Unit 3 Statistical Variability and Geometry

Content Area: **Mathematics**
Course(s): **Mathematics 6**
Time Period: **March**
Length: **60 Instructional days**
Status: **Published**

Unit Overview

Unit Three includes statistical measures, data displays, and geometry encompassing sixty days. The main focus is statistics: measures of center, variation, and absolute deviation with various plots and displays, and areas of polygons, surface area, and volume. The main focus for geometry is areas of parallelograms, triangles, and trapezoids and three-dimensional figures with volumes. Mathematical Practices from the box below will be connected to the daily lessons.

Unit 3	Content Focus	Math Practices	Vocabulary
18 days	Areas of parallelograms, triangles, and trapezoids, and polygons in the coordinate plane. Three-dimensional figures with surface areas of prisms and pyramids, and volumes of rectangular prisms	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 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	• Composite figure • Polygon • Edge • Face • Net • Polyhedron • Priam • Pyramid • Solid • Surface Area • Vertex • Volume
17 days	Integers with Comparing and Ordering, Number Lines, Absolute value, and Coordinate Plane	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 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	• Absolute Value • Coordinate Plane • Integers • Negative numbers • Opposites • Origin • Positive Numbers • Quadrants
12 Days	Introduction to statistics, mean, measures of center, measures of variation, and mean absolute deviation	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively	• First quartile • Interquartile range • Mean • Mean absolute deviation

		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	• Measure of center • Measure of variation • Median • Mode • Outlier • Quartiles • Range • Statistics • Third Quartile
12 days	Plots and displays: stem and leaf, histograms, shapes of distribution, and box-and-whisker plots.	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 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	• Box and whisker plot • Frequency • Frequency table • Histogram • Leaf • Skewed right • Skewed left • Stem • Stem and leaf plot • Symmetry

Priority Standards

MA.6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MA.6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
MA.6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates

	to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	
MA.6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	
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.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:	

Unit Assessments

- Big Ideas Chapter 10 Assessment and Standards
- Big Ideas Chapter 4 Assessments with Standards
- Big Ideas Chapter 8 Assessment and Standards
- Big Ideas Chapter 9 Assessment and Standards
- Big Ideas Quiz 10.1-10.2
- Big Ideas Quiz 10.3-10.4
- Big Ideas Quiz 4.1-4.2
- Big Ideas Quiz 4.3-4.4
- Big Ideas Quiz 8.1-8.2
- Big Ideas Quiz 8.3-8.4
- Big Ideas Quiz 9.1-9.3
- Big Ideas Quiz 9.4-9.5
- S/W Grade 6 Math Benchmark Unit 3

Student Learning Goals (Objectives)

Content Focus	CCCS Priority Standard	Learning Goals	Learning Targets
Apply knowledge of operations to display data with measures of center and analyze quartile ranges.	MA.6.6.SP.1 MA.6.6.SP.2 Ma.6.6.SP.3 Ma.6.6.SP.4	Calculate quantitative measures of center (median, mean) and variability (interquartile range, mean absolute deviation) (6.SP.5)	I can perform basic processes, such as • Describe the distribution of data by c

Apply and extend previous understandings of data displays to construct stem and leaf plots, histograms, and box and whisker plots along with shapes of the distributions.	Ma.6.6.SP.5	Describe patterns and deviations from patterns in the data (6.SP.5) Choose the appropriate measure of center and variability based on the shape of the data distribution and the context in which the data were gathered (6.SP.5)	spread and shape (6.SP. • Display num data on a his and box plot (6.SP.4) • Describe sur features of numerical da (6.SP.5)
Understand formulas for areas of polygons. Use of coordinate plane for polygon drawings and distances.	MA.6.6.G.1 MA.6.6.G.3 MA.6.6.NS.6 MA.6.6.NS.8	Solve real-world or mathematic problems involving the area of polygons (6.G.1) Use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate (6.NS.6) Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate (6.G.3)	I can perform basic processes, such as • Find the area right triangle triangles, spe quadrilaterals polygons by composing in rectangles or decomposing triangles and shapes (6.G. • Draw polygor the coordinat given coordir for the vertic (6.G.3) • Find and pos rational numl including inte on a coordina plane (6.NS.6 • Understand s numbers in o pairs as indic locations in quadrants of coordinate pl recognize tha two ordered differ only by the locations

