

Geometry with Data Analysis Syllabus 2024-2025

General Course Information:

Course Name: Geometry w/Data Analysis
Semester and Year: Fall 2024
Adopted Textbook: Big Ideas Learning;
Big Ideas Geometry with Data Analysis
ISBN: 978-1-64432-607-7

Credit offered: 1.0 credit
Instructor/Contact Information:

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Course Description: Geometry with Data Analysis is a newly-designed course which builds on the students' experiences in the middle grades. It is the first of three required courses in high school mathematics, providing a common Grade 9 experience for all students entering high-school-level mathematics. If students need additional support while taking Geometry with Data Analysis, schools are encouraged to offer a concurrent "lab course" to meet their specific needs. The lab course might review prior knowledge for upcoming lessons, reinforce content from previous lessons, or preview upcoming content to ensure that students can fully participate in the required class. Since the lab course does not cover additional mathematical standards, students can receive only an elective credit for each lab course, not a mathematics credit. See further details on the lab courses in the High School Overview. Note that school systems will not offer Geometry with Data Analysis as "A" and "B" courses in which the content is spread over two courses.

Geometry with Data Analysis builds essential concepts necessary for students to meet their postsecondary goals (whether they pursue additional study or enter the workforce), to function as effective citizens, and to recognize the wonder, joy, and beauty of mathematics (NCTM, 2018). It is important because it develops mathematical knowledge and skills through visual representations prior to the more abstract development of algebra. Beginning high school mathematics with Geometry with Data Analysis in Grade 9 offers students the opportunity to build their reasoning and sensemaking skills, see the applicability of mathematics, and prepare more effectively for further studies in algebra. The course also focuses on data analysis, which provides students with tools to describe, show, and summarize data in the world around them. In Geometry with Data Analysis, students incorporate knowledge and skills from several mathematics content areas, leading to a deeper understanding of fundamental relationships within the discipline and building a solid foundation for further study. In the content area of Geometry and Measurement, students build on and deepen prior understanding of transformations, congruence, similarity, and coordinate geometry concepts. Informal explorations of transformations provide a foundation for more formal considerations of congruence and similarity, including development of criteria for triangle congruence and similarity. An emphasis on reasoning and proof throughout the content area promotes exploration, conjecture testing, and informal and formal justification. Students extend their middle school work with conjecturing and creating informal arguments to more formal proofs in this course. In the content area of Algebra and Functions, students perform algebraic calculations with specific application to geometry that build on foundations of algebra from Grades 7 and 8. In the Data Analysis, Statistics, and Probability content area, students build from earlier experiences in analyzing data and creating linear models to focus on univariate quantitative data on the real number line (shape, center, and variability) and bivariate quantitative data on a coordinate plane (creating linear models). Email is the best way to reach me at tpairrett@chiltonboe.com. If an email is sent after school hours, it may be answered the following school morning. Weekly assignments and all documents can be found in Google Classroom. Most assignments will be in Big Ideas online.

Prerequisite: N/A

Instructional and Technology Information

Required Textbooks: 978-1-64432-607-7 Big Ideas Learning; Big Ideas Geometry with Data Analysis

Specific Technologies/Software/Programs used in this course: Big Ideas Math Online (accessed through Clever) and Google Classroom

Grading: Major grades (tests, projects, research papers, etc.) are 75 points or higher. Minor grades (quizzes, daily classroom grades, homework, etc.) are 74 points and below. (Homework is 5 points each. It is due at the beginning of the next class.)

Course Policies and Procedures:

Attendance/Missed Work -An absence is defined as non-attendance in a regularly scheduled class or activity. To be counted present, a student must be present more than 50% of the scheduled class time. Every student, upon return to school should bring a verifiable written excuse from home or doctor for each absence and present it to the principal or designee no later than 2 days after his/her return

or absences will be recorded as unexcused. Grades 9-12: One parent note can excuse no more than three consecutive days. If a student is absent for any reason as defined as excused in the student handbook, he/she shall be allowed to make up all major assignments and other work missed during said absence at the time agreeable to the teacher. At the secondary level, students are responsible for contacting the teacher to arrange to make up the work.

Academic Integrity Statement - Students caught cheating on an assignment, test, or exam will receive no credit for the assignment/test. A zero will be given for the grade. Other disciplinary action may occur when deemed appropriate by the principal.

Expectations of classroom behavior -

1. Classroom Rules
 - A. Come to class prepared each day.
 - B. Follow all procedures and directions the first time they are given.
 - C. Be respectful of others and their property.
 - D. Keep our classroom clean.
2. Violation of Rules
 - A. Break detention or writing sets of multiplication tables
 - B. Lines or paragraphs
 - C. A phone call or notification letter of behavior to parents
 - D. Paddling or office referral

Positive Attitude -

- Actively listen, make good eye contact, and participate.
- Cooperate with your teacher and classmates.
- Be kind and encourage others.

