

# Unit 05: Statistical Measurement

Content Area: **Template**  
Course(s):  
Time Period: **Full Year**  
Length: **FY**  
Status: **Published**

## Standards Alignment

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### New Jersey Student Learning Standards

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MA.6.RP	Ratios and Proportional Relationships
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.6.RP.A.2	Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$ , and use rate language in the context of a ratio relationship.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
MA.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
MA.6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
MA.6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
MA.6.SP	Statistics and Probability
MA.6.SP.A	Develop understanding of statistical variability.
MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.A.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:
MA.6.SP.B.5a	Reporting the number of observations.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
MA.6.SP.B.5d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
AAAA.K-12.1	Inquire, think critically, and gain knowledge.
AAAA.K-12.1.3	Responsibilities
AAAA.K-12.1.3.5	Use information technology responsibly.
AAAA.K-12.2.1	Skills
AAAA.K-12.2.1.4	Use technology and other information tools to analyze and organize information.
AAAA.K-12.3	Share knowledge and participate ethically and productively as members of our democratic society.
AAAA.K-12.3.1	Skills
AAAA.K-12.3.1.6	Use information and technology ethically and responsibly.

## **Integration of Career Readiness, Life Literacies and Key Skills**

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CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

## **Technology / Integration of Computer Science and Design Thinking**

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TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber

bullying, cyber security, and cyber ethics including appropriate use of social media.

TECH.8.1.8.D.5

Understand appropriate uses for social media and the negative consequences of misuse.

## **Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section**

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### **Capacities of the Literate Individual**

#### **Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language**

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.

They come to understand other perspectives and cultures.

LA.K-12.NJSLSA.R

Reading

MATH.K-12.1

Make sense of problems and persevere in solving them

Key Ideas and Details

MATH.K-12.2

Reason abstractly and quantitatively

LA.K-12.NJSLSA.R1

Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

LA.RL.6.1

Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.

MATH.K-12.3

Construct viable arguments and critique the reasoning of others

MATH.K-12.4

Model with mathematics

MATH.K-12.5

Use appropriate tools strategically

MATH.K-12.6

Attend to precision

MATH.K-12.7

Look for and make use of structure

MATH.K-12.8

Look for and express regularity in repeated reasoning

LA.K-12.NJSLSA.W

Writing

Text Types and Purposes

LA.K-12.NJSLSA.W1

Write arguments to support claims in an analysis of substantive topics or texts, using valid

	reasoning and relevant and sufficient evidence.
LA.W.6.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.6.1.A	Introduce claim(s) and organize the reasons and evidence clearly.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
LA.W.6.1.C	Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.
LA.K-12.NJSLSA.SL	Speaking and Listening
LA.W.6.1.D	Establish and maintain a formal/academic style, approach, and form. Comprehension and Collaboration
LA.W.6.1.E	Provide a concluding statement or section that follows from the argument presented.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.6.1.A	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
LA.SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
LA.SL.6.1.C	Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
LA.SL.6.1.D	Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

## **Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section**

see Crosswalks

## **21st Century Life and Careers**

### **Stage I: Desired Results**

### **Transfer/Overview/Rationale**

**Transfer / Overview / Rationale**

## Unit Rationale

The purpose of this unit...

**Large quantities of information are often presented in statistical form. In order to predict events, we must master statistical measures and data displays.**

## Meaning

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## Essential Questions

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Essential Questions

- How can you tell whether a question is a statistical question?
- What type of measures of center can we use to analyze and answer questions about a set of real-world data?
- How does the variability or spread of a data set affect its validity and help us answer questions about real-world data?
- How can I represent data graphically and what are the advantages of graphing data?

## **Enduring Understanding/Indicators of Understanding**

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### Enduring Understanding/Indicators of Understanding

- Statistical questions have more than one correct answer and allow us to justify explanations and conclusions to others
- Sorting/organizing data can help determine the median and mode of a data set efficiently
- Analyzing/manipulating a data set allows us to determine whether it is reliable
- Data can be displayed in graphs to efficiently compare and contrast statistics

## **Acquisition (Student Learning Objectives)**

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### **Knowledge**

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Knowledge

Students will know...

