Georgia Mathematics

Advanced Mathematical Decision Making

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. AMDM.MP

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

Mathematical Modeling

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

- 1.1 Explain contextual, mathematical problems using a mathematical model. AMDM.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. AMDM.MM.1.2
- 1.3 Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation. AMDM.MM.1.3
- 1.4 Use relevant information to create various mathematical representations and structures to solve real-life problems. AMDM.MM.1.4

Quantitative & Proportional Reasoning

2 Make decisions and solve problems using ratios, rates, and percents in a variety of real-world applications. AMDM.QPR.2

- 2.1 Apply proportions, ratios, rates, and percentages to various settings, including business, media, and consumerism. AMDM.QPR.2.1
- 2.2 Solve problems involving ratios in mechanical and agricultural contexts. AMDM.QPR.2.2
- 2.3 Use proportions to solve problems involving large quantities that are not easily measured. AMDM.QPR.2.3

3 Make predictions by analyzing averages and indices of large data sets through investigations of real-world contexts. AMDM.QPR.3

- 3.1 Use averages and weighted averages to make decisions. AMDM.QPR.3.1
- 3.2 Calculate and interpret indices. AMDM.QPR.3.2

Patterning & Algebraic Reasoning

4 Develop methods or algorithms to analyze discrete situations. AMDM.PAR.4

- 4.1 Create and verify identification numbers. AMDM.PAR.4.1
- 4.2 Analyze and evaluate the mathematics behind various methods of voting and selection. AMDM.PAR.4.2
- 4.3 Evaluate various voting and selection processes to determine an appropriate method for a given situation. AMDM.PAR.4.3
- 4.4 Apply various ranking algorithms to determine an appropriate method for a given situation. AMDM.PAR.4.4

5 Analyze the chances for success or failure in order to make decisions. AMDM.PR.5

- 5.1 Determine conditional probabilities and probabilities of compound events to make decisions in problem situations. AMDM.PR.5.1
- 5.2 Use probabilities to make and justify decisions about risks in everyday life. AMDM.PR.5.2

8 Create and analyze mathematical models to make decisions related to earning, investing, spending, and borrowing money. AMDM.PAR.8

- 8.1 Use exponential functions to model change in a variety of financial situations. AMDM.PAR.8.1
- 8.2 Determine, represent, and analyze mathematical models for income, expenditures, and various types of loans and investments. AMDM.PAR.8.2

11 Use functions to model problem situations in both discrete and continuous relationships. AMDM.PAR.11

- 11.1 Represent situations and solve problems using vectors, in areas such as transportation, computer graphics, and the physics of force and motion. AMDM.PAR.11.1
- 11.2 Represent geometric transformations and solve problems using matrices. AMDM.PAR.11.2

12 Make informed decisions and solve problems with a variety of network models in quantitative situations. AMDM.PAR.12

- 12.1 Solve problems represented by a vertex-edge graphs. AMDM.PAR.12.1
- 12.2 Construct, analyze, and interpret flow charts to develop an algorithm to describe processes such as quality control procedures. AMDM.PAR.12.2
- 12.3 Investigate the scheduling of projects using Program Evaluation Review Technique (PERT). AMDM.PAR.12.3
- 12.4 Consider problems that can be resolved by coloring graphs. AMDM.PAR.12.4

Probabilistic Reasoning

6 Model strategic interaction among rational decision-makers. AMDM.PR.6

- 6.1 Calculate expected value to analyze mathematical fairness, payoff, and risk. AMDM.PR.6.1
- 6.2 Analyze real-life situations involving strategic interactions using the mathematics of zero-sum games. AMDM.PR.6.2
- 6.3 Construct a mathematical model of probabilistic situations to make mathematical assumptions. AMDM.PR.6.3

Data & Statistical Reasoning

7 Conduct investigative research to solve real-life problems and answer statistical investigative questions involved in business and financial decision-making. AMDM.DSR.7

- 7.1 Apply statistical methods to design, conduct, and analyze statistical studies. Identify a contextual, real-life problem that can be answered using investigative research. AMDM.DSR.7.1
- 7.2 Build the skills and vocabulary necessary to analyze and critique reported statistical information, summaries, and graphical displays. Develop statistical investigative questions that can help solve a real-life problem involved in business and financial decision-making. AMDM.DSR.7.2
- 7.3 Create a statistical study using sound methodology to answer statistical investigative questions and to solve the real-life problem. AMDM.DSR.7.3
- 7.4 Explain how the sample size impacts the precision with which estimates of the population parameters can be made (i.e., the larger the sample size the more precision). AMDM.DSR.7.4
- 7.5 Recognize that random selection from a population plays a different role than random assignment in an experiment. AMDM.DSR.7.5
- 7.6 Incorporate random designs in data collection. AMDM.DSR.7.6
- 7.7 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. AMDM.DSR.7.7
- 7.8 Use distributions to identify the key features of the data collected. AMDM.DSR.7.8
- 7.9 Interpret results and make connections to the original research question. AMDM.DSR.7.9

Functional & Graphical Reasoning

9 Use functions to model problem situations in both discrete and continuous relationships. AMDM.FGR.9

- 9.1 Determine whether a problem situation involving two quantities is best modeled by a discrete or continuous relationship. AMDM.FGR.9.1
- 9.2 Use linear, exponential, logistic, and piecewise functions to construct a model. AMDM.FGR.9.2

Geometric & Spatial Reasoning

10 Use functions to model problem situations in both discrete and continuous relationships. AMDM.GSR.10

- 10.1 Create and use two-dimensional and three-dimensional representations to model authentic situations. AMDM.GSR.10.1
- 10.2 Solve problems involving inaccessible distances using basic trigonometric principles including extensions of right triangle trigonometry. AMDM.GSR.10.2