Mathematics for Data and Financial Literacy

Version Description

In Mathematics for Data and Financial Literacy, instructional time will emphasize five areas:

> (1) extending knowledge of ratios, proportions and functions to data and financial contexts;
> (2) developing understanding of basic economic and accounting principles;
> (3) determining advantages and disadvantages of credit accounts and short- and long-term loans;
> (4) developing understanding of planning for the future through investments, insurance and retirement plans and
> (5) extending knowledge of data analysis to create and evaluate reports and to make predictions.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

All clarifications stated, whether general or specific to Mathematics for Data and Financial Literacy, are expectations for instruction of that benchmark.

General Notes

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards: This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section: Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf.

General Information

Course Number: 1200384	Course Type: Core Academic Course
Course Length: Year (Y)	Course Level: 2
	Grade Level(s): 9, 10, 11, 12
Graduation Requirement: Mathematics	Number of Credits: One (1) credit
Course Path: Section | Grades PreK to 12 Education Courses > Grade Group | Grades 9 to 12 and Adult Education Courses > Subject | Mathematics > SubSubject | Mathematical Studies/Applications > Abbreviated Title | MATH DATA & FIN LIT	
Educator Certification: Mathematics (Grades 6-12)	

Course Standards and Benchmarks

Mathematical Thinking and Reasoning

> ### MA.K12.MTR.1.1 Actively participate in effortful learning both individually and collectively.

Mathematicians who participate in effortful learning both individually and with others:
- Analyze the problem in a way that makes sense given the task.
- Ask questions that will help with solving the task.
- Build perseverance by modifying methods as needed while solving a challenging task.
- Stay engaged and maintain a positive mindset when working to solve tasks.
- Help and support each other when attempting a new method or approach.

Clarifications:
Teachers who encourage students to participate actively in effortful learning both individually and with others:
- Cultivate a community of growth mindset learners.
- Foster perseverance in students by choosing tasks that are challenging.
- Develop students' ability to analyze and problem solve.
- Recognize students' effort when solving challenging problems.

MA.K12.MTR.2.1 Demonstrate understanding by representing problems in multiple ways.

Mathematicians who demonstrate understanding by representing problems in multiple ways:
- Build understanding through modeling and using manipulatives.
- Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
- Progress from modeling problems with objects and drawings to using algorithms and equations.
- Express connections between concepts and representations.
- Choose a representation based on the given context or purpose.

Clarifications:
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
- Help students make connections between concepts and representations.
- Provide opportunities for students to use manipulatives when investigating concepts.
- Guide students from concrete to pictorial to abstract representations as understanding progresses.
- Show students that various representations can have different purposes and can be useful in different situations.

MA.K12.MTR.3.1 Complete tasks with mathematical fluency.

Mathematicians who complete tasks with mathematical fluency:
- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

Clarifications:
Teachers who encourage students to complete tasks with mathematical fluency:
- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

MA.K12.MTR.4.1 Engage in discussions that reflect on the mathematical thinking of self and others.

Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

Clarifications:
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1 Use patterns and structure to help understand and connect mathematical concepts.

Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

Clarifications:
Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1 Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:
- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

Clarifications:
Teachers who encourage students to assess the reasonableness of solutions:
- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1 Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:
- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate.
- Redesign models and methods to improve accuracy or efficiency.

Clarifications:
Teachers who encourage students to apply mathematics to real-world contexts:
- Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
- Challenge students to question the accuracy of their models and methods.
- Support students as they validate conclusions by comparing them to the given situation.
- Indicate how various concepts can be applied to other disciplines.

ELA Expectations

ELA.K12.EE.1.1 Cite evidence to explain and justify reasoning.

ELA.K12.EE.2.1 Read and comprehend grade-level complex texts proficiently.

ELA.K12.EE.3.1 Make inferences to support comprehension.

ELA.K12.EE.4.1 Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

> *ELA.K12.EE.5.1 Use the accepted rules governing a specific format to create quality work.*

> *ELA.K12.EE.6.1 Use appropriate voice and tone when speaking or writing.*

English Language Development

> *ELD.K12.ELL.MA Language of Mathematics*

ELD.K12.ELL.MA.1	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

Number Sense and Operations

> *MA.912.NSO.1 Generate equivalent expressions and perform operations with expressions involving exponents, radicals or logarithms.*

MA.912.NSO.1.1	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents.

Benchmark Clarifications:
Clarification 1: Instruction includes the use of technology when appropriate.
Clarification 2: Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
Clarification 3: Instruction includes converting between expressions involving rational exponents and expressions involving radicals.
Clarification 4: Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.

