# CARLSTADT-EAST RUTHERFORD REGIONAL HIGH SCHOOL DISTRICT CONTENT: MATHEMATICS DEPARTMENT AP STATISTICS <u>AP Statistics Curriculum Guide</u>

Pacing Guide	Chapter 1: Exploring Data - 3 weeks
AP Statistics is a full year course that meets on a rotating basis for	Chapter 2: Modeling Distribution of Data – 1 week
three (3) 55-minute blocks and one (1) 40-minute block for every five (5) day cycle.	Chapter 3: Describing Relationships – 3 weeks
	Chapter 4: Designing Studies – 3 weeks
	<b>Chapter 5:</b> Probability: What are the Chances? – 3 weeks
	<b>Chapter 6:</b> Random Variables – 2 weeks
	<b>Chapter 7:</b> Sampling Distributions – 2 weeks
	<b>Chapter 8:</b> Estimating with Confidence – 1 weeks
	<b>Chapter 9:</b> Testing a Claim – 2 weeks
	Chapter 10: Comparing Two Populations or Groups – 2 weeks
	<b>Chapter 11:</b> Inference for Distributions of Categorical Data – 2 weeks
	Chapter 12: More about Regression – 2 weeks

<ul><li>21<sup>st</sup> Century Skills Standards:</li><li>9.1 Personal Finance Literacy</li></ul>	<b>9.1.12.D.3:</b> Summarize how investing builds wealth and assists in meeting long-and short-term financial goals.
	<b>9.1.12.D.5:</b> Justify the use of savings and investment options to meet targeted goals.
<b>9.2</b> Career Awareness	9.2.12.C.4: Analyze how economic conditions and social changes influence employment trends and future education.
	<b>9.2.12.C.9:</b> Analyze the correlation between personal and financial behavior and employability.
Technology Standards	<b>8.1.12.A.4:</b> Construct a spreadsheet, enter data, and use mathematical or logical functions to manipulate data, generate charts and graphs, and interpret the results.
Interdisciplinary Connections	Science: HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems

NJSLS Mathematical Practices –	1. Make sense of problems and persevere in solving them.		
These practices are demonstrated	2. Reason abstractly and quantitatively.		
throughout the curriculum.	3. Construct viable arguments and critique the reasoning of others.		
	4. Model with mathematics.		
	5. Use appropriate tools strategically.		
	6. Attend to precision.		
	7. Look for and make use of structure.		
	8. Look for and express regularity in repeated reasoning.		
NJSLS Career Ready Practices –	CRP2. Apply appropriate academic and technical skills.		
These practices are demonstrated	CRP4. Communicate clearly and effectively and with reason.		
throughout the curriculum	CRP6. Demonstrate creativity and innovation.		
	CRP7. Employ valid and reliable research strategies.		
	CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.		
	CRP9. Model integrity, ethical leadership and effective management.		
	CRP11. Use technology to enhance productivity.		
	CRP12. Work productively in teams while using cultural global competence.		

## CARLSTADT-EAST RUTHERFORD REGIONAL HIGH SCHOOL DISTRICT CONTENT: MATHEMATICS DEPARTMENT AP STATISTICS Differentiation/Accommodations/Modifications

Note: Each district should review the various strategies noted below and determine which are applicable for their population within varied grade levels and languages and make edits where needed.

Gifted and Talented	English Language Learners	Students with Disabilities	Students at Risk of School Failure
<ul> <li>(content, process, product and learning environment)</li> <li>Extension Activities:</li> <li>Conduct research and provide presentation of mathematical topics.</li> <li>Design surveys to generate and analyze data to be used in discussion.</li> <li>Use of higher level questioning techniques.</li> <li>Provide assessments at a higher level of thinking.</li> </ul>	<ul> <li>Modifications for Classroom:</li> <li>Modifications for Homework/Assignments</li> <li>Modified assignments.</li> <li>Extended time for assignment completion as needed.</li> <li>Use graphing calculator.</li> <li>Highlight formulas.</li> </ul>	<ul> <li>(appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team)</li> <li>Modifications for Classroom: <ul> <li>Ask students to restate information, directions, and assignments.</li> <li>Repetition and practice.</li> <li>Model skills / techniques to be mastered.</li> <li>Extended time to complete class work.</li> <li>Provide copy of classnotes.</li> <li>Preferential seating to be mutually determined by the student and teacher.</li> <li>Students may request books online, on tape/CD, as available and appropriate.</li> <li>Assign peer helper in the class setting.</li> <li>Provide regular parent / school communication</li> <li>Provide oral reminders and check student work during independent</li> </ul> </li> </ul>	<ul> <li>Modifications for Classroom:</li> <li>Ask students to restate information, directions, and assignments.</li> <li>Repetition and practice.</li> <li>Model skills / techniques to be mastered.</li> <li>Extended time to complete class work.</li> <li>Provide copy of classnotes.</li> <li>Preferential seating to be mutually determined by the student and teacher.</li> <li>Students may request books online, on tape/CD, as available and appropriate.</li> <li>Assign peer helper in the class setting.</li> <li>Provide oral reminders and check student work during independent work time.</li> <li>Assist student with long and short term planning of assignments</li> <li>Provide regular parent / school communication.</li> <li>Assign peer helper in the class setting.</li> </ul>

