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

Ab
De

Skip to main content

**Solve contextual, mathematical problems involving linear programming and use the mathematics as a model to make decisions about real life**

| | |
|---|---|
| **Making – Linear Programming** | **phenomena.** MIG.ARDDM.2<br>1. Use advanced linear programming to make decisions and interpret results in real-life contexts. MIG.ARDDM.2.1<br>2. Distinguish among continuous, integer, and binary contexts MIG.ARDDM.2.2<br>3. Model and interpret results of a contextual problem with three or more variables using linear programming. MIG.ARDDM.2.3<br>4. Solve problems with three or more variables using technology and principles of linear programming. MIG.ARDDM.2.4<br>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<br>1. Find the optimal median location in a one-dimensional context. MIG.ARDDM.3.1<br>2. Find the optimal median location in a rectilinear context. MIG.ARDDM.3.2<br>3. Find the optimal location given three equally weighted, noncollinear points MIG.ARDDM.3.3<br>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<br>1. Relate context to a network representation. MIG.ARDDM.4.1<br>2. Apply appropriate recursive algorithms. MIG.ARDDM.4.2<br>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<br>1. Use properties of normal distributions to make decisions about optimization and efficiency. MIG.ARPDM.5.1<br>2. Calculate, analyze and interpret theoretical and empirical probabilities using standardized and non-standardized data. MIG.ARPDM.5.2<br>3. Consider contextual factors and investigate issues within the decision-making process. MIG.ARPDM.5.3<br>4. Apply techniques to quality control settings. MIG.ARPDM.5.4 |
| **Abstract Reasoning & Probabilistic Decision-Ma Ge 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 |

Skip to main content

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