Georgia Mathematics

Advanced Financial Algebra

Mathematical Practices

0 Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration, and expression. Seek help and apply feedback. Set and monitor goals. AFA.MP

- 0.1 Make sense of problems and persevere in solving them. AFA.MP.1
- 0.2 Reason abstractly and quantitatively. AFA.MP.2
- 0.3 Construct viable arguments and critique the reasoning of others. AFA.MP.3
- 0.4 Model with mathematics. AFA.MP.4
- 0.5 Use appropriate tools strategically. AFA.MP.5
- 0.6 Attend to precision. AFA.MP.6
- 0.7 Look for and make use of structure. AFA.MP.7
- 0.8 Look for and express regularity in repeated reasoning. AFA.MP.8

Mathematical Modeling

1 Apply mathematics to real-life situations; model real-life phenomena using mathematics. AFA.MM.1

- 1.1 Explain contextual, mathematical problems using a mathematical model. AFA.MM.1.1
- 1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts. AFA.MM.1.2
- 1.3 Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation. AFA.MM.1.3
- 1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems. AFA.MM.1.4

Numerical Reasoning

2 Utilize fractions, decimals, percents, and ratios to write and solve a variety of financial problems. AFA.NR.2

- 2.1 Use fractions, decimals, percents, and ratios to solve problems related to budgets, income tax rates, payroll deductions, pie charts, percent yield, sales tax, percent populations, rent increase, cost savings, debt-to-income ratios, stock splits, floor plans and scale models, trigonometric calculations, banking services, and other business and financial applications. AFA.NR.2.1
- .2 Convert numerical quantities of one form (fractions, decimals, percents) to another within financial applications. AFA.NR.2.2

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2.3 Calculate and interpret percent of increase and decrease. AFA.NR.2.3

2.4 Construct, solve, and interpret algebraic ratios and proportions. AFA.NR.2.4

Functional & Graphical Reasoning

3 Explore and apply functions to model and explain real-life phenomena and to solve complex problems in business and financial contexts. AFA.FGR.3

3.1 Examine and identify the key characteristics of functions that model financial situations given the parameters of the context. AFA.FGR.3.1

3.2 Solve financial problems given the parameters of the applicable context using a variety of functions. AFA.FGR.3.2

3.3 Describe the meaning of functions and how to determine if a relation is a function or not. AFA.FGR.3.3

3.4 Utilize function notation to represent a functional relation and to evaluate functions. AFA.FGR.3.4

3.5 Create, apply, and interpret linear functions to model real-world financial problems. AFA.FGR.3.5

3.6 Create, apply, and interpret exponential functions of the form y = ab^x and classify them as exponential decay (when 0 < b < 1) or as exponential growth (when b > 1). AFA.FGR.3.6

3.7 Create, apply, and interpret quadratic functions to model real-world financial applications. AFA.FGR.3.7

3.8 Create, apply, and interpret the greatest integer function in real-world financial applications. AFA.FGR.3.8

3.9 Create, apply, and interpret piecewise functions in real-world financial applications. AFA.FGR.3.9

3.10 Recognize real-world situations where square root, cubic, or rational functions apply. AFA.FGR.3.10

3.11 Create and use inequalities to define domains when creating algebraic expressions and functions. AFA.FGR.3.11

Patterning & Algebraic Reasoning

4 Explore, evaluate, and rearrange formulas applicable to business and financial contexts. AFA.PAR.4

4.1 Use and rearrange formulas applicable to real-world contexts. AFA.PAR.4.1

4.2 Investigate the impact of changing the value of the different variables in financial formulas to compare the resulting financial outcomes. AFA.PAR.4.2

4.3 Write algebraic formulas for use in spreadsheets and utilize technology to perform both iterate and formulaic calculations. AFA.PAR.4.3

4.4 Use the simple interest formula, I = Prt, and inverse operations to solve for specified variables in banking services applications and other interest problems. AFA.PAR.4.4

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.5 Demonstrate by iteration (both with technology and without) that the compounding process pays “interest on your interest.” AFA.PAR.4.5

4.6 Derive the compound interest formula, A = P(1+ r/t)^nt, by using patterns and inductive reasoning, then compute compound interest with and without the formula. AFA.PAR.4.6

4.7 Explore the concept of limits of rational functions in discovering the compound continuous formula. Use technology to investigate and verify what happens as the number of compounds approaches infinity. AFA.PAR.4.7

