



Marietta City Schools
2024–2025 District Unit Planner

Advanced Mathematical Decision Making (AMDM)

Unit title	Unit 6: Using Network Models to Make Decisions	Unit duration (hours)	15 hours
-------------------	--	------------------------------	----------

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

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

AMDM.PAR.12.1 Solve problems represented by vertex-edge graphs.

AMDM.PAR.12.2 Construct, analyze, and interpret flow charts to develop an algorithm to describe processes such as quality control procedures.

AMDM.PAR.12.3 Investigate the scheduling of projects using Program Evaluation Review Technique (PERT).

AMDM.PAR.12.4 Consider problems that can be resolved by coloring graphs.

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

AMDM.MM.1.1 Explain contextual, mathematical problems using a mathematical model.

AMDM.MM.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.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.

AMDM.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Concepts/Skills to support mastery of standards

Vocabulary

activity graph	drone (unpiloted aerial vehicle)	Hamiltonian circuit	planar
chromatic number	edge	Hamiltonian path	Program Evaluation Review Technique (PERT)

coloring graph	Euler circuit	most likely time	vertex
critical path	Euler path	optimistic time	vertex-edge graph
degree	expected time	pessimistic time	weighted graph

Notation

Essential Questions

- How can students make conjectures and use theorems to determine whether graphs have Euler or Hamiltonian circuits?
- How can students devise and use algorithms to locate Euler circuits?
- How can students create graphs conforming to specific coloring properties?
- How can students create graph structures to model different scenarios? (shortest/cheapest path)

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Mid-Unit Quiz

Summative Assessment(s): Unit 6 Quest (50 point test)

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
----------------------	----------------------	---

<p>AMDM.PAR.12: Make informed decisions and solve problems with a variety of network models in quantitative situations.</p> <ul style="list-style-type: none"> AMDM.PAR.12.1 Solve problems represented by vertex-edge graphs. <p>AMDM.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.</p> <ul style="list-style-type: none"> AMDM.MM.1.1 Explain contextual, mathematical problems using a mathematical model. AMDM.MM.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.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation. AMDM.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems. 	<p>Clean the Town (diagnostic and explore)</p> <p>In this learning plan, students will be introduced to Euler and Hamiltonian graphs. These graphs, unlike the familiar graphs used in other mathematical classes, consist of vertices and edges. The vertex-edge graph is a diagram consisting of points (vertices) and arcs or line segments (edges) connecting the points. Students will attempt to find the “best” route for a robotic street cleaner to traverse. The optimization of time and city resources defines the “best” route. The circuit of the cleaner must return to the starting point, the city garage, by the end of the day.</p> <p>Learning Goals:</p> <ol style="list-style-type: none"> I can determine whether a graph displays a Euler path or circuit. I can determine whether a graph displays a Hamiltonian path or circuit. I can recognize an efficient path through a weighted graph. 	<ul style="list-style-type: none"> Students will work together in collaborative teams Students may use different colors to help display paths/circuits.
Content Resources		