 4.1 – 4.3, 4.5, 4.7 – 4.9 | | |
| | *Second Grading Period's curriculum continued on next page* | | |

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Exponential Functions** | M.5B use exponential models available through technology to model growth and decay in areas, including radioactive decay<br><br>M.9F use regression methods available through technology to model linear and exponential functions, interpret correlations, and make predictions | Model sets of data related to social sciences with linear functions using regression methods through technology (M.9F)<br><br>Interpret correlations based on linear regressions (M.9F)<br><br>Model sets of data related to social sciences with exponential functions using regression methods through technology (M.9F)<br><br>Model growth and decay exponential functions in areas such as population, biology, ecology, and chemistry, using technology (M.5B)<br><br>Model radioactive decay and other real world exponential functions related to science and engineering (M.5B)<br><br>Interpret correlations based on growth and decay of exponential functions (M.9F)<br><br>Analyze exponential regression models represented in tables, graphs, and equations (M.5B)<br><br>Make predictions based on data of exponential functions (M.5B)<br><br>Predict the independent or dependent quantity based on the given information within a real-world situation for both linear and exponential functions (M.9F) | **10-11 Days** |
| | *Textbook Sections*: 6.1 – 6.7 | | |
| **Semester Review** | Review/Midterm Exam | | **5-7 Days** |

| Third Grading Period (47 Days) | Days |
|---|---|

<table>
<tr><td rowspan="3"><strong>Right Triangles</strong></td><td colspan="2"><strong>Standard(s)</strong>       <strong>Including, but not limited to…</strong></td><td rowspan="2"><strong>8-9 Days</strong></td></tr>
</table>

| | **Standard(s)** | **Including, but not limited to…** | **Days** |
|---|---|---|---|
| **Right Triangles** | M.6C use the Pythagorean Theorem and special right-triangle relationships to calculate distances<br><br>M.6D use trigonometric ratios to calculate distances and angle measures as applied to fields | Calculate the length of the hypotenuse and legs of a right triangle using the Pythagorean Theorem and special right-triangle relationships (M.6C)<br><br>Identify appropriate situations to use the Pythagorean Theorem and/or special right-triangle relationships (M.6C)<br><br>Calculate distances and angle measures using trigonometric ratios (M.6D)<br><br>Solve problems in fields such as surveying, navigation, and orienteering using trigonometric ratios (M.6D) | **8-9 Days** |
| | *Textbook Sections*: 6.9 – 6.12 | | |
| | **Standard(s)** | **Including, but not limited to…** | |
| **Periodic Behavior** | M.7A use trigonometric ratios and functions available through technology to model periodic behavior in art and music<br><br>M.7C ~~use geometric transformations, proportions, and~~ periodic motion to describe mathematical patterns and structure in music | Model periodic behavior found in art and music using trigonometric ratios (M.7A)<br><br>Analyze models of periodic behavior to answer questions involving art and music (M.7A)<br><br>Investigate patterns of periodic functions using amplitude (volume) and frequency (pitch) of music (M.7C) | **4-5 Days** |
| | *Textbook Sections*: 6.14, 6.15, 6.17 | | |
| | **Standard(s)** | **Including, but not limited to…** | |
| **Geometric Models** | M.6.A use similarity, geometric transformations, symmetry, and perspective drawings to describe mathematical patterns and structure in architecture<br><br>M.7.B use similarity, geometric transformations, symmetry, and perspective drawings to describe mathematical patterns and structure in art and photography<br><br>M.7.C use geometric transformations, proportions, and periodic motion to describe mathematical patterns and structure in music | Describe symmetry in architecture (M.6A)<br><br>Describe symmetry in art and photography (M.7B)<br><br>Describe mathematical patterns in architecture using dilations, translations, rotations, and reflections (M.6A)<br><br>Describe mathematical patterns in art and photography using dilations, translations, rotations, and reflections (M.7B)<br><br>Describe mathematical patterns and structure in music using transformations, proportions (harmonic frequencies), and periodic motion (M.7C)<br><br>Describe mathematical patterns and structures in art and photography using perspective drawings and similarity (M.7B)<br><br>Describe mathematical patterns and structures in architecture using perspective drawings and similarity (M.6A) | **5-6 Days** |
| | *Textbook Sections*: 7.6, 7.7, 7.12 | | |
| | *Third Grading Period's curriculum continued on the next page.* | | |

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Scale Factor** | M.6.B use scale factors with two-dimensional and three-dimensional objects to demonstrate proportional and non-proportional changes in surface area and volume as applied to fields [such as engineering drawing, architecture, and construction]<br><br>M.7.D use scale factors with two-dimensional and three-dimensional objects to demonstrate proportional and non-proportional changes in surface area and volume as applied to fields [such as painting, sculpture, and photography] | Demonstrate proportional changes in area of two-dimensional figures in science and engineering using scale factors (M.6B)<br><br>Demonstrate proportional changes in area of two-dimensional figures in art using scale factors (M.7D)<br><br>Demonstrate non-proportional changes in area of two-dimensional figures in science and engineering using scale factor (M.6B)<br><br>Demonstrate non-proportional changes in area of two-dimensional figures in art using scale factor (M.7D)<br><br>Demonstrate proportional changes in surface area of three-dimensional objects in science and engineering using scale factors (M.6B)<br><br>Demonstrate proportional changes in surface area of three-dimensional objects in art using scale factors (M.7D)<br><br>Demonstrate non-proportional changes in surface area of three-dimensional objects in science and engineering using scale factors (M.6B)<br><br>Demonstrate non-proportional changes in surface area of three-dimensional objects in art using scale factors (M.7D)<br><br>Demonstrate proportional changes in volume of three-dimensional objects in science and engineering using scale factors (M.6B)<br><br>Demonstrate proportional changes in volume of three-dimensional objects in art using scale factors (M.7D)<br><br>Demonstrate non-proportional changes in volume of three-dimensional objects in science and engineering using scale factors (M.6B)<br><br>Demonstrate non-proportional changes in volume of three-dimensional objects in art using scale factors (M.7D) | **7-8 Days** |
| | *Textbook Sections*: 1.4, 7.3, 7.6, 7.9 – 7.11 | | |
| | *Third Grading Period's curriculum continued on the next page.* | | |