Respect for All -

- Accept and respect everyone. Seek first to understand, then to be understood.
- Use positive words and body language

Integrity -

- Take responsibility for your actions
- Be honest.

Do the Right Thing

- Stop, think, and make good choices.
- Keep hands, feet, and objects to yourself.

Effort Towards Learning

- Pay attention and follow all directions the first time.
- Be prepared and on time. Put first things first.
- Give your best effort.

Phone Policy:

- Cell phones/electronic devices may only be used during class changes or after school. Devices may not be used in the lunchroom, classroom settings, or in restrooms.
- If a student is caught using a cell phone/electronic device during class time, a staff member will confiscate the device.
- Refusal to surrender the phone when asked is considered defiance. Defiance will result in disciplinary consequences, including suspension. Parents will be contacted.
- Filming/videoing or taking photos of individuals without the consent of a school board employee is an intermediate offense.

29-Patterns and Relationships

Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.

- a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
- b. Identify different sets of properties necessary to define and construct figures.

30-Definitions

Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

31-Apply Theorems

Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.

- a. Investigate, prove, and apply theorems about lines and angles, including but not limited to: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints.

33-Parallel and Perpendicular Lines

Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. Example: Find the equation of a line parallel or perpendicular to a given line that passes through a given point.

Chapter 9: Right Triangles and Trigonometry

Pythagorean theorem, special right triangles, trig ratios

Lesson 9.1 Properties of Radicals

Lesson 9.2 The Pythagorean Theorem

Lesson 9.3 Special Right Triangles

Lesson 9.4 Similar Right Triangles

Lesson 9.5 The Tangent Ratio

Lesson 9.6 The Sine and Cosine Ratios

Lesson 9.7 Solving Right Triangles

Standards

1-Rewriting Expressions

Extend understanding of irrational and rational numbers by rewriting expressions involving radicals, including addition, subtraction, multiplication, and division, in order to recognize geometric patterns.

2-Using Units

Use units as a way to understand problems and to guide the solution of multi-step problems.

- d. Choose a level of accuracy appropriate to limitations of measurements when reporting quantities.

31-Apply Theorems

Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.

- b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180° ; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity.

34-Use Triangles in Problem Solving

Use congruence and similarity criteria for triangles to solve problems in real-world contexts.

35. Discover and apply relationships in similar right triangles.

- a. Derive and apply the constant ratios of the sides in special right triangles (45° - 45° - 90° and 30° - 60° - 90°).
- b. Use similarity to explore and define basic trigonometric ratios, including sine ratio, cosine ratio, and tangent ratio.
- c. Explain and use the relationship between the sine and cosine of complementary angles.
- d. Demonstrate the converse of the Pythagorean Theorem.
- e. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems, including finding areas of regular polygons.

36-Problem Solving

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems

Chapter 4: Transformations

Translations, reflections, rotations, dilations

Lesson 4.1 Translations

Lesson 4.2 Reflections

Lesson 4.3 Rotations

Lesson 4.4 Congruence and Transformations

Lesson 4.5 Dilations

Lesson 4.6 Similarity and Transformations

Standards

19-Scale Factor

Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor.

21-Transformations

Represent transformations and compositions of transformations in the plane (coordinate and otherwise) using tools such as tracing paper and geometry software.

- a. Describe transformations and compositions of transformations as functions that take points in the plane as inputs and give other points as outputs, using informal and formal notation.
- b. Compare transformations which preserve distance and angle measure to those that do not.

22-Rotations and Reflections

Explore rotations, reflections, and translations using graph paper, tracing paper, and geometry software.

- a. Given a geometric figure and a rotation, reflection, or translation, draw the image of the transformed figure using graph paper, tracing paper, or geometry software.
- b. Specify a sequence of rotations, reflections, or translations that will carry a given figure onto another.
- c. Draw figures with different types of symmetries and describe their attributes

23-Definitions of Rotation, Reflection & Translations

Develop definitions of rotation, reflection, and translation in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

24-Congruence of Figures

Define congruence of two figures in terms of rigid motions (a sequence of translations, rotations, and reflections); show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other.

**Big Ideas
Chapter 4**

26-Dilations

Verify experimentally the properties of dilations given by a center and a scale factor.

- Verify that a dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
- Verify that the dilation of a line segment is longer or shorter in the ratio given by the scale factor.

27-Similarity Transformation

Given two figures, determine whether they are similar by identifying a similarity transformation (sequence of rigid motions and dilations) that maps one figure to the other.

