CAISL
Carlucci American International School of Lisbon

GRADE 9 GEOMETRY FRAMEWORK

Contents

EXPECTATIONS

MATH TOOLS

To support curriculum implementation, the Common Core recommends the use of certain math tools at each grade level. CAISL implements these recommendations, with the exception of a graphing calculator, which CAISL chooses to introduce in High School.

MENTAL MATH

To reinforce computational fluency, students are expected to practice mental math calculations based on grade level content on a weekly basis.

INFORMATION TECHNOLOGY EXPECTATIONS

Students will be expected to use a variety of digital tools according to grade level expectations stated in CAISL's Research and Information Technology Integration Scope and Sequence.
See link below:
https://www.caislisbon.org/uploaded/Curriculum_links/2019-2020/IT_Skills_Scope_and_Sequence_by_Grade.pdf

PERFORMANCE INDICATORS

MATH PRACTICES

Explanations of Math Tools: By the end of the year students will be expected to problem solve, reason mathematically, and communicate efficiently according to grade level expectations. See link below:

https://www.caislisbon.org/uploaded/Curriculum_links/Math/Math_Practice_Progressions_5-12.pdf

PROBLEM SOLVING

Make sense of problems and persevere in solving them
Look for and make use of structure (Deductive Reasoning)
Look for and express regularity in repeated reasoning (Inductive Reasoning)

MATHEMATICAL REASONING, COMMUNICATION AND MODELING

Reason abstractly and quantitatively
Construct viable arguments and critique the reasoning of others
Model with mathematics
Use appropriate tools strategically
Attend to precision

MATH CONCEPTS

GEOMETRY

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. DOK1
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. DOK3
Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. DOK2
Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. DOK3
Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another. DOK2
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. DOK3 E
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. DOK2
Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. DOK2
Prove theorems about lines and angles. DOK3
Prove theorems about parallelograms. DOK3
Make formal geometric constructions with a variety of tools and methods. DOK2 E
Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. DOK2

Verify experimentally the properties of dilations given by a center and a scale factor. DOK2
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. DOK3
Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. DOK2
Prove theorems about triangles. DOK3 E
Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. DOK2 E
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. DOK2 E
Explain and use the relationship between the sine and cosine of complementary angles. DOK2
Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. DOK2 E
Prove that all circles are similar. DOK3
Identify and describe relationships among inscribed angles, radii, and chords. DOK2 E
Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. DOK3
Construct a tangent line from a point outside a given circle to the circle. DOK2
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. DOK3
Use coordinates to prove simple geometric theorems algebraically. DOK3 E
Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. DOK2 E
Find the point on a directed line segment between two given points that partitions the segment in a given ratio. DOK2
Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. DOK2
Explain a proof of the Pythagorean Theorem and its converse. DOK2
Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. DOK2 E
Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. DOK2
Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. DOK2 E
Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. DOK1
Use geometric shapes, their measures, and their properties to describe objects. DOK2
Apply concepts of density based on area and volume in modeling situations. DOK2
Apply geometric methods to solve design problems. DOK2

FURTHER CURRICULAR EXPECTATIONS

For the Performance Indicator (Similarity, Right Triangles, and Trigonometry):
Verify experimentally the properties of dilations given by a center and a scale factor.

- 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.
- The dilation of a line segment is longer or shorter in the ratio given by the scale factor.