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Probability** | M.8.A determine the number of ways an event may occur using combinations, permutations, and the Fundamental Counting Principle | Determine the number of ways an event [such as a sports tournament] may occur using combinations (M.8A)<br><br>Determine the number of ways an event may occur using permutations (M.8A)<br><br>Determine the number of ways an event may occur using the Fundamental Counting Principle (M.8A) | **10-11 Days** |
| | *Textbook Sections*: 2.11-2.14 | | |
| | Standard(s) | Including, but not limited to… | |
| **Experiments** | M.8.B compare theoretical to empirical probability<br><br>M.8.C use experiments to determine the reasonableness of a theoretical model such as binomial or geometric | Compare theoretical to empirical probability [such as determining if a particular game of chance is fair] (M.8B)<br><br>Determine if a game of chance is fair (M.8B)<br><br>Determine reasonableness of a binomial model in experiments such as flipping a coin (M.8C)<br><br>Determine possible outcomes and their likelihood using a geometric model (M.8C)<br><br>Determine the reasonableness of a theoretical model by experimenting or given the results of an experiment (M.8C) | **7-8 Days** |
| | *Textbook Sections*: 2.13, 2.15 | | |

| Fourth Grading Period (46 Days) | Days |
|---|---|

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Interpreting Graphs** | M.9.A interpret information from various graphs, including line graphs, bar graphs, circle graphs, histograms, scatterplots, dot plots, stem-and-leaf plots, and box and whisker plots, to draw conclusions from the data and determine the strengths and weaknesses of conclusions | Interpret information from line graphs to draw conclusions (M.9A)<br><br>Interpret information from bar graphs to draw conclusions (M.9A)<br><br>Interpret information from circle graphs to draw conclusions (M.9A)<br><br>Interpret information from histograms to draw conclusions (M.9A)<br><br>Interpret information from scatterplots to draw conclusions (M.9A)<br><br>Interpret information from dot plots to draw conclusions (M.9A)<br><br>Determine strengths and weakness of conclusions based on various graphs (M.9A) | **9-10 Days** |

*Textbook Sections*: 2.1-2.4

| | Standard(s) | Including, but not limited to… | |
|---|---|---|---|
| **Statistics** | M.9.A interpret information from various graphs, including line graphs, bar graphs, circle graphs, histograms, scatterplots, dot plots, stem-and-leaf plots, and box and whisker plots, to draw conclusions from the data and determine the strengths and weaknesses of conclusions<br><br>M.9.B analyze numerical data using measures of central tendency (mean, median, and mode) and variability (range, interquartile range or IQR, and standard deviation) in order to make inferences with normal distributions<br><br>M.9.D use data from a sample to estimate population mean or population proportion | Draw conclusions about normally-distributed data collected using measures of central tendency and measures of variability (M.9B)<br><br>Interpret information from box-and-whisker plots to draw conclusions (M.9A)<br><br>Make predictions based on normally-distributed data collected using measures of central tendency and measures of variability (M.9B)<br><br>Estimate population mean using data from a given sample (M.9D)<br><br>Estimate population proportion using data from a given sample (M.9D) | **9-10 Days** |

*Textbook Sections*: 2.5 – 2.7, 2.16

*Fourth Grading Period's curriculum continued on the next page.*

| | | Standard(s) | Including, but not limited to… | |
|---|---|---|---|---|
| **Research Study** | | M.9.C distinguish the purposes and differences among types of research, including surveys, experiments, and observational studies<br><br>M.9.E analyze marketing claims based on graphs and statistics from electronic and print media and justify the validity of stated or implied conclusions<br><br>M.10.A formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions<br><br>M.10.B communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation | Identify the purpose of different types of research, including surveys, experiments, and observational studies (M.9C)<br><br>Explain the differences between types of research, including surveys, experiments, and observational studies (M.9C)<br><br>Analyze marketing claims based on graphs from electronic and print media. (i.e. journals and newspapers) (M.9E)<br><br>Analyze marketing claims based on statistics presented in electronic and print media. (i.e. journals and newspapers) (M.9E)<br><br>Justify the validity of the stated conclusions (M.9E)<br><br>Justify the validity of the implied conclusions (M.9E)<br><br>Formulate a meaningful question to perform a study (M.10A)<br><br>Determine the data needed to answer the question in the study (M.10A)<br><br>Collect the data needed to answer the questions in the study (M.10A)<br><br>Analyze the data collected from the study (M.10A)<br><br>Draw a reasonable conclusion based on the study (M.10A)<br><br>Communicate methods used to complete a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation (M.10B)<br><br>Communicate analyses conducted for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation (M.10B)<br><br>Communicate conclusions drawn for a data-analysis project through the use of one or more of the following: a written report, a visual display, an oral report, or a multi-media presentation (M.10B) | **14-15 Days** |
| | | *Textbook Sections*: 2.8 – 2.10 | | |

Review/Exam

5-7 Days