Chapter 5: Congruent Triangles

Angles of triangles, congruence statements, proofs

Lesson 5.1 Angles of Triangles

Lesson 5.2 Congruent Polygons

Lesson 5.3 Proving Triangle Congruence by SAS

Lesson 5.4 Equilateral and Isosceles Triangles

Lesson 5.5 Proving Triangle Congruence by SSS

Lesson 5.6 Proving Triangle Congruence by ASA and AAS

Lesson 5.7 Using Congruent Triangles

Lesson 5.8 Coordinate Proofs

Standards

3-Coordinates of Polygons

Find the coordinates of the vertices of a polygon determined by a set of lines, given their equations, by setting their function rules equal and solving, or by using their graphs.

25-Triangle Congruence

Verify criteria for showing triangles are congruent using a sequence of rigid motions that map one triangle to another.

- Verify that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
- Verify that two triangles are congruent if (but not only if) the following groups of corresponding parts are congruent: angle-side-angle (ASA), side-angle-side (SAS), side-side-side (SSS), and angle-angle-side (AAS).

29-Patterns and Relationships

Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.

- Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
- Identify different sets of properties necessary to define and construct figures.

31-Apply Theorems

Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.

- Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180° ; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity.

32-Geometric Coordinates

Use coordinates to prove simple geometric theorems algebraically.

34-Use Triangles in Problem Solving

Use congruence and similarity criteria for triangles to solve problems in real-world contexts.

Big Ideas
Chapter 5

36-Problem Solving

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems

Chapter 7: Quadrilaterals and Other Polygons

Parallelograms, trapezoids, kites, proofs

Big Ideas
Chapter 7

Lesson 7.1 Polygons

Lesson 7.2 Properties of Parallelograms

Lesson 7.3 Proving that a Quadrilateral is a Parallelogram

Lesson 7.4 Properties of Special Parallelograms

Lesson 7.5 Properties of Trapezoids and Kites

Standards

29-Patterns and Relationships

Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.

- Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
- Identify different sets of properties necessary to define and construct figures.

31-Quadrilateral Proofs

c. Investigate, prove, and apply theorems about parallelograms and other quadrilaterals, including but not limited to both necessary and sufficient conditions for parallelograms and other quadrilaterals, as well as relationships among kinds of quadrilaterals.

36-Problem Solving

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems

Chapter 8: Similarity

Similar polygons, proportions, proofs

Big Ideas
Chapter 8

Lesson 8.1 Similar Polygons

Lesson 8.2 Proving Triangle Similarity by AA

Lesson 8.3 Proving Triangle Similarity by SSS and SAS

Lesson 8.4 Proportionality Theorems

Standards

2-Using Units

Use units as a way to understand problems and to guide the solution of multi-step problems.

- Choose and interpret units consistently in formulas.
- Define appropriate quantities for the purpose of descriptive modeling.

19-Scale Factor

Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor.

27-Similarity Transformation

Given two figures, determine whether they are similar by identifying a similarity transformation (sequence of rigid motions and dilations) that maps one figure to the other.

28-Triangle Similarity

Verify criteria for showing triangles are similar using a similarity transformation (sequence of rigid motions and dilations) that maps one triangle to another.

- Verify that two triangles are similar if and only if corresponding pairs of sides are proportional and corresponding pairs of angles are congruent.

b. Verify that two triangles are similar if (but not only if) two pairs of corresponding angles are congruent (AA), the corresponding sides are proportional (SSS), or two pairs of corresponding sides are proportional and the pair of included angles is congruent (SAS).

31-Apply Theorems

Justify whether conjectures are true or false in order to prove theorems and then apply those theorems in solving problems, communicating proofs in a variety of ways, including flow chart, two-column, and paragraph formats.

b. Investigate, prove, and apply theorems about triangles, including but not limited to: the sum of the measures of the interior angles of a triangle is 180° ; the base angles of isosceles triangles are congruent; the segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length; a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem using triangle similarity.

34-Use Triangles in Problem Solving

Use congruence and similarity criteria for triangles to solve problems in real-world contexts.

36-Problem Solving

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems

3rd & 4th Nine Weeks

Measurements in Congruent and Similar Figures

Chapter 10: Circles

Arcs, chords, and angle relationships

Lesson 10.1 Lines and Segments that Intersect Circles

Lesson 10.7 Circles in the Coordinate Plane

Lesson 10.2 Finding Arc Measures

Lesson 10.3 Using Chords

Lesson 10.4 Inscribed Angles and Polygons

Lesson 10.5 Angle Relationships in Circles

Lesson 10.6 Segment Relationships in Circles

Standards

6-Equation of a Circle

Derive the equation of a circle of given center and radius using the Pythagorean Theorem.