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APSIA	ATISTICS	
	<ul> <li>work time.</li> <li>Assist student with long and short term planning of assignments</li> <li>Modifications for Homework</li> </ul>	<ul> <li>Provide oral reminders and check student work during independent work time.</li> <li>Assist student with long and short term planning of assignments</li> </ul>
	• Extended time to complete assignments.	Modifications for Homework
	<ul> <li>Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.</li> <li>Provide the student with clearly stated (written) expectations and grading criteria for assignments.</li> <li>Modification for Assessments</li> </ul>	<ul> <li>Extended time to complete assignments.</li> <li>Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.</li> <li>Provide the student with clearly stated (written) expectations and grading criteria for assignments.</li> </ul>
	• Extended time on classroom tests	Modification for Assessments
	<ul> <li>and quizzes.</li> <li>Student may take / complete tests in an alternate setting as needed.</li> <li>Restate, reread, and clarify directions/questions.</li> <li>Distribute study guide for classroom tests.</li> <li>Establish procedures for accommodations / modifications for assessments.</li> </ul>	<ul> <li>Extended time on classroom tests and quizzes.</li> <li>Student may take / complete tests in an alternate setting as needed.</li> <li>Restate, reread, and clarify directions/questions.</li> <li>Distribute study guide for classroom tests.</li> <li>Establish procedures for accommodations / modifications for assessments.</li> </ul>

