Marietta City Schools

2024–2025 District Unit Planner

AP Statistics

Unit title	**Unit 7: Inference for Quantitative Data: Means**	**Unit duration (hours)**	**12-15 hours**

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

In this unit, students will analyze quantitative data to make inference about population means. Students should understand that t* and t-tests are used for inference with means when the population standard deviation is not known. Using sample standard deviation in the formula for z gives a slightly different value, t, whose distribution, which depends on sample size, has more area in the tails than a normal distribution. The boundaries for rejecting a null hypothesis using a t-distribution tend to be further from the mean than for a normal distribution. Students should understand how and why conditions for inference with proportions and means are similar and different.

GA DoE Standards

Standards

7.1 Introducing Statistics: Should I Worry About Error?
7.2 Constructing a Confidence Interval for a Population Mean
7.3 Justifying a Claim About a Population Mean Based on a Confidence Interval
7.4 Setting Up a Test for a Population Mean
7.5 Carrying Out a Test for a Population Mean
7.6 Confidence Intervals for the Difference of Two Means
7.7 Justifying a Claim About the Difference of Two Means Based on a Confidence Interval
7.8 Setting Up a Test fo a Difference of Two Population Means
7.9 Carrying Out a Test for the Difference of Two Population Means
7.10 Skills Focus: Selecting, Implementing and Communicating Inference Procedures

Concepts/Skills to support mastery of standards

- Determine the critical value for calculating a C% confidence interval for a population mean
- State and check the 10%, random sample, and normal/large sample conditions for constructing a confidence interval for a population mean
- Construct and interpret a confidence interval for a population mean
- Determine whether the conditions are met for constructing a Confidence Interval for a difference between 2 means
- Construct and interpret a Confidence interval for a difference between 2 means

- Analyze the distribution of difference in a paired data set using graphs and summary statistics
- Construct and interpret a confidence interval for mean difference
- State and check the random, 10%, and Normal/Large Sample Conditions for performing a significance test about a population mean.
- Calculate the standardized test statistic and P value for a test about a population mean
- Perform a significance test about a population mean
- Understand the connection between confidence intervals and significance tests
- State appropriate hypothesis for a significance test about a difference between 2 means
- Determine whether the conditions are met for performing a test about a difference between means
- State appropriate hypotheses for a significance test about a difference in means
- Determine whether the conditions are met for performing test about a difference between 2 means
- Calculate the standardized test statistic and p value for a test about a difference between 2 means
- Perform a significance test about a difference between 2 means
- Perform a significance test about mean difference
- Determine when it is appropriate to use paired t procedures versus 2 sample t procedures

Vocabulary

Critical Value	Random Condition	10% condition	Normal/Large Sample Condition	1 sample t interval	2 sample t interval
Sample Size	Plausible Values	Point Estimate	Null Hypothesis	Alternative Hypothesis	Confidence Level
Margin of error	Central Limit Theorem	P value	Standardized Test Statistic	1 sided significance test	2 sided significance test

Notation

Sampling distributions for means:

Random Variable	Parameters of Sampling Distribution		Standard Error* of Sample Statistic
For one population: $\bar{X}$	$\mu_{\bar{X}} = \mu$	$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$	$s_{\bar{X}} = \frac{s}{\sqrt{n}}$
For two populations: $\bar{X}_1 - \bar{X}_2$	$\mu_{\bar{X}_1 - \bar{X}_2} = \mu_1 - \mu_2$	$\sigma_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	$s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

Essential Questions

How do we know whether to use a t -test or a z -test for inference with means?
How can we make sure that samples are independent?
Why is it inappropriate to accept a hypothesis as true based on the results of statistical inference testing?
How do we interpret a confidence interval and/or level in context?
How do we determine the point estimate and margin of error of a confidence interval?
What will affect the length of the confidence interval?
How do we construct and interpret a confidence interval for a population mean?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s):

Common Formative Assessment – Ticket out the Door

Summative Assessment(s):

Common Summative Assessment – Unit 7 Test (50% Multiple Choice/50% Free Response)

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences		Personalized Learning and Differentiation
3D Construct a confidence interval, provided conditions for inference are met. **4D Justify a claim based on a confidence interval**	**Math Medic Lesson: Estimating a population mean (How much screen time?)** 1. Determine the critical value for calculating a C% confidence interval for a population mean. 2. State and check the Random, 10%, and Normal/LargeSample conditions for constructing a confidence interval for a population mean.		Graphic organizers are provided for each lesson and additional practice as needed. Some students will move through the task independently. Others will need prompts and support for understanding.
1F Identify null and alternative hypotheses. **3E Calculate a test statistic and find a p-value, provided conditions for inference are met.** **4E Justify a claim using a decision based on significance tests.**	**Math Medic Lesson: Significance test for a mean (What is normal body temperature?)** 1. State and Check the Random, 10%, and Normal/Large Sample conditions for a significance test about a population mean. 2. Calculate the standardized test statistic and P-value for a test about a population mean. 3. Perform a significance test about a population mean.		Graphic organizers are provided for each lesson and additional practice as needed. Some students will move through the task independently. Others will need prompts and support for understanding.

Content Resources

- The Practice of Statistics, 5th Edition
- Notes, Review, and Extra Practice provided on Schoology
- College Board
- Stats Medic
- AP Statistics Formula Sheet