Geometry
2012–2016

This document serves as a guide for the transition from the Nevada State Standards (NSS) to the Common Core State Standards (CCSS). Users of this document should also refer to the Mathematics Standards for High School introduction (p. 57), the narratives for each conceptual category, the Glossary, and Appendix A of the CCSS.

The tables beginning on the next page list the Common Core State Standards for Geometry. Corresponding Nevada State Standards are listed where the content matches in whole or in part. In many cases, the expectations of the CCSS exceed the NSS. Teachers must move their instruction, and therefore their students' mathematical knowledge, from the level of the NSS to the CCSS. Teachers must also incorporate the *Standards for Mathematical Practice* into instruction to complete students' educational experiences. Additional clarification is provided in the comments for each CCSS. Course pathways are provided for both a traditional sequence (Algebra 1, Geometry, Algebra 2, 4th-year course) and an integrated sequence (Mathematics 1, Mathematics 2, Mathematics 3, 4th-year course). Where multiple courses are listed for a particular standard, teachers should consult The Pathways in Appendix A to understand how a standard's emphasis changes from one course to the next.

The Nevada Transition Plan recommends CCSS course implementation using the following timeline:

2012–2013	Grade 9	Traditional: Algebra 1 or Geometry Integrated: Mathematics 1 or Mathematics 2
2013–2014	Grade 9	Traditional: Algebra 1 or Geometry Integrated: Mathematics 1 or Mathematics 2
	Grade 10	Traditional: Geometry or Algebra 2 Integrated: Mathematics 2 or Mathematics 3
2014–2015	Grade 9	Traditional: Algebra 1 or Geometry Integrated: Mathematics 1 or Mathematics 2
	Grade 10	Traditional: Geometry or Algebra 2 Integrated: Mathematics 2 or Mathematics 3
	Grade 11	Traditional: Algebra 2 or higher (4th-year courses) Integrated: Mathematics 3 or higher (4th-year courses)
2015–2016	Grades 9–12	Traditional: Full CCSS Implementation Integrated: Full CCSS Implementation

According to this plan, in 2012–2013, grade 9 students receive full common core instruction in mathematics, typically Algebra 1 or Geometry in a traditional sequence, or Mathematics 1 or 2 in an integrated sequence. In 2013–2014, grade 9–10 students receive full common core instruction, etc. When a course is offered in a grade earlier than listed, e.g. Algebra 1 in 8th grade, students receive full common core instruction for that course.

Geometry: Congruence

Experiment with transformations in the plane.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]			
G.CO.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.			CCSS increases formality of these terms from NSS in earlier grades.	M1	G		
G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	4.7.3 Demonstrate translation, reflection, and rotation using coordinate geometry and models. Describe the location of the original figure and its transformation on a coordinate plane.	+2	Extend demonstrating transformations in the NSS to describing transformations as functions.	M1	G		
	4.8.3 Describe the relationship between an original figure and its transformation or dilation.	+1					
G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	4.7.3 Demonstrate translation, reflection, and rotation using coordinate geometry and models.	+2	Extend demonstrating transformations in the NSS to describing the results of more than one transformation.	M1	G		
G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.				M1	G		
G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	4.8.3 Describe the relationship between an original figure and its transformation or dilation.	+1	Extend describing a single transformation in the NSS to describing the results of a sequence of transformations.	M1	G		

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December 1, 2011

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Geometry: Congruence

Understand congruence in terms of rigid motions.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.CO.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.				M1 G
G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.				M1 G
G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.				M1 G

Prove geometric theorems.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.CO.9 Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	4.12.6 Solve problems using complementary and supplementary angles, congruent angles, vertical angles, angles formed when parallel lines are cut by a transversal and angles in polygons.	0	Extend solving problems in the NSS to proving theorems.	G M2
	4.12.9 Formulate, evaluate, and justify arguments using inductive and deductive reasoning in mathematical and practical situations.	0		
G.CO.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.*	4.12.9 Formulate, evaluate, and justify arguments using inductive and deductive reasoning in mathematical and practical situations.	0		G M2

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Geometry: Congruence
Prove geometric theorems.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.CO.11 Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*	4.12.9 Formulate, evaluate, and justify arguments using inductive and deductive reasoning in mathematical and practical situations.	0		G M2

Geometry: Congruence
Make geometric constructions.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*	4.8.8 Construct geometric figures using a variety of tools.	+1		G M1
G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.				G M1

Geometry: Similarity, Right Triangles, and Trigonometry
Understand similarity in terms of similarity transformations.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor: a. 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.				G M2

