

Geometry Summary

The purpose of this course is to formalize, deepen, and extend students' geometric and algebraic experiences. Students will continue their work with similarity and congruence. Students explore more complex geometric concepts and relationships, including: formal mathematical arguments, transformations, the coordinate system, right angle trigonometry, circles, and probability.

Standards for Mathematical Practice

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.

Coordinate Geometry and Right Triangles

- Use the Pythagorean Theorem to solve problems about right angles. For example, a rectangle with a length of 9 inches and a diagonal of 20 inches has a width of about 17.86 inches.
- Use trigonometric ratios to solve problems with right triangles. For example, the angle that a 12-foot ladder makes with the ground when the ladder is leaning against a point that is 10 feet high is determined by $\sin^{-1}(10/12)$.
- Calculate the distance or midpoint between two points in a coordinate plane. For example, the distance between the points (3, 10) and (6, a) is 10 units. The possible values for a are $a = 6$ or $a = 14$.
- Know that the slopes of parallel lines are the same and that the slopes of perpendicular lines are the negative reciprocal of each other. For example, the lines determined by $y = (3/2)x + 8$ and $y = (-2/3)x + 2$ are perpendicular.
- Use the slope, distance, or midpoint between two points on a coordinate plane to establish properties of a 2-dimensional shape. For example, in quadrilateral PQRS, the midpoints of PR and QS are both at (3, 4). The slope of line segment PR is $3/4$ and the slope of line segment QS is $-4/3$. This means that quadrilateral PQRS is a rhombus.

Measurement

- Use the relationships between vertical angles and the relationships between angles when parallel lines are cut by a transversal (alternate interior angles, alternate exterior angles, corresponding angles, and supplementary angles) to find missing angle measures.
- Describe methods to determine or estimate the area or perimeter of geometric figures.
- Describe how the change in a linear dimension (length, radius, diameter) affects the perimeter, circumference, or area. For example, when the radius of a circle is doubled, the circumference is also doubled, but the area is multiplied by 4.
- Use area models to find probabilities. For example, the probabilities associated with flipping a coin and choosing a number from 1 to 3 can be modeled by dividing a rectangle of area 1 square unit into two equal columns and three equal rows.

Diagnostic Category Skills List

Geometric Properties

- Solve problems using the radius, diameter, segment, or tangent of a circle. For example, identify that a tangent intersects a circle at exactly one point.
- Solve problems using arcs, semicircles, sectors, or angles of a circle. For example, determine that the ratio of the area of a sector to the area of the circle is equal to the ratio of the measure of the central angle to 360° .
- Use chords, tangents, and secants to find missing arc measures or missing segment measures. For example, points X, Y, and Z are on a circle. The measure of angle Y is 90° and the length of XY is 4. Find the length of XZ.
- Use properties of circles and spheres to solve problems.
- Use properties of triangles to solve problems. For example, in isosceles triangle ABC, $AB = BC$. The measure of angle B is 50° , so the measure of angle A must be 65° .
- Use properties of quadrilaterals to solve problems. For example, a quadrilateral has diagonals that both bisect each other and are congruent. Know that the quadrilateral must be a rectangle.
- Use properties of regular polygons to solve problems. For example, determine that the measure of each interior angle of a regular decagon (10-sided polygon) is 144° .
- Solve problems using the properties of pyramids and prisms.

Congruence, Similarity, and Proofs

- Solve problems using similar and congruent polygons and solids. For example, when pentagon ABCDE is congruent to pentagon JKLMN, it must be true that angle DEA is congruent to angle MNJ.
- Use proportional relationships of similar figures. For example, knowing that triangle JKL is similar to triangle QRS, determine that $QS = 9$ units when $JK = 24$ units, $JL = 12$ units, and $QR = 18$ units.
- Write, analyze, and complete formal proofs. For example, if triangle ABC and triangle DEF have line segment AB congruent to line segment DE, angle B congruent to angle E, and line segment BC congruent to line segment EF, then triangle ABC is congruent to triangle DEF by side-angle-side.

Additional Materials and Resources can be found at:

<http://www.pdesas.org/>

or

<https://pa.drctdirect.com/>

CLASSROOM
DIAGNOSTIC TOOLS

Geometry Summary, Standards for Mathematical Practice, and Diagnostic Category Skills List

The Geometry Summary describes the performance that students in Geometry are expected to demonstrate. The standards for mathematical practice describe practices that students should develop across grades in their study of mathematics. The Diagnostic Category Skills List provides descriptions of skills that students can be expected to demonstrate within each Diagnostic Category while taking the Classroom Diagnostic Tools for Geometry. While this list does not include every possible skill that students may encounter within the CDT, it does provide a representative sample for each diagnostic category. Additionally, mathematics instruction should not address these as discrete skills but rather incorporate them with the standards for mathematical practice as a part of an integrated curriculum.



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SAS Standards
Aligned
System