- How to analyze, interpret, apply, sort information to solve a specific problem
- Given a situation add, subtract, multiply, divide fractions, mixed numbers and decimals to solve real-world problems

- How to choose and analyze statistical questions and data
- How to calculate measures of center including mean, median, and mode in a variety of situations
- How to choose the appropriate measure of center for a set of real-world data that will be the best representation of a data set
- How to calculate measures of variability including range, outliers, quartiles, interquartile range, and mean absolute deviation
- Choose and create a correct data display among stem-and-leaf plots, histograms, and box-and-whisker plots.
- Interpret shapes of distribution and describe them using skewed left/right or symmetric

## **Skills**

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### Skills

Student will be skilled at ...

- Identify, interpret and analyze questions that will create statistical data
- Calculate measures of center including mean, median, and mode and apply to real-world data
- Calculate measures of variability including range, outliers, quartiles, interquartile range, and mean absolute deviation and apply to real-world data

- Interpret, analyze and construct graphical representations of a data set including line plots, histograms, stem-and-leaf plots, and box-and-whisker plots
- Choose appropriate measures of center and variation to best describe the distribution of a data set
- Given a word problem, describe distributions

### **Stage 3: Learning Plan**

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### **Resource and Mentor Texts**

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Resources and Mentor Texts

[Unit 5 activities.docx](#)

[Unit 5-cycle 1 dot plot activity.docx](#)

[Unit 5-cycle 2 range activity.doc](#)

[Unit 5- cycle 3 Ages-President.doc](#)

[Unit 5 - PARCC practice.docx](#)

### **Formative Assessment Strategies**

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Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation

- STEM projects

## **Learning Activities/Unit of Study**

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### Learning Activities/Unit of Study

#### Statistical Measurement: Approximately 6 Cycles

#### Cycle 1: Topics Covered

- Dot plots
- Mean
- Median
- Mode

- Activities/Centers

- IXL.com centers
  - DD.1 Calculate mean, median, mode, and range
  - DD.2 Interpret charts to find mean, median, mode, and range
  - DD.3 Mean, median, mode, and range: find the missing number
  - CC.4 Interpret line plots
  - CC.5 Create line plots
- Tenmarks centers
  - 6.SP.5c Find: Measures of Center and Variability of Data Sets
  - 6.SP.3 Recognizing Measures of Center & Measures of Variation
  - 6.SP.4 Displaying Numerical Data
- Hands-On/Creative Centers
  - Length of student names\*
- Online games
  - Multiple games for mean, median, and mode <http://interactivesites.weebly.com/mean-median-and-mode.html>
- Xtramath: review flashcards
- Teacher Directed Stations
  - Bellringers: Week 24—page 160-161
  - Bellringers: Week 24—page 159
  - Teacher created problems on white boards: find the mean

#### Cycle 2: Topics Covered

- Range
- Interquartile range

- Outliers

- Activities/Centers

- IXL.com centers
  - DD.1 Calculate mean, median, mode, and range
  - DD.2 Interpret charts to find mean, median, mode, and range
  - DD.3 Mean, median, mode, and range: find the missing number
  - CC.19 Interpret box-and-whisker plots
- Tenmarks centers
  - 6.SP.5c Find: Measures of Center and Variability of Data Sets
  - 6.SP.3 Recognizing Measures of Center & Measures of Variation
- Hands-On/Creative Centers
  - Several measures of center activities\*
- Online games
  - <http://www.turtlediary.com/game/mean-median-mode-range.html>
- Xtramath: review flashcards
- Teacher Directed Stations
  - Bellringers: Week 23—page 157-158
  - Bellringers: Week 23—page 155-156
  - Teacher created problems on white boards: find the interquartile range

