Marietta City Schools

2023–2024 District Unit Planner

Advanced Mathematical Decision Making (AMDM)

Unit title	Unit 3: Using Statistical Studies to Make Decisions	Unit duration (hours)	*24 hours*

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

GA DoE Standards

Standards

AMDM.DSR.7: Conduct investigative research to solve real-life problems and answer statistical investigative questions involved in business and financial decision-making.

   AMDM.DSR.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.7.2 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.7.3 Create a statistical study using sound methodology to answer statistical investigative questions and to solve the real-life problem.

   AMDM.DSR.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.7.5 Recognize that random selection from a population plays a different role than random assignment in an experiment.

   AMDM.DSR.7.6 Incorporate random designs in data collection.

   AMDM.DSR.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.7.8 Use distributions to identify the key features of the data collected.

   AMDM.DSR.7.9 Interpret results and make connections to the original research question.

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

● Statistical investigations
● Analyzing data

- Sources of variability
- Modeling and analyzing with graphical representations
- Make decisions in various business enterprises including financial decision-making

Vocabulary

alternative hypothesis	average	bar graph	bivariate	box plot	census
cluster sample	confounding variable	constraints	continuous	continuous data displays	convenience sample
data collection	discrete	discrete data displays	distributions	estimates	experimental study
experimental units	explanatory variable	five-number summary	histograms	inference	investigative research
line plot	margin of error	measures of center/shape/spread	methodology	nonresponse	null hypothesis
observational study	outlier	pie chart	population	population parameters	quartile
question wording	random	random number generator	research question	response variable	results
sample	sample size	sampling method	sampling survey	sampling technique	scatter plot
simple random sample	skewness	statistical bias	statistical inference	statistical question	statistical studies
systematic sample	treatments	unbiased	undercoverage	univariate	voluntary sample

Notation

$\bar{x} = mean$ Q_3 = third quartile H_o = null hypothesis   MOE = $\pm \frac{2\sigma}{\sqrt{n}}$ $\rightarrow$ Quantitative Data

Q_1 = first quartile   IQR = Q_3 - Q_1 H_a = alternative hypothesis   MOE = $\pm \frac{1}{\sqrt{n}}$ $\rightarrow$ Categorical Data

Essential Questions

- What is the research cycle and how is it used in a research study?
- What are the various sampling methods of collecting data?
- What are the different ways to display data graphically?
- What is the difference between parameters and samples?
- What is bias and how can it affect decisions?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s): Vocabulary Quiz

Summative Assessment(s): Unit 3 Test

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
AMDM.DSR.7 Conduct investigative research to solve real-life problems and answer statistical investigative questions involved in business and financial decision-making. ● AMDM.DSR.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.7.2 Build the skills and	**M&M Data Dive** In this learning plan, students will build on prior knowledge of probability to complete a statistical study of the number of M&M colors in a single bag. **Learning Goals:** 1. I can conduct statistical studies. 2. I can distinguish between the population and a sample. 3. I can organize and display categorical data using two-way tables, bar graphs, and pie charts. 4. I can describe and analyze quantitative data using characteristics and graphical displays. 5. I understand how sample size affects the precision of an estimate for a parameter.	

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.7.4 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.7.6 Incorporate random designs in data collection. ● AMDM.DSR.7.8 Use distributions to identify the key features of the data collected. ● AMDM.DSR.7.9 Interpret results and make connections to the original research question.		

Content Resources