- a. Given the endpoints of the diameter of a circle, use the midpoint formula to find its center and then use the Pythagorean Theorem to find its equation.
- b. Derive the distance formula from the Pythagorean Theorem.

29-Patterns and Relationships

Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools.

- a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties.
- b. Identify different sets of properties necessary to define and construct figures.

30-Definitions

Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

36-Problem Solving

**Big Ideas
Chapter
10**

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems.

37-Inscribed Angles

Investigate and apply relationships among inscribed angles, radii, and chords, including but not limited to: the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

Chapter 11: Circumference, Area, and Volume

Arc length, circumference, area, volume, 3-D figures

Big Ideas
Chapter
11

Lesson 11.4 Three-Dimensional Figures

Lesson 11.5 Volumes of Prisms and Cylinders

Lesson 11.6 Volumes of Pyramids

Assessment: Test on Big Ideas 11.4 - 11.6

Lesson 11.7 Surface Areas and Volumes of Cones

Lesson 11.8 Surface Areas and Volumes of Spheres

Surface Area and Volume Activity

Assessment: Quiz on Big Ideas 11.7 and 11.8

Standards

2-Using Units

Use units as a way to understand problems and to guide the solution of multi-step problems.

- Choose and interpret units consistently in formulas.
- Choose a level of accuracy appropriate to limitations of measurements when reporting quantities.

4-Rearrange Formulas

Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

16-Cross-Sections

Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

17-Surface Area

Model and solve problems using surface area and volume of solids, including composite solids and solids with portions removed.

- Give an informal argument for the formulas for the surface area and volume of a sphere, cylinder, pyramid, and cone using dissection arguments, Cavalieri's Principle, and informal limit arguments.
- Apply geometric concepts to find missing dimensions to solve surface area or volume problems.

18-Perimeter and Area

Given the coordinates of the vertices of a polygon, compute its perimeter and area using a variety of methods, including the distance formula and dynamic geometry software, and evaluate the accuracy of the results.

19-Scale Factor

Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor.

20-Arc Length

Derive and apply the formula for the length of an arc and the formula for the area of a sector.

35-Similar Right Triangles

Discover and apply relationships in similar right triangles.

- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied

problems, including finding areas of regular polygons.

36-Problem Solving

Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems.

38. Mathematical Modeling

Use the mathematical modeling cycle involving geometric methods to solve design problems

Chapter 12: Data Analysis and Displays

Distributions, data displays, variation

Lesson 12.1 Measures of Center and Variation

Assessment: Statistics Quiz

Lesson 12.2 Box-and-Whisker Plots

Lesson 12.3 Shapes of Distributions

Lesson 12.4 Scatter Plots and Lines of Fit

Lesson 12.5 Analyzing Lines of Fit

Lesson 12.6 Choosing a Data Display

Assessment: Statistics Test (Big Ideas Chapter 12)

Standards

2-Using Units

Use units as a way to understand problems and to guide the solution of multi-step problems.

- b. Choose and interpret the scale and the origin in graphs and data displays.

7-Statistical Reasoning

Use mathematical and statistical reasoning with quantitative data, both univariate data (set of values) and bivariate data (set of pairs of values) that suggest a linear association, in order to draw conclusions and assess risk.

8-Organize Data

Use technology to organize data, including very large data sets, into a useful and manageable structure.

9-Distribution of Data

Represent the distribution of univariate quantitative data with plots on the real number line, choosing a format (dot plot, histogram, or box plot) most appropriate to the data set, and represent the distribution of bivariate quantitative data with a scatter plot. Extend from simple cases by hand to more complex cases involving large data sets using technology.

10-Mean and Median

Use statistics appropriate to the shape of the data distribution to compare and contrast two or more data sets, utilizing the mean and median for center and the interquartile range and standard deviation for variability.

- a. Explain how standard deviation develops from mean absolute deviation.
- b. Calculate the standard deviation for a data set, using technology where appropriate.

11-Spread of Data

Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers) on mean and standard deviation.

12-Scatter Plot

Represent data of two quantitative variables on a scatter plot, and describe how the variables are related.

- a. Find a linear function for a scatter plot that suggests a linear association and informally assess its fit by plotting and analyzing residuals, including the squares of the residuals, in order to improve its

fit.

- b. Use technology to find the least-squares line of best fit for two quantitative variables.

13-Correlation Coefficient

Compute (using technology) and interpret the correlation coefficient of a linear relationship.

14-Correlation and Causation

Distinguish between correlation and causation.

15-Linear Models

Evaluate possible solutions to real-life problems by developing linear models of contextual situations and using them to predict unknown values.

- a. Use the linear model to solve problems in the context of the given data.

- b. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the given data.

Assessments

Critical Standards