4.8 Apply the natural base e in the continuous compounding formula, A = Pe^rt. AFA.PAR.4.8

4.9 Use the monthly payment formula to calculate payment amounts in a variety of circumstances. AFA.PAR.4.9

4.10 Utilize the monthly payment formula to assist in calculating the total interest paid (finance charge) when using credit. Compare the total of monthly payments to the original (cash) price. AFA.PAR.4.10

4.11 Interpret and use sigma notation. AFA.PAR.4.11

4.12 Explore and identify how the elements of the present value of a single deposit formula and the periodic deposit investment formula relate to the compound interest formula. AFA.PAR.4.12

4.13 Utilize the present and future value of a periodic investment formulas to make calculations regarding long-term investments and retirement planning. AFA.PAR.4.13

5 Write and solve systems of equations and/or inequalities in context of financial applications. AFA.PAR.5

5.1 Write, graph, solve, and interpret systems of linear equations given an applicable financial situation. AFA.PAR.5.1

5.2 Write, graph, solve, and interpret systems of equations containing one linear and one quadratic equation, given an applicable financial situation. AFA.PAR.5.2

5.3 Write, graph, and interpret systems of equations containing one linear and one exponential equation, given an applicable financial situation. AFA.PAR.5.3

5.4 Write, graph, and interpret systems of a linear and a piecewise function. AFA.PAR.5.4

5.5 Solve linear systems of equations and inequalities to identify points of intersection and define domains in the context of the problem situation. AFA.PAR.5.5

Geometric & Spatial Reasoning

6 Apply properties of polygons, circles, and trigonometry to model and explore real-world applications. AFA.GSR.6

6.1 Apply concepts of area, volume, and scale factors to a variety of real-world financial applications. AFA.GSR.6.1

6.2 Use factors of dilations to draw to scale in contextual situations. AFA.GSR.6.2

6.3 Use sectors and central angles of a circle to depict proportional categories on a pie chart when given categorical information. AFA.GSR.6.3

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6.4 Solve problems using the Pythagorean Theorem and trigonometric functions and their inverses in context. AFA.GSR.6.4

Data & Statistical Reasoning

7 Collect, analyze, interpret, summarize, and construct displays of data to make predictions within real-world applications. AFA.DSR.7

7.1 Interpret measures of central tendency (mean, median, mode) and spread (range, interquartile range, variance, standard deviation) to analyze contextualized data sets. AFA.DSR.7.1

7.2 Construct and interpret common data displays (bar graphs, line graphs, stock bar charts, candlestick charts, box and whisker plots, stem and leaf plots, and circle graphs) to recognize and interpret trends. AFA.DSR.7.2

7.3 Construct and interpret scatterplots to recognize and interpret trends. AFA.DSR.7.3

7.4 Use technology to find, interpret, and graph linear, quadratic, and exponential regression equations to make predictions about the corresponding context. AFA.DSR.7.4

7.5 Use technology to determine the correlation coefficient of linear, quadratic, and exponential regression curves. AFA.DSR.7.5

7.6 Distinguish between causation and correlation for bivariate data. AFA.DSR.7.6

7.7 Create and analyze discrete probability distributions. AFA.DSR.7.7

7.8 Apply the Arithmetic Average Formula to calculate and interpret a d-day simple moving average given a set of n data points, p1, p2, p3, ..., pn-1, pn. AFA.DSR.7.8

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8 Conduct investigative research to solve real-life problems and answer statistical questions involved in business and financial decision-making AFA.DSR.8

- 8.1 Identify a contextual, real-life problem that can be answered using investigative research. AFA.DSR.8.1
- 8.2 Develop statistical questions that can help solve a real-life problem involved in business and financial decision-making. AFA.DSR.8.2
- 8.3 Create a statistical study using sound methodology to answer statistical questions and to solve the real-life problem. AFA.DSR.8.3
- 8.4 Explain how the sample size impacts the precision with which estimates of the population parameters can be made. AFA.DSR.8.4
- 8.5 Recognize that random selection from a population plays a different role than random assignment in an experiment. AFA.DSR.8.5
- 8.6 Incorporate random designs in data collection. AFA.DSR.8.6
- 8.7 Describe ways in which “big data” can be used to make decisions in various business enterprises and in the context of business and financial decision-making. AFA.DSR.8.7
- 8.8 Use distributions to identify the key features of the data collected. AFA.DSR.8.8
- 8.9 Interpret results and make connections to the original research question. AFA.DSR.8.9