Marietta City Schools

2024–2025 District Unit Planner

Advanced Mathematical Decision Making (AMDM)

Unit title	Unit 4: Using Mathematical Models to Make Decisions	**Unit duration (hours)**	*26 hours*

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

GA DoE Standards

Standards

AMDM.PAR.8: Create and analyze mathematical models to make decisions related to earning, investing, spending, and borrowing money.
AMDM.PAR.8.1 Use exponential functions to model change in a variety of financial situations.
AMDM.PAR.8.2 Determine, represent, and analyze mathematical models for income, expenditures, and various types of loans and investments.
AMDM.FGR.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.9.2 Use linear, exponential, logistic, and piecewise functions to construct a model.
AMDM.GSR.10: Use functions to model problem situations in both discrete and continuous relationships.
AMDM.GSR.10.1 Create and use two-dimensional and three-dimensional representations to model authentic situations.
AMDM.GSR.10.2 Solve problems involving inaccessible distances using basic trigonometric principles including extensions of right triangle trigonometry.
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

- Simple Interest
- Compound Interest
- Compound Continuous
- Future Value

- Time Value of Money
- Pattern Identification
- Population Growth
- Medication Dosage

Vocabulary

bivariate data	carrying capacity	common ratio
compound interest	constant function	constant of proportionality
continuous function	cosine	discontinuous function
domain	exponential function	future value
interest	iteration	logistic growth curve
piecewise function	present value	range
rate of change	recursive rule	simple interest
sine	step function	tangent
trigonometric ratios		

Notation

Simple Interest I = PRT

Use compound interest formula that mirrors what is used in Alg. 1/Alg. 2.

Compound Interest Formula

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Continuous compound interest $I = Pe^{rt}$

Linear Model y = mx + b

Exponential Model $y = ab^x$

Growth/Decay Models $y = a(1 \pm r)^t$

Essential Questions

- How can students explain the difference between a linear and exponential pattern?
- How can students determine when to use an explicit formula and when to use a recursive formula?
- How can students determine when to use a trigonometric function to model a situation?
- How can students use linear and exponential functions to predict outcomes?
- How can students analyze which income opportunities are best for a given situation based on type of income, type of employment, taxes, benefits, and financial goals?
- How can students analyze and adjust the future-value formula to account for compound interest?
- How can students use time value of money to analyze real-world scenarios dealing with the future value and present value of an investment?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Quiz - Explicit and Recursive Rules; Future Value TOTD

Summative Assessment(s): Test - Unit 4, part 1 (linear, exponential, and trigonometric functions); Test - Unit 4, part 2 (finance); Finance Project

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation

AMDM.PAR.8 Create and analyze mathematical models to make decisions related to earning, investing, spending, and borrowing money. ● AMDM.PAR.8.1 Use exponential functions to model change in a variety of financial situations. ● AMDM.PAR.8.2 Determine, represent, and analyze mathematical models for income, expenditures, and various types of loans and investments. **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.	**Salary vs. Hourly vs. Commission Jobs** In this learning plan, students will explore different occupation opportunities to determine take-home salary. They will analyze taxes and benefits to determine the best employment option so they may make an informed decision. **Learning Goals:** 1. I can find pre-tax monthly salaries. 2. I can find post-tax monthly salaries. 3. I can find monthly take-home salaries. 4. I can use this information to determine which employment opportunity would be best for the individual..	
AMDM.PAR.8 Create and analyze mathematical models to make decisions related to earning, investing, spending, and borrowing money. • AMDM.PAR.8.2 Determine, represent, and analyze mathematical models for income,	**Rent, Lease, or Buy (Engage)** In this learning plan, students revisit the fundamental principles of linear and exponential functions. This plan not only enables students to distinguish between functions and equations but also guides them in closely analyzing the real-life financial attributes inherent to these functions. **Learning Goals:**	

expenditures, and various types of loans and investments.	1. I can write equations to determine solutions using a table or word problem.	
Content Resources		