### Cycle 3: Topics Covered

- Absolute deviation

- Activities/Centers

- Tenmarks centers
  - 6.SP.3 Recognizing Measures of Center & Measures of Variation
- Hands-On/Creative Centers
  - Work with a partner to investigate mean absolute deviation  
<http://www.wccusd.net/cms/lib03/CA01001466/Centricity/domain/60/lessons/grade%207%20lessons/MeanAbsoluteDeviationLessonV1.pdf>
- Online games
  - Read and try on your own <http://www.mathsisfun.com/data/mean-deviation.html>
- Xtramath: review flashcards
- Teacher Directed Stations
  - Bellringers: Week 23—page 153-154
  - Bellringers: Week 23—page 152
  - Teacher created problems on white boards:
- STEM activity: looking at presidents ages <http://www.mathsisfun.com/data/mean-deviation.html>

### Cycle 4: Topics Covered

- Stem-and-leaf plots

- Activities/Centers

- IXL.com centers

- CC.3 Stem-and-leaf plots
- Tenmarks centers
  - 6.SP.4 Displaying Numerical Data
- Hands-On/Creative Centers
  - [http://mathinscience.info/teach/teach\\_projects/nsf\\_scholars/skunk/skunk.pdf](http://mathinscience.info/teach/teach_projects/nsf_scholars/skunk/skunk.pdf)
- Xtramath: review flashcards
- Teacher Directed Stations
  - Bellringers: Week 22—page 150-151
  - Bellringers: Week 22—page 148-149
  - Teacher created problems on white boards: create a stem-and-leaf plot from data
- STEM activity: <http://www.learnnc.org/lp/pages/3358?ref=search>

### Cycle 5: Topics Covered

- Histograms
- Distributions

- Activities/Centers

- IXL.com centers
  - CC.12 Interpret histograms
  - CC.13 Create histograms
- Tenmarks centers
  - 6.SP.5d Measures of Center and Variability: Shape Data Display
  - 6.SP.2 Describing Data Distributions in Terms of Center/Spread/Shape
  - 6.SP.4 Displaying Numerical Data
- Hands-On/Creative Centers
  - Post-it notes to demonstrate histograms [http://www.post-it.com/3M/en\\_US/post-it/ideas/articles/histogram/](http://www.post-it.com/3M/en_US/post-it/ideas/articles/histogram/)
- Xtramath: review flashcards
- Teacher Directed Stations
  - Bellringers: Week 22—page 146-147
  - Bellringers: Week 22—page 145
- STEM activity: <http://www.scholastic.com/browse/lessonplan.jsp?id=459>

### Cycle 6: Topics Covered

- Box-and whisker plots

- Activities/Centers

- IXL.com centers
  - CC.19 Interpret box-and-whisker plots
- Tenmarks centers
  - 6.SP.5b Attributes of Data Displays
- Hands-On/Creative Centers
  - <http://www.regentsprep.org/regents/math/algebra/ad3/datateacher.htm>
- Online games
  - [https://www.eduplace.com/kids/hmcam/animath/box\\_and\\_whisker\\_plot.html](https://www.eduplace.com/kids/hmcam/animath/box_and_whisker_plot.html)
- Xtramath: review flashcards
- Teacher Directed Stations

- Bellringers: Week 21—page 143-144
- Bellringers: Week 21—page 141-142
- Teacher created problems on white boards: create a box-and-whisker plot from the data
- PARCC practice\*

## **Modifications and/or Accommodations**

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### **Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)**

#### **English Language Learners**

**Native language support:** The teacher provides auditory or written content to students in their native language.

**Adjusted Speech:** The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

**Visuals:** The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

**Front-Loading Vocabulary:** The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

#### **Special Education Students**

**Chunking:** The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

**Checking for Understanding:** It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

**Extra time:** The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

**Oral Reading:** The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

**Timers:** The teacher will use timers as an instructional tool. The use of timers is beneficial for

students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

## Students with 504 Plans

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## Gifted & Talented Strategies

**Extensions/Enrichments:** Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

**Modify/Change Activities:** Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

## Students at Risk of School Failure

**Directions or Instructions:** Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

**Peer Support:** Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

**Alternate or Modified Assignments:** Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may

hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

**Increase One to One Time:** When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

**Contracts:** It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

**Hands On:** As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

**Tests/Assessments:** Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

**Seating:** Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.