MA.912.NSO.1.2	Generate equivalent algebraic expressions using the properties of exponents.

Example: The expression 1.5^{3t+2} is equivalent to the expression $2.25(1.5)^{3t}$ which is equivalent to $2.25(3.375)^{t}$.

Algebraic Reasoning

> ***MA.912.AR.1 Interpret and rewrite algebraic expressions and equations in equivalent forms.***

MA.912.AR.1.1 Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

> *Algebra 1 Example:* Derrick is using the formula $P = 1000(1 + .1)^t$ to make a prediction about the camel population in Australia. He identifies the growth factor as $(1 + .1)$, or 1.1, and states that the camel population will grow at an annual rate of 10% per year.

> *Example:* The expression 1.15^t can be rewritten as $\left(1.15^{\frac{1}{12}}\right)^{12t}$ which is approximately equivalent to 1.012^{12t}. This latter expression reveals the approximate equivalent monthly interest rate of 1.2% if the annual rate is 15%.

Benchmark Clarifications:
Clarification 1: Parts of an expression include factors, terms, constants, coefficients and variables.
Clarification 2: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

MA.912.AR.1.2 Rearrange equations or formulas to isolate a quantity of interest.

> *Algebra 1 Example:* The Ideal Gas Law $PV = nRT$ can be rearranged as $T = \frac{PV}{nR}$ to isolate temperature as the quantity of interest.

> *Example:* Given the Compound Interest formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, solve for P.

> *Mathematics for Data and Financial Literacy Honors Example:* Given the Compound Interest formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, solve for t.

Benchmark Clarifications:
Clarification 1: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions.
Clarification 2: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

> **MA.912.AR.2 Write, solve and graph linear equations, functions and inequalities in one and two variables.**

MA.912.AR.2.5	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context.

Algebra 1 Example: Lizzy's mother uses the function $C(p) = 450 + 7.75p$, where $C(p)$ represents the total cost of a rental space and p is the number of people attending, to help budget Lizzy's 16th birthday party. Lizzy's mom wants to spend no more than $850 for the party. Graph the function in terms of the context.

Benchmark Clarifications:
Clarification 1: Key features are limited to domain, range, intercepts and rate of change.
Clarification 2: Instruction includes the use of standard form, slope-intercept form and point-slope form.
Clarification 3: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
Clarification 4: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
Clarification 5: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

> **MA.912.AR.5 Write, solve and graph exponential and logarithmic equations and functions in one and two variables.**

MA.912.AR.5.7	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context.

Example: The graph of the function $f(t) = e^{5t+2}$ can be transformed into the straight line $y = 5t + 2$ by taking the natural logarithm of the function's outputs.

Benchmark Clarifications:
Clarification 1: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes.
Clarification 2: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
Clarification 3: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function.
Clarification 4: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

MA.912.AR.9 Write and solve a system of two- and three-variable equations and inequalities that describe quantities or relationships.

MA.912.AR.9.10 Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context.

Example: A mechanic wants to place an ad in his local newspaper. The cost, in dollars, of an ad x inches long is given by the following piecewise function. Find the cost of an ad that would be 16 inches long.

$$C(x) = \begin{cases} 12x, & x < 5 \\ 60 + 8(x - 5), & x \geq 5 \end{cases}$$

Benchmark Clarifications:
Clarification 1: Key features are limited to domain, range, intercepts, asymptotes and end behavior.
Clarification 2: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.

MA.912.AR.10 Solve problems involving sequences and series.

MA.912.AR.10.1 Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.

Example: Tara is saving money to move out of her parent's house. She opens the account with $250 and puts $100 into a savings account every month after that. Write the total amount of money she has in her account after each month as a sequence. In how many months will she have at least $3,000?

MA.912.AR.10.2 Given a mathematical or real-world context, write and solve problems involving geometric sequences.

Example: A bacteria in a Petri dish initially covers 2 square centimeters. The bacteria grows at a rate of 2.6% every day. Determine the geometric sequence that describes the area covered by the bacteria after $0, 1, 2, 3 \ldots$ days. Determine, using technology, how many days it would take the bacteria to cover 10 square centimeters.

Functions

> ### MA.912.F.1 Understand, compare and analyze properties of functions.

MA.912.F.1.2	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output.

Algebra 1 Example: The function $f(x) = \frac{x}{7} - 8$ models Alicia's position in miles relative to a water stand x minutes into a marathon. Evaluate and interpret for a quarter of an hour into the race.