Theme: Exploring Data         Essential Questions:         How do we analyze categorical data?         How do we display quantitative data with graphs?         How do we describe quantitative data with numbers?         Content (As a result of this learning segment, students will know)       Skills (As a result of this learning segment, students will be able to)       Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)         • Section 1.1 Analyzing Categorical Data       • Students will be able to know bar charts, pie charts, dot plot, time plot and stem & leaf plots       • Construct frequency distribution and histogram, describe graphs, shape, center, range, and outliers       • Homework         • Section 1.3 Describing Quantitative Data with Numbers       • Find the 5 number summary, measuring center, mean vs. median, standard deviation       • Cumulative tests	
How do we analyze categorical data?How do we display quantitative data with graphs?How do we describe quantitative data with numbers?Content (As a result of this learning segment, students will know)Skills (As a result of this learning segment, students will be able to)Section 1.1 Analyzing Categorical DataStudents will be able to know bar charts, pie charts, dot plot, time plot and stem & leaf plotsSection 1.2 Displaying Quantitative data with graphsStudents will be able to know bar charts, pie charts, dot plot, time plot and stem & leaf plotsConstruct frequency distribution and histogram, describe graphs, shape, center, range, and outliersHomeworkFind the 5 number summary, measuring center, mean vs. median, standard deviationFind the 5 number summary, measuring center, mean vs. median, standard deviation	
<ul> <li>Changing units of measure and compare distributions</li> <li>Projects / Presentations</li> <li>Midterm exam</li> <li>Final Exam</li> </ul>	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         I A 1-4         I B 1, 3, 4, 5         I C 1-4         I E 1         Time Frame:         3 weeks         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 2			
Theme: Modeling Distribution of Data			
<b>Essential Questions:</b> How to describe location in a distributio How to draw the density curve and calcu How to check for normality?			
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 2.1 Describing Location in a Distribution</li> <li>Section 2.2 Density Curve and Normal Distribution</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know the density curve and the normal distribution</li> <li>The 68-95-99.7 rule and normal distribution calculations</li> <li>Finding a value given a proportion and assessing normality</li> </ul>	Assessments ((The above Essential Questions will be assessed with the following formative and summative measures:) Homework Warm up exercises Exit Tickets Group activities Section quizzes Chapter tests Cumulative tests Projects / Presentations Midterm exam Final Exam	Standards:TECH 8.1.12.A.1NJSLS MA 9-12III C 1-3Time Frame:1 weekMaterials:Textbook: Yates, Moore, and Starnes.The Practice of Statistics.Graphing calculators: Ti-83/84 plus.Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 3			
Theme: Describing Relationships			
Essential Questions:			
How do we graph and interpret scatterpl			
	and y-intercept for the least-square regres		
	and the coefficient of determination to pr		
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 3.1 Scatterplots and Correlation</li> <li>Section 3.2 Least-Square Regression</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know the difference between explanatory and response variable</li> <li>Drawing and interpreting scatterplots</li> <li>Calculate correlation and least-square regression.</li> <li>Interpret coefficient of determination and residual plots.</li> </ul>	Assessments(The above Essential Questions will be assessed with the following formative and summative measures:)• Homework• Warm up exercises• Exit Tickets• Group activities• Section quizzes• Chapter tests• Cumulative tests• Projects / Presentations• Midterm exam• Final Exam	Standards: PFL 9.2.12.C.9 TECH 8.1.12.A.1 NJSLS MA 9-12 I D 1-4Time Frame: 3 weeksMaterials: Textbook: Yates, Moore, and Starnes. The Practice of Statistics.Graphing calculators: Ti-83/84 plus.
			Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 4			
Theme: Designing Studies			
· · · · · · · · · · · · · · · · · · ·	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know the difference between sample vs. population and observational vs. experimental study</li> <li>Know the different methods of sampling</li> <li>Construct a good experiment</li> <li>Block design experiment and matched pair</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)         • Homework         • Homework         • Warm up exercises         • Exit Tickets         • Group activities         • Section quizzes         • Chapter tests         • Projects / Presentations         • Midterm exam         • Final Exam	Standards: TECH 8.1.12.A.1 NJSLS MA 9-12 II A 1-5 II B 1-4 II C 1, 3, 4, 5 II D, III A 5, III D 6Time Frame: 3 weeksMaterials: Textbook: Yates, Moore, and Starnes. The Practice of Statistics.Graphing calculators: Ti-83/84 plus.
			Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 5			
<b>Theme:</b> Probability: What are the char	nces?		
<b>Essential Questions:</b> How do we use probability to predict fu What are the rules of probability?		and dependent events?	
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 5.1 Randomness, Probability, and Simulation</li> <li>Section 5.2 Probability Rules</li> <li>Section 5.3 Conditional Probability and Independence</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know sample spaces and probability models</li> <li>Students will be able to know disjoint, mutually exclusive and independence</li> <li>Venn Diagrams and conditional probability</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:) • Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         III A 1-3         Time Frame:         3 weeks         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 6		
Theme: Random Variables		
Theme: Random Variables Essential Questions: What is the difference between discrete How do we calculate the mean and vari	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)  Homework Warm up exercises Exit Tickets Group activities Section quizzes Chapter tests Cumulative tests Projects / Presentations Midterm exam Final Exam	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         III A 6         III B 1, 2         Time Frame:         2 weeks         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.
		Smart board, internet research and

<b>CONTENT:</b> Chapter 7			
Theme: Sampling Distributions			
Essential Questions:			
What is the difference between sample a			
What is sampling variability and how to			
How to apply the central limit theorem a		1	
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 7.1 What is a Sampling Distribution?</li> <li>Section 7.2 Sample Proportions</li> <li>Section 7.3 Sample Means</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know the difference between parameter vs. sample.</li> <li>Sampling variability and calculating probabilities and standard deviations</li> <li>Central limit theorem</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:) • Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         III D 1-3         Time Frame:         2 weeks         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.

<b>CONTENT:</b> Chapter 8			
Theme: Estimating with Confidence			
<b>Essential Questions:</b> How do we estimate population proport How do we estimate population mean?	tion?		
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 8.1 Confidence Interval: The Basics</li> <li>Section 8.2 Estimating a Population Proportion</li> <li>Section 8.3 Estimating a Population Mean</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able use confidence interval to estimate population mean</li> <li>Students will be able use confidence interval to estimate population proportion</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:) Homework Warm up exercises Exit Tickets Group activities Section quizzes Chapter tests Cumulative tests Projects / Presentations Midterm exam Final Exam	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         IV A 1-4         9.3.ST.SM.2, 9.3.12.BM.1         Time Frame:         1 week         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.