			points are rel reflection acr or both axes (6.NS.6) • Graph points (including rat numbers) in quadrants of coordinate pl solve real wo mathematica problems (6.I 6.NS.8, 6.G.3
Apply and extend previous understandings of quantities to include positive and negative numbers with absolute values.	MA.6.6.G.2 MA.6.6.G.4	Apply the formula V=lwh and V=bh to find the volume of a right rectangular prism with fractional edge length in the context of solving real-world and mathematical problems (6.G.2) Solve real world or mathematical problems involving the area of a right prism (6.G.4) Use nets to find the surface area of the figure (6.G.4)	I can perform basic processes, such as • Find the volu right rectang prism by pac with unit cub the appropria fractional edg length (6.G.2 • Represent th dimensional f using nets m of rectangles triangles (6.C

| Apply and extend previous understandings of quantities to include positive and negative numbers with absolute values. | MA.6.6.NS.5

MA.6.6.NS.7

MA.6.6.NS.6

MA.6.6.NS.8 | Write, interpret and explain statements of order for rational numbers in real world context (6.NS.7)

Understand the absolute | I can perform basi process, such as

• Use positive
negative nur
to represent
quantities in
world contex
explaining th |

		value of a rational number as its distance from 0 on the number line (6.NS.7) Distinguish comparisons of absolute value from statements of order (6.NS.7)	meaning of z each situatio (6.NS.5) • Recognize o signs of num indicating lo on opposite 0 on the nur line (6.NS.6) • Find and pos rational num including int on a number (6.NS.6) • Interpret statements c inequality as statements a the relative p of two numb a number lin diagram (6.N

• SWBAT apply the formula V=lwh and V=bh to find the volume of a right rectangular prism with fractional edge lengths in the context of solving real world or mathematical problems (6.G.2)

• SWBAT calculate quantitative measures of center (median, mean) and variability (IQR, MAD) (6.SP.5)

• SWBAT choose the appropriate measure of center and variability based on the shape of the data distribution and the context in which the data were gathered (6.SP.5)

• SWBAT describe patterns and deviations from patterns in the data (6.SP.5)

• SWBAT solve real world or mathematical problems involving the area of a right prism (6.G.4)

• SWBAT solve real world or mathematical problems involving the area of polygons (6.G.1)

• SWBAT use coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate (6.NS.8)

• SWBAT use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate (6.G.3)

• SWBAT use nets to find the surface area of the figure (6.G.4)

Unit Learning Targets

• I can analyze set of data.

• I can apply techniques to special quadrilaterals and polygons to solve real world problems.

• I can apply volume formulas to solve real world problems.

• I can calculate IQR and MAD.

• I can calculate mean, median, range, and mode.

- I can calculate the volume of a right rectangular prism.
- I can combine areas of nets to find surface area of a 3-dimensional figure.
- I can compare the area of a triangle to the area of a composed rectangle.
- I can create dot plot, histogram, and box plots.
- I can describe a set of data by its center.
- I can describe data with clusters, peaks, gaps, and symmetry.
- I can determine effect of outliers on data sets.
- I can draw polygons in the coordinate plane.
- I can find median, quartile and interquartile ranges.
- I can identify outliers.
- I can identify that a set of data has distribution.
- I can identify the components of dot plots, histograms, and box plots.
- I can justify formulas for triangles and parallelograms.
- I can organize, describe, and display data in graphs and tables.
- I can recognize a statistical question.
- I can recognize and know how to compose and decompose polygons into triangles and rectangles.
- I can recognize measures of central tendency.
- I can recognize measures of variance.
- I can recognize that 3-D figures can be represented by nets.
- I can recognize that data has variability
- I can represent three-dimensional figures using nets for rectangles and triangles.
- I can use coordinates to find the length of a side of a polygon.