Benchmark Clarifications:
Clarification 1: Problems include simple functions in two-variables, such as $f(x, y) = 3x - 2y$.
Clarification 2: Within the Algebra 1 course, functions are limited to one-variable such as $f(x) = 3x$.

> ### MA.912.F.3 Create new functions from existing functions.

MA.912.F.3.2	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function.

Benchmark Clarifications:
Clarification 1: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation.
Clarification 2: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.

Financial Literacy

> ### MA.912.FL.1 Build mathematical foundations for financial literacy.

MA.912.FL.1.1	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business.

Benchmark Clarifications:
Clarification 1: Problems include discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.

MA.912.FL.1.2	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.

Example: A local grocery stores sells trail mix for $1.75 per pound. If the grocery store spends $0.82 on each pound of mix. How much will the store gain in gross profit if they sell 6.4 pounds in one day?

Example: If Juan makes $25.00 per hour and works 40 hours per week, what is his annual salary?

MA.912.FL.1.3	Solve real-world problems involving weighted averages using spreadsheets and other technology.

Example: Kiko wants to buy a new refrigerator and decides on the following rating system: capacity 50%, water filter life 30% and capability with technology 20%. One refrigerator gets 8 (out of 10) for capacity, 6 for water filter life and 7 for capability with technology. Another refrigerator gets 9 for capacity, 4 for water filter life and 6 for capability with technology. Which refrigerator is best based on the rating system?

MA.912.FL.2 Develop an understanding of basic accounting and economic principles.

MA.912.FL.2.1	Given assets and liabilities, calculate net worth using spreadsheets and other technology.

Example: Jose is trying to prepare a balance sheet for the end of the year based on his profits and losses. Create a spreadsheet showing his liabilities and assets, and compute his net worth.

Benchmark Clarifications:
Clarification 1: Instruction includes net worth for a business and for an individual.
Clarification 2: Instruction includes understanding the difference between a capital asset and a liquid asset.
Clarification 3: Instruction includes displaying net worth over time in a table or graph.

MA.912.FL.2.2	Solve real-world problems involving profits, costs and revenues using spreadsheets and other technology.

Example: A travel agency charges $2400 per person for a week-long trip to London if the group has 16 people or less. For groups larger then 16, the price per person is reduced by $100 for each additional person. Create an expression describing the revenue as a function of the number of people in the group. Determine the number of people that maximizes the revenue.

Benchmark Clarifications:
Clarification 1: Instruction includes the connection to data.
Clarification 2: Instruction includes displaying profits and costs over time in a table or graph and using the graph to predict profits.
Clarification 3: Problems include maximizing profits, maximizing revenues and minimizing costs.

MA.912.FL.2.4	Given current exchange rates, convert between currencies. Solve real-world problems involving exchange rates.

Benchmark Clarifications:
Clarification 1: Instruction includes taking into account various fees, such as conversion fee, foreign transaction fee and dynamic concurrency conversion fee.

MA.912.FL.2.5	Develop budgets that fit within various incomes using spreadsheets and other technology.

> *Example:* Develop a budget spreadsheet for your business that includes typical expenses such as rental space, transportation, utilities, inventory, payroll, and miscellaneous expenses. Add categories for savings toward your own financial goals, and determine the monthly income needed, before taxes, to meet the requirements of your budget.

Benchmark Clarifications:
Clarification 1: Instruction includes budgets for a business and for an individual.
Clarification 2: Instruction includes taking into account various cash management strategies, such as checking and savings accounts, and how inflation may affect these strategies.

MA.912.FL.2.6	Given a real-world scenario, complete and calculate federal income tax using spreadsheets and other technology.

Benchmark Clarifications:
Clarification 1: Instruction includes understanding the difference between standardized deductions and itemized deductions.
Clarification 2: Instruction includes the connection to piecewise linear functions with slopes relating to the marginal tax rates.

MA.912.FL.3 Describe the advantages and disadvantages of short-term and long-term purchases.

MA.912.FL.3.1	Compare simple, compound and continuously compounded interest over time.

Benchmark Clarifications:
Clarification 1: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.

MA.912.FL.3.2	Solve real-world problems involving simple, compound and continuously compounded interest.

Example: Find the amount of money on deposit at the end of 5 years if you started with $500 and it was compounded quarterly at 6% interest per year.

Example: Joe won $25,000 on a lottery scratch-off ticket. How many years will it take at 6% interest compounded yearly for his money to double?

