Georgia Mathematics

Mathematics of Industry & Government

Adopted 2021

Mathematical Practices

MP. 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. MIG.MP

1. **Make sense of problems and persevere in solving them.** MIG.MP.1
2. **Reason abstractly and quantitatively.** MIG.MP.2
3. **Construct viable arguments and critique the reasoning of others.** MIG.MP.3
4. **Model with mathematics.** MIG.MP.4
5. **Use appropriate tools strategically.** MIG.MP.5
6. **Attend to precision.** MIG.MP.6
7. **Look for and make use of structure.** MIG.MP.7
8. **Look for and express regularity in repeated reasoning.** MIG.MP.8

Mathematical Modeling

1. **Apply mathematics to real-life situations; model real-life phenomena using mathematics.** MIG.MM.1
    1. Explain contextual, mathematical problems using a mathematical model. MIG.MM.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. MIG.MM.1.2
    3. Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation. MIG.MM.1.3
    4. Use various mathematical representations and structures with this information to represent and solve real-life problems. MIG.MM.1.4

Abstract Reasoning & Deterministic Decision-Making – Linear Programming

2. **Solve contextual, mathematical problems involving linear programming and use the mathematics as a model to make decisions about real life phenomena.** MIG.ARDDM.2
    1. Use advanced linear programming to make decisions and interpret results in real-life contexts. MIG.ARDDM.2.1
    2. Distinguish among continuous, integer, and binary contexts MIG.ARDDM.2.2
    3. Model and interpret results of a contextual problem with three or more variables using linear programming. MIG.ARDDM.2.3
    4. Solve problems with three or more variables using technology and principles of linear programming. MIG.ARDDM.2.4
    5. Examine cause and effect of contextual changes. MIG.ARDDM.2.5

Abstract Reasoning & Deterministic Decision-Making – Optimal Locations

3. **Solve contextual, mathematical problems involving optimal locations and use the mathematics as a model to make decisions about real life phenomena.** MIG.ARDDM.3
    1. Find the optimal median location in a one-dimensional context. MIG.ARDDM.3.1
    2. Find the optimal median location in a rectilinear context. MIG.ARDDM.3.2
    3. Find the optimal location given three equally weighted, noncollinear points MIG.ARDDM.3.3
    4. Find the optimal location in a set covering context. MIG.ARDDM.3.4

Abstract Reasoning & Deterministic Decision-Making – Optimal Paths

4. **Solve contextual, mathematical problems involving optimal paths and use the mathematics as a model to make decisions about real life phenomena.** MIG.ARDDM.4
    1. Relate context to a network representation. MIG.ARDDM.4.1
    2. Apply appropriate recursive algorithms. MIG.ARDDM.4.2
    3. Examine alternate decisions in response to contextual changes. MIG.ARDDM.4.3

Abstract Reasoning & Probabilistic Decision-Making – Normal Distributions

5. **Solve contextual, mathematical problems with normal distributions to make appropriate decisions.** MIG.ARPDM.5
    1. Use properties of normal distributions to make decisions about optimization and efficiency. MIG.ARPDM.5.1
    2. Calculate, analyze and interpret theoretical and empirical probabilities using standardized and non-standardized data. MIG.ARPDM.5.2
    3. Consider contextual factors and investigate issues within the decision-making process. MIG.ARPDM.5.3
    4. Apply techniques to quality control settings. MIG.ARPDM.5.4

Abstract Reasoning & Probabilistic Decision-Making – Binomial, Geometric, and Poisson Distributions

6. **Solve contextual, mathematical problems using other distributions (e.g., binomial, geometric, and Poisson) as well as simulations to make appropriate decisions.** MIG.ARPDM.6
    1. Calculate theoretical and empirical probabilities using standardized and non-standardized data. MIG.ARPDM.6.1
    2. Analyze and interpret the probabilities in terms of context. MIG.ARPDM.6.2
    3. Consider contextual factors and investigate issues within the decision-making process. MIG.ARPDM.6.3

Probabilistic Reasoning – Probabilistic Models

7. **Use probabilistic models to make appropriate decisions.** MIG.PR.7
    1. Use program evaluation review technique (PERT) to investigate completion times of a project. MIG.PR.7.1
    2. Develop and apply transition matrices to make predictions using Markov Chains. MIG.PR.7.2
    3. Apply queuing theory MIG.PR.7.3
    4. Consider contextual factors and investigate issues within the decision-making process. MIG.PR.7.4

Abstract Reasoning & Probabilistic Decision-Making – Simulations

8. **Use simulations to make appropriate decisions.** MIG.ARPDM.8
    1. Use technology to simulate a real-world situation. MIG.ARPDM.8.1
    2. Analyze, evaluate, and interpret results of simulations. MIG.ARPDM.8.2
    3. Examine alternate decisions in response to contextual changes of simulations. MIG.ARPDM.8.3

Abstract Reasoning & Probabilistic Decision-Making – Fair Representation

9. **Using quantitative reasoning, determine fair methods to reflect the wishes of a larger population with representatives.** MIG.ARPDM.9
    1. Develop and analyze fair methods for voting. MIG.ARPDM.9.1
    2. Develop and analyze fair methods for apportioning representatives. MIG.ARPDM.9.2
    3. Develop fair methods for setting voting district boundaries. MIG.ARPDM.9.3