Learning Plan (Skills and Activities)

Unit 3	Topic	Activity	Learning Goals	Learning Targets	Resources	Assessments
Weeks 22-25	Areas of parallelograms, triangles, and trapezoids, and polygons in the coordinate plane. Three-dimensional figures with	**Whole Group**: Ch. 4 /Lessons 1-4 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's	SWBAT find areas of parallelograms. SWBAT solve real-life problems. SWBAT find areas of triangles. SWBAT find areas of	I can: • recognize and know how to compose and decompose polygons into triangles and rectangles. • compare the area of a triangle to the area of a composed	Big Ideas NJ DOE Model Curriculum National Library of Virtual Manipulatives Accelerated Math Corestandards.o	After Lesson 7.2 – Quiz After Lesson 7.4 -Quiz After Chapter is completed - Chapter 87Test S/W

	surface areas of prisms and pyramids, and volumes of rectangular prisms.	notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group**: Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B Puzzle Time Student Text problems	trapezoids. SWBAT find areas of composite figures. SWBAT draw polygons in the coordinate plane. SWBAT find distances in the coordinate plane. SWBAT draw three-dimensional figures. SWBAT find the number of faces, edges, and vertices of solids. SWBAT use nets to represent prisms. SWBAT find the surface area of prisms. SWBAT solve real-life problems. SWBAT use nets to represent	rectangle. • apply techniques to special quadrilaterals and polygons to solve real world problems. • justify formulas for triangles and parallelograms. • draw polygons in the coordinate plane. • use coordinates to find the length of a side of a polygon • calculate the volume of a right rectangular prism. • apply volume formulas to solve real world problems. • recognize that 3-D figures can be represented by nets. • represent three-dimensional figures using nets for rectangles and triangles. • can combine areas of nets	rg NJCTL Chromebooks	Grade 6 Math Benchmark Unit 3

		Enrichment and Extension	pyramids.		to find surface area of a 3-dimensional figure.		
		Technology Connection	SWBAT find the surface area of pyramids.				
		Whole Group: Ch. 8 /Lessons 1-4 (from Big Ideas Teachers Manual)	SWBAT find the volume of prisms with fractional edge lengths by using models.				
		Chapter Opener, Start Thinking! Warm-Up	SWBAT find the volume of prisms by using formulas.				
		Introduce Vocabulary Words. Laurie's notes.					
		Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.)					
		Small Group:					
		Journal activities.					
		Lesson problems from text or on-line digital book.					
		Lesson tutorials from dynamic					

		classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection				
Week s 26-28	Integers with Comparing and Ordering, Number Lines, Absolute value, and Coordinate Plane	**Whole Group**: Ch. 6 /Lessons 1-5 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in	SWBAT understand positive and negative integers and use them to describe real=life situations SWBAT graph integers on a number line SWBAT use a number line to compare positive and negative integers SWBAT find	I can: • identify an integer and its opposite. • use integers to represent quantities in real world situations. • explain where zero fits into a situation represented by integers. • find and position integers and other rational numbers on a horizontal or	Big Ideas NJ DOE Model Curriculum National Library of Virtual Manipulatives Accelerated Math Corestandards.o rg NJCTL Chromebooks	After Lesson 8.2 – Quiz After Lesson 8.4 -Quiz After Chapter is completed - Chapter 8 Test S/W Grade 6 Math Benchmar k Unit 3

		groups and which pages will be done during independent work.) **Small Group:** Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection	the absolute value of numbers SWBAT use absolute value to compare numbers in real-life situations SWBAT describe the location of points in the coordinate plane SWBAT plot points on the coordinate plane SWBAT find the distances between points on the coordinate plane	vertical number line diagram. • find a position pairs of integers and other rational numbers on a coordinate plane. • distinguish comparisons of absolute value from statements about order and apply to real world contexts. • calculate absolute value. • graph points in all four quadrants of the coordinate plane. • solve real-world problems by graphing points in all four quadrants. • calculate the distance between two points with the same first coordinate or same second coordinate.		
Weeks 29-	Introduction to statistics,	**Whole Group**: Ch. 9	SWBAT recognize	I can:	Big Ideas	After Lesson 9.3