Benchmark Clarifications:
Clarification 1: Within the Algebra 1 course, interest is limited to simple and compound.

MA.912.FL.3.5	Compare the advantages and disadvantages of using cash versus personal financing options.

Example: Compare paying for a tank of gasoline in the following ways: cash; credit card and paying over 2 months; credit card and paying balance in full each month.

Benchmark Clarifications:
Clarification 1: Instruction includes advantages and disadvantages for a business and for an individual.
Clarification 2: Personal financing options include debit cards, credit cards, installment plans and loans.

MA.912.FL.3.6	Calculate the finance charges and total amount due on a bill using various forms of credit using estimation, spreadsheets and other technology.

Example: Calculate the finance charge each month and the total amount paid for 5 months if you charged $500 on your credit card but you can only afford to pay $100 each month. Your credit card has a monthly periodic finance rate of 1.5% and an annual finance rate of 17.99%.

Benchmark Clarifications:
Clarification 1: Instruction includes how annual percentage rate (APR) and periodic rate are calculated per month and the connection between the two percentages.

MA.912.FL.3.7	Compare the advantages and disadvantages of different types of student loans by manipulating a variety of variables and calculating the total cost using spreadsheets and other technology.

Benchmark Clarifications:
Clarification 1: Instruction includes students researching the latest information on different student loan options.
Clarification 2: Instruction includes comparing subsidized (Stafford), unsubsidized, direct unsubsidized and PLUS loans.
Clarification 3: Instruction includes considering different repayment plans, including deferred payments and forbearance.
Clarification 4: Instruction includes how interest on student loans may affect one's income taxes.

| MA.912.FL.3.8 | Calculate using spreadsheets and other technology the total cost of purchasing consumer durables over time given different monthly payments, down payments, financing options and fees. |

Example: You want to buy a sofa that cost $899. Company A will let you pay $100 down and then pay the remaining balance over 3 years at 15.99% interest. Company B will not require a down payment and will defer payments for one year. However, you will accrue interest at a rate of 18.99% interest during that first year. Starting the second year you will have to pay the new amount for 2 years at a rate of 26 % interest. Which deal is better and why? Calculate the total amount paid for both deals.

Example: An electronics company advertises that if you buy a TV over $450, you will not have to pay interest for one year. If you bought a 65' TV, regularly $699.99 and on sale for 10% off, on January 1st and only paid $300 of the balance within the year, how much interest would you have to pay for the remaining balance on the TV? Assume the interest rate is 23.99%. What did the TV really cost you?

Benchmark Clarifications:
Clarification 1: Instruction includes how interest on loans may affect one's income taxes.

| MA.912.FL.3.9 | Compare the advantages and disadvantages of different types of mortgage loans by manipulating a variety of variables and calculating fees and total cost using spreadsheets and other technology. |

Benchmark Clarifications:
Clarification 1: Instruction includes understanding various considerations that qualify a buyer for a loan, such as Debt-to-Income ratio.
Clarification 2: Fees include discount prices, origination fee, maximum brokerage fee on a net or gross loan, documentary stamps and prorated expenses.
Clarification 3: Instruction includes a cost comparison between a higher interest rate and fewer mortgage points versus a lower interest rate and more mortgage points.
Clarification 4: Instruction includes a cost comparison between the length of the mortgage loan, such as 30-year versus 15-year.
Clarification 5: Instruction includes adjustable rate loans, tax implications and equity for mortgages.

| MA.912.FL.3.10 | Analyze credit scores qualitatively. Explain how short-term and long-term purchases, including deferred payments, may increase or decrease credit scores. Explain how credit scores influence buying power. |

Benchmark Clarifications:
Clarification 1: Instruction includes how each of the following categories affects a credit score: past payment history, amount of debt, public records information, length of credit history and the number of recent credit inquiries.
Clarification 2: Instruction includes how credit score affects qualification and interest rate for a home mortgage.

MA.912.FL.3.11 Given a real-world scenario, establish a plan to pay off debt.

> *Example:* Suppose you currently have a balance of $4500 on a credit card that charges 18% annual interest. What monthly payment would you have to make in order to pay off the card in 3 years, assuming you do not make any more charges to the card?

Benchmark Clarifications:
Clarification 1: Instruction includes the comparison of different plans to pay off the debt.
Clarification 2: Instruction includes pay off plans for a business and for an individual.

MA.912.FL.4 Describe the advantages and disadvantages of financial and investment plans, including insurances.