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Geometry: Similarity, Right Triangles, and Trigonometry

Understand similarity in terms of similarity transformations.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor: b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.				G M2
G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	4.8.2 Apply the properties of equality and proportionality to congruent or similar shapes.	+1	Extend applying properties in the NSS to include similarity achieved through transformations and dilations.	G M2
G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.				G M2

Prove theorems involving similarity.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.4 Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity*.	4.12.9 Formulate, evaluate, and justify arguments using inductive and deductive reasoning in mathematical and practical situations.	0		G M2
G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.				G M2

Define trigonometric ratios and solve problems involving right triangles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	4.12.2 Apply properties of similarity through right triangle trigonometry to find missing angles and sides.	0		G M2

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Geometry: Similarity, Right Triangles, and Trigonometry

Define trigonometric ratios and solve problems involving right triangles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.				G M2
G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★	4.12.2 Apply properties of similarity through right triangle trigonometry to find missing angles and sides.	0		G M2
	4.12.7 Apply the Pythagorean Theorem and its converse in mathematical and practical situations.	0		

Apply trigonometry to general triangles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.SRT.9 (+) Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.				G M3
G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.				G M3
G.SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).				G M3

Geometry: Circles

Understand and apply theorems about circles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.C.1 Prove that all circles are similar.				G M2

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Geometry: Circles

Understand and apply theorems about circles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.C.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*.	4.12.1 Identify and use the parts of a circle to solve mathematical and practical problems.	0	Extend identifying and using parts of a circle in the NSS to describing relationships among inscribed figures.	G M2
G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.				G M2
G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle.				G M2

Find arc lengths and areas of sectors of circles.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.C.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.				G M2

Geometry: Expressing Geometric Properties with Equations

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

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.GPE.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.				G M2
G.GPE.2 Derive the equation of a parabola given a focus and directrix.				G M2

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Geometry: Expressing Geometric Properties with Equations

Use coordinates to prove simple geometric theorems algebraically.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.GPE.4 Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point* $(1,\sqrt{3})$ *lies on the circle centered at the origin and containing the point (0, 2).*				M1 G M2
G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	4.12.5 Determine the slope of lines using coordinate geometry and algebraic techniques. Identify parallel, perpendicular, and intersecting lines by slope.	0	Extend identifying lines by slope in the NSS to include coordinate geometry proofs.	M1 G
G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.				G M2
G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★				M1 G

Geometry: Geometric Measurement and Dimension

Explain volume formulas and use them to solve problems.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments*.				G M2

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Geometry: Geometric Measurement and Dimension

Explain volume formulas and use them to solve problems.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	3.12.3 Select and use appropriate measurement tools, techniques, and formulas to solve problems in mathematical and practical situations.	0		G M2
	3.12.5 Determine the measure of unknown dimensions, angles, areas, and volumes using relationships and formulas to solve problems.	0		

Visualize relationships between two-dimensional and three-dimensional objects.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.GMD.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.				G M3

Geometry: Modeling with Geometry

Apply geometric concepts in modeling situations.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
G.MG.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).★				G M3
G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★				G M3
G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★				G M3

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Statistics and Probability: Conditional Probability and the Rules of Probability

Understand independence and conditional probability and use them to interpret data.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
S.CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").				G M2
S.CP.2 Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.				G M2
S.CP.3 Understand the conditional probability of *A* given *B* as P(*A* 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*.				G M2
S.CP.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*				G M2
S.CP.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.*				G M2

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Statistics and Probability: Conditional Probability and the Rules of Probability

Use the rules of probability to compute probabilities of compound events in a uniform probability model.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
S.CP.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.				G M2
S.CP.7 Apply the Addition Rule, P(*A* or *B*) = P(*A*) + P(*B*) – P(*A* and *B*), and interpret the answer in terms of the model.				G M2
S.CP.8 (+) Apply the general Multiplication Rule in a uniform probability model, P(*A* and *B*) = P(*A*)P(*B*|*A*) = P(*B*)P(*A*|*B*), and interpret the answer in terms of the model.				G M2

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Statistics and Probability: Conditional Probability and the Rules of Probability

Use the rules of probability to compute probabilities of compound events in a uniform probability model.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
S.CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	5.12.4 Apply permutations and combinations to mathematical and practical situations, including the Fundamental Counting Principle.	0		G M2

Statistics and Probability: Using Probability to Make Decisions

Calculate expected values and use them to solve problems.

Common Core State Standard (CCSS)	Nevada State Standard (NSS)	Change[1]	Comments	Pathways[2]
S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).				G M2 A2 M3
S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).				G M2 A2 M3

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