

Very Short Introductions

(Applying the Common Core Standards for High School Mathematics)

Mathematics » High School

Geometry

To meet many of the Common Core Standards for geometry you can use [Mathematics: A Very Short Introduction](#) and [Symmetry: A Very Short Introduction](#).

Geometry » Congruence

Experiment with transformations in the plane

- [CCSS.Math.Content.HSG-CO.A.1](#) Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) which describes angles, line segments, arcs, circles, and more.

Understand congruence in terms of rigid motions

- [CCSS.Math.Content.HSG-CO.B.6](#) Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Use the *Symmetry: VSI* Chapter 3 ([Types of symmetry](#)) which describes rigid motion.

Prove geometric theorems

- [CCSS.Math.Content.HSG-CO.C.10](#) Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180° ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)), Chapter 3 ([Proofs](#)), and Chapter 5 ([Dimensions](#)). These chapters include the Pythagorean Theorem and information on the geometry of triangle that will help you meet this standard.

Geometry » Similarity, Right Triangles, & Trigonometry

Define trigonometric ratios and solve problems involving right triangles

- [CCSS.Math.Content.HSG-SRT.C.8](#) Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Use the *Mathematics: VSI* Chapter 3 ([Proofs](#)) & Chapter 5 ([Dimensions](#)) which cover the Pythagorean Theorem.

Geometry » Circles

Understand and apply theorems about circles

- [CCSS.Math.Content.HSG-C.A.2](#) Identify and describe relationships among inscribed angles, radii, and chords. *Include 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.*

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) section on “[Spherical geometry](#)” and Chapter 3 ([Proofs](#)) sections on “Dividing a circle into regions” and “Regions of a circle”.

- [CCSS.Math.Content.HSG-C.A.3](#) Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) section on “[Spherical geometry](#)”

Find arc lengths and areas of sectors of circles

- [CCSS.Math.Content.HSG-C.B.5](#) Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) section on “[Spherical geometry](#)” and Chapter 3 ([Proofs](#)) sections on “Dividing a circle into regions” and “Regions of a circle”

Geometry » Expressing Geometric Properties with Equations

Translate between the geometric description and the equation for a conic section

- [CCSS.Math.Content.HSG-GPE.A.1](#) Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) section on “[Spherical geometry](#)”, Chapter 5 ([Dimensions](#)) section on “How to define high-dimensional space” and Chapter 3 ([Proofs](#)) section on the [Pythagorean Theorem](#).

Geometry » Modeling with Geometry

Apply geometric concepts in modeling situations

- [CCSS.Math.Content.HSG-MG.A.1](#) Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Use the *Mathematics: VSI* Chapter 6 ([Geometry](#)) and Chapter 1 ([Modeling](#))

Statistics & Probability

To meet Common Core Standards for Statistics & Probability use [Statistics: A Very Short Introduction](#) and [Probability: A Very Short Introduction](#).

Statistics & Probability » Interpreting Categorical & Quantitative Data

Summarize, represent, and interpret data on a single count or measurement variable

- [CCSS.Math.Content.HSS-ID.A.2](#) Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

Use the *Statistics: VSI* Chapter 2 ([Simple descriptions](#)) and the *Probability: VSI* Chapter 4 ([Chance experiments](#))

- [CCSS.Math.Content.HSS-ID.A.3](#) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Use the *Statistics: VSI* Chapter 2 ([Simple descriptions](#)), Chapter 3 ([Collecting good data](#)), and Chapter 6 ([Statistical models and methods](#)).

- [CCSS.Math.Content.HSS-ID.A.4](#) Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

Use the *Probability: VSI* Chapter 4 ([Chance experiments](#)) and the *Statistics: VSI* Chapter 2 ([Simple descriptions](#)), Chapter 4 ([Probability](#)), and Chapter 5 ([Estimation and inference](#)).

Statistics & Probability » Making Inferences & Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments

- [CCSS.Math.Content.HSS-IC.A.1](#) Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

Use the *Probability: VSI* Chapter 4 ([Chance experiments](#)) and the *Statistics: VSI* Chapter 2 ([Simple descriptions](#)), Chapter 4 ([Probability](#)), and Chapter 5 ([Estimation and inference](#)).

- [CCSS.Math.Content.HSS-IC.A.2](#) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*

Use the *Probability: VSI* Chapter 1 ([Fundamentals](#)), Chapter 2 ([The workings of probability](#)), and Chapter 4 ([Chance experiments](#)) and the *Statistics: VSI* Chapter 4 ([Probability](#)) and Chapter 5 ([Estimation and inference](#)).

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

- [CCSS.Math.Content.HSS-IC.B.3](#) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

Use the *Statistics: VSI* sections on “[Survey sampling](#)” and on “[Observational versus experimental data](#)”, both in Chapter 3 ([Collecting Good Data](#)).

- [CCSS.Math.Content.HSS-IC.B.4](#) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

Use the *Statistics: VSI* Chapter 3 ([Collecting Good Data](#)) and Chapter 5 ([Estimation and inference](#))

- [CCSS.Math.Content.HSS-IC.B.5](#) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

Use the *Statistics: VSI* Chapter 3 ([Collecting Good Data](#)) and Chapter 5 ([Estimation and inference](#)). Both chapters include treatment examples.

- [CCSS.Math.Content.HSS-IC.B.6](#) Evaluate reports based on data.

Use the *Statistics: VSI* with particular attention to Chapter 3 ([Collecting Good Data](#)).

Statistics & Probability » Conditional Probability & the Rules of Probability

Understand independence and conditional probability and use them to interpret data

- [CCSS.Math.Content.HSS-CP.A.3](#) Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A , and the conditional probability of B given A is the same as the probability of B .

Use the *Probability: VSI* Chapter 2 ([The workings of probability](#)) which covers the Addition law, Multiplication Law, Independence, and more.

- [CCSS.Math.Content.HSS-CP.A.5](#) Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*

Use the *Probability: VSI* Probability VSI Chapter 2 ([The workings of probability](#)) to understand the concepts and Chapter 6 ([Games people play](#)) and Chapter 7 ([Applications in science, medicine, and operations research](#)) to provide everyday situational examples.

Use the rules of probability to compute probabilities of compound events.

- [CCSS.Math.Content.HSS-CP.B.6](#) Find the conditional probability of A given B as the fraction of B 's outcomes that also belong to A , and interpret the answer in terms of the model.

Use the “[Events with Overlap](#)” section of Chapter 2 ([The workings of probability](#)) in the *Probability: VSI*

- [CCSS.Math.Content.HSS-CP.B.7](#) Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.

The **Addition Rule** is covered in Chapter 2 ([The workings of probability](#)) of the *Probability: VSI*

- [CCSS.Math.Content.HSS-CP.B.8](#) (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

The **Multiplication Rule** is covered in Chapter 2 ([The workings of probability](#)) of the *Probability: VSI*

- [CCSS.Math.Content.HSS-CP.B.9](#) (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Use the *Probability: VSI* section on "[More than two events](#)" in Chapter 2 ([The workings of probability](#))