MA.912.FL.4.1 Calculate and compare options, deductibles and fees for various types of insurance policies using spreadsheets and other technology.

Benchmark Clarifications:
Clarification 1: Insurances include medical, car, homeowners, life and rental car.
Clarification 2: Instruction includes types of insurance for a business and for an individual.

MA.912.FL.4.3 Compare the advantages and disadvantages of various retirement savings plans using spreadsheets and other technology.

Benchmark Clarifications:
Clarification 1: Instruction includes weighing options based on salary and retirement plans from different potential employers.
Clarification 2: Instruction includes understanding the need to build one's own retirement plan when starting a business.

MA.912.FL.4.4 Collect, organize and interpret data to determine an effective retirement savings plan to meet personal financial goals using spreadsheets and other technology.

> *Example:* Investigate historical rates of return for stocks, bonds, savings accounts, mutual funds, as well as the relative risks for each type of investment. Organize your results in a table showing the relative returns and risks of each type of investment over short and long terms, and use these data to determine a combination of investments suitable for building a retirement account sufficient to meet anticipated financial needs.

Benchmark Clarifications:
Clarification 1: Instruction includes students researching the latest information on different retirement options.
Clarification 2: Instruction includes the understanding of the relationship between salaries and retirement plans.
Clarification 3: Instruction includes retirement plans from the perspective of a business and of an individual.
Clarification 4: Instruction includes the comparison of different types of retirement plans, including IRAs, pensions and annuities.

MA.912.FL.4.5   Compare different ways that portfolios can be diversified in investments.

Benchmark Clarifications:
Clarification 1: Instruction includes diversifying a portfolio with different types of stock and diversifying a portfolio by including both stocks and bonds.

MA.912.FL.4.6   Simulate the purchase of a stock portfolio with a set amount of money, and evaluate its worth over time considering gains, losses and selling, taking into account any associated fees.

Data Analysis and Probability

MA.912.DP.1 Summarize, represent and interpret categorical and numerical data with one and two variables.

MA.912.DP.1.2   Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display.

Benchmark Clarifications:
Clarification 1: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.

MA.912.DP.2 Solve problems involving univariate and bivariate numerical data.

MA.912.DP.2.4   Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data.

Benchmark Clarifications:
Clarification 1: Instruction includes fitting a linear function both informally and formally with the use of technology.
Clarification 2: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.

MA.912.DP.3 Solve problems involving categorical data.

MA.912.DP.3.1 — Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.

Algebra 1 Example: Complete the frequency table below.

	Has an A in math	Doesn't have an A in math	Total
Plays an instrument	20		90
Doesn't play an instrument	20		
Total			350

Using the information in the table, it is possible to determine that the second column contains the numbers 70 and 240. This means that there are 70 students who play an instrument but do not have an A in math and the total number of students who play an instrument is 90. The ratio of the joint frequencies in the first column is 1 to 1 and the ratio in the second column is 7 to 24, indicating a strong positive association between playing an instrument and getting an A in math.

MA.912.DP.3.2 — Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data.

Algebra 1 Example: A study shows that 9% of the population have diabetes and 91% do not. The study also shows that 95% of the people who do not have diabetes, test negative on a diabetes test while 80% who do have diabetes, test positive. Based on the given information, the following relative frequency table can be constructed.

	Positive	Negative	Total
Has diabetes	7.2%	1.8%	9%
Doesn't have diabetes	4.55%	86.45%	91%

Benchmark Clarifications:
Clarification 1: Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table.
Clarification 2: Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.

MA.912.DP.3.3   Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context.

> *Algebra 1 Example:* Given the relative frequency table below, the ratio of true positives to false positives can be determined as 7.2 to 4.55, which is about 3 to 2, meaning that a randomly selected person who tests positive for diabetes is about 50% more likely to have diabetes than not have it.

	Positive	Negative	Total
Has diabetes	7.2%	1.8%	9%
Doesn't have diabetes	4.55%	86.45%	91%

Benchmark Clarifications:
Clarification 1: Instruction includes problems involving false positive and false negatives.

MA.912.DP.5 Determine methods of data collection and make inferences from collected data.

MA.912.DP.5.11   Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics.

> *Example:* A local news station changes the *y*-axis on a data display from 0 to 10,000 to include data only within the range 7,000 to 10,000. Depending on the purpose, this could emphasize differences in data values in a misleading way.

Benchmark Clarifications:
Clarification 1: Instruction includes determining whether or not data displays could be misleading.