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 Solve problems involving ratios in mechanical and agricultural contexts. AMDM.QPR.2.2

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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

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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

.1 Determine whether a problem situation involving two quantities is best modeled by a discrete or continuous relationship. AMDM.FGR.9.1

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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