CONTENT: Chapter 9			
Theme: Testing a Claim			
Essential Questions:			
What is the reasoning behind testing for	6		
How do we use tests of significance to r		1	
<ul> <li>How do we use tests of significance to r</li> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 9.1 Significance Tests: The Basics</li> <li>Section 9.2 Tests About a Population Proportion</li> <li>Section 9.3 Tests About a Population Mean</li> </ul>	<ul> <li>nake decision and statistical inference?</li> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to know the difference between the null and alternative hypothesis</li> <li>Students will be able use the z-test to test for significance</li> <li>Students will be able to make sense of statistical significance and calculate type I and type II errors</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)      Homework     Warm up exercises     Exit Tickets     Group activities     Section quizzes     Chapter tests     Cumulative tests     Projects / Presentations     Midterm exam     Final Exam	Standards: TECH 8.1.12.A.1 NJSLS MA 9-12 III D 5-7 IV A 5, 7 IV B 1, 4Time Frame: 2 weeksMaterials: Textbook: Yates, Moore, and Starnes. The Practice of Statistics.Graphing calculators: Ti-83/84 plus.Smart board, internet research and activities, graph papers, color pencils.

CONTENT: Chapter 10			
Theme: Comparing Two Populations o	r Groups		
<b>Essential Questions:</b>			
How to compare two population means?			
How to compare two proportions?			
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 10.1 Comparing Two Proportions</li> <li>Section 10.2 Comparing Two Means</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to compare two means, calculate confidence interval and test for significance</li> <li>Students will be able to compare two proportions, calculate confidence interval and test for significance</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:) • Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	Standards:         TECH 8.1.12.A.1         NJSLS MA 9-12         III D 4-6         IV A 5, 7         IV B 2         Time Frame:         2 weeks         Materials:         Textbook: Yates, Moore, and Starnes.         The Practice of Statistics.         Graphing calculators: Ti-83/84 plus.         Smart board, internet research and activities, graph papers, color pencils.

CONTENT: Chapter 11				
Theme: Inference for Distributions of Categorical Data				
Essential Questions: How to test for Goodness of Fit? How to analyze Chi-Square distribution Content (As a result of this learning segment, students will know)	s to make statistical inference? <b>Skills</b> (As a result of this learning segment, students will be able to)	<b>Assessments</b> (The above Essential Questions will be assessed with the	Standards: TECH 8.1.12.A.1	
<ul> <li>Section 11.1 Chi-Square Tests for Goodness of Fit</li> <li>Section 11.2 Inference for Two- Way Tables</li> </ul>	<ul> <li>Students will be able to find the expected value, chi-square value and calculate the p-value and examine the chi-square distribution</li> <li>Students will be able to use chi-square test for homogeneity, association and independence</li> </ul>	<ul> <li>following formative and summative measures:)</li> <li>Homework</li> <li>Warm up exercises</li> <li>Exit Tickets</li> <li>Group activities</li> <li>Section quizzes</li> <li>Chapter tests</li> </ul>	NJSLS MA 9-12 III D 8 IV B 6 <b>Time Frame:</b> 2 weeks	
		<ul> <li>Cumulative tests</li> <li>Projects / Presentations</li> <li>Midterm exam</li> <li>Final Exam</li> </ul>	Materials: Textbook: Yates, Moore, and Starnes. <i>The Practice of Statistics</i> . Graphing calculators: Ti-83/84 plus. Smart board, internet research and activities, graph papers, color pencils.	

<b>CONTENT:</b> Chapter 12			
Theme: More about Regression			
<b>Essential Questions:</b> How to test the hypothesis of no linear How to check for regression conditions	?		
<ul> <li>Content (As a result of this learning segment, students will know)</li> <li>Section 12.1 Inference for Linear Regression</li> <li>Section 12.2 Transforming to Achieve Linearity</li> </ul>	<ul> <li>Skills (As a result of this learning segment, students will be able to)</li> <li>Students will be able to find standard error and least squares line</li> <li>Students will be able to find confidence intervals for the regression slope</li> <li>Test the hypothesis of no linear relationship</li> </ul>	Assessments (The above Essential Questions will be assessed with the following formative and summative measures:) • Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	Standards: TECH 8.1.12.A.1 NJSLS MA 9-12 IV A 8 IV B 7 Time Frame: 2 weeks Materials: Textbook: Yates, Moore, and Starnes. <i>The Practice of Statistics</i> . Graphing calculators: Ti-83/84 plus. Smart board, internet research and activities, graph papers, color pencils.