32	mean, measures of center, measures of variation, and mean absolute deviation.	/Lessons 1-5 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group**: Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent**	statistical questions. SWBAT use dot plots to display numerical data. SWBAT understand the concept of the mean of data sets. SWBAT find the mean of data sets. SWBAT compare and interpret the means of data sets. SWBAT understand the concept of measures of center. SWBAT find the median and mode of data sets. SWBAT find the range of data sets. SWBAT find the interquartile range of data sets. SWBAT check for outliers in data sets. SWBAT	• recognize that data has variability. • recognize a statistical question. • identify that a set of data has distribution. • describe a set of data by its center. • describe data with clusters, peaks, gaps, and symmetry. • recognize measures of central tendency. • recognize measures of variance.	NJ DOE Model Curriculum National Library of Virtual Manipulatives Accelerated Math Corestandards.org NJCTL Chromebooks	– Quiz After Lesson 9.5 -Quiz After Chapter is completed - Chapter 9 Test

		Work: Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection	understand the meaning of mean absolute deviation. SWBAT find the mean absolute deviation of data sets.			
Weeks 33-35	Plots and displays: stem and leaf, histograms, shapes of distribution, and box-and-whisker plots.	**Whole Group**: Ch. 10 /Lessons 1-4 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group:** Journal activities.	SWBAT make and interpret stem and leaf plots. SWBAT make histograms. SWBAT use histograms to analyze data, SWBAT describe shapes of distributions. SWBAT make and interpret box and whisker plots. SWBAT compare box and whisker plots.	I can: • identify the components of dot plots, histograms, and box plots. • find median, quartile and interquartile ranges. • analyze set of data. • create dot plot, histogram, and box plots. • organize, describe, and display data in graphs and tables. • calculate mean, median, range, and mode. • calculate IQR and MAD. • identify outliers.	Big Ideas NJ DOE Model Curriculum National Library of Virtual Manipulatives Accelerated Math Corestandards.org NJCTL Chromebooks	After Lesson 10.2 – Quiz After Lesson 10.4 -Quiz After Chapter is completed - Chapter 10 Test

		Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection		• determine effect of outliers on data sets.		

Materials and Resources

- Big Ideas - Big Ideas Learning LLC. 2014 www.bigideasmath.com
- Chromebooks
- http://www.njctl.org/courses/math/
- National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/vlibrary.html
- NJ DOE Model Curriculum www.state.nj.us/education/modelcurriculum
- www.corestandards.org
- www.ixl.com

Technology Integration

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools
- 8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results
- Design own real world problems adding text to screenshots
- Use of Geogebra-Tool

TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
TECH.8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
TECH.8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.

21st Century Life and Career Ready Practices

- CRP6. Demonstrate creativity and innovation
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Strategies or Differentiating Instruction

- Extend pacing of lessons
- Graph paper
- Incorporate centers that focus on skills that students are struggling with
- Modified/ shortened assignments if necessary
- Multiplication chart
- Place value chart if applicable
- Provide a copy of written notes/directions

- Provide formulas/conversions if applicable

- Provide list/chart of key words used in word problems to help determine operation. For example "In all, altogether mean addition"

- Small group instruction based on levels/abilities

- Use of calculator

- Use of manipulatives

- Utilize visual aids

Cross Curricular Connections

- Reading and comprehension - involved for all word problems.

- Science: creating and reading data graphs

- Social Studies - Types of Graphs/maps

- Social Studies: latitude and longitude / coordinate plane

Marzano Elements

- Communicating high expectations for each student to close the achievement gap (DQ9)

- Establishing and acknowledging adherence to rules and procedures (DQ6)

- Establishing and maintaining relationships in a student centered classroom (DQ8)

- Establishing Classroom Routines (DQ6)

- Helping students engage in cognitively complex tasks (DQ4)

- Helping students examine similarities and differences (DQ3)

- Helping students examine their reasoning (DQ3)

- Helping students practice skills, strategies, and processes (DQ3)

- Helping students process new content (DQ2)

- Helping students revise knowledge (DQ3)

- Identifying critical content from the standards (DQ2)

- Organizing students to interact with content (DQ2)

- Organizing students to practice and deepen knowledge (DQ3)

- Previewing new content (DQ2)

- Providing feedback and celebrating success (DQ1)

- Reviewing content (DQ3)

- Using engagement strategies (DQ3)

- Using formative assessments to track student progress (DQ1)

- Using questions to help students elaborate on content (DQ2)