SDST Course Overview

Course Grade: Grades 8-10

Subject: Mathematics – Geometry

Course/Content Area Description/Overview:

Geometry is a mathematics course that develops students' ability to reason spatially, analyze relationships among geometric figures, and justify conclusions using precise mathematical language. Students explore properties of two- and three-dimensional figures through constructions, transformations, congruence, similarity, coordinate geometry, trigonometry, and modeling.

The course emphasizes inductive and deductive reasoning, proof, and the use of multiple representations—including diagrams, physical and digital tools, coordinate systems, and algebraic methods—to analyze geometric relationships. Geometry is aligned to the **PA Core Geometry Anchors**, building conceptual understanding, procedural fluency, and application.

Across middle school and high school Geometry experiences, students progress from informal reasoning and pattern recognition to formal deductive reasoning and proof. Students apply geometric concepts to real-world contexts involving measurement, area, volume, and proportional reasoning, strengthening critical thinking, communication, and problem-solving skills that support future coursework and informed decision-making.

Overarching Essential Questions for this Curriculum Plan:

1. How can geometric relationships be represented, analyzed, and justified using definitions, properties, and theorems?
2. How do patterns, transformations, and symmetry help us understand and compare geometric figures?
3. How can geometry be used to model, measure, and solve real-world problems involving shape, space, and change?

Major Units of Study:	**In this course/content area, students will develop mastery in these areas:**
1. Foundations of geometric reasoning and vocabulary 2. Shape relationships, symmetry, and transformations 3. Constructions, coordinate geometry, and congruence 4. Triangle and polygon properties with proof 5. Similarity, proportional reasoning, and dilation 6. Circles and measurement in two dimensions 7. Right triangle relationships and trigonometry 8. Three-dimensional modeling and volume 9. Probability and data in geometric contexts	● Using precise geometric vocabulary, notation, and diagrams to analyze relationships and support reasoning *(G.1)* ● Applying inductive and deductive reasoning to identify patterns, make conjectures, and construct geometric proofs *(G.1, G.2)* ● Performing and interpreting geometric constructions using appropriate tools to support reasoning and verification *(G.1, G.2)* ● Analyzing transformations to determine congruence and similarity among geometric figures *(G.2)* ● Proving and applying properties of triangles, quadrilaterals, and polygons *(G.3, G.4)* ● Establishing similarity through dilations and proportional relationships *(G.2, G.4)* ● Using coordinate geometry to model, classify, and verify geometric relationships *(G.5)* ● Applying the Pythagorean Theorem and special right triangle relationships to solve problems *(G.4)* ● Applying trigonometric ratios to solve contextual problems involving right triangles *(G.4)* ● Analyzing properties of circles and applying geometric relationships involving arcs, angles, and tangents *(G.3)* ● Modeling two- and three-dimensional figures and solving problems involving area, surface area, and volume *(G.6)* ● Modeling and solving real-world problems using geometric reasoning *(G.1–G.6)*

Course Mastery

Students demonstrate mastery of this course by consistently meeting the identified academic standards through the application of content knowledge, skills, and practices across multiple instructional contexts.

Evidence of mastery may include, but is not limited to, performance tasks, projects, and standards-aligned assessments.

In this course/content area, students will develop mastery in these areas:				
	SDST Profile of a Graduate Connections	**Focus Skills**	**Focus Concepts**	**Connections to Standards and Anchors**

	***Critical Thinking***	Analyzing patterns and geometric relationships Evaluating conjectures and proof strategies Making sense of complex, multi-step spatial problems	Structure of geometric systems Congruence, similarity, and proof Modeling and measurement	PA Core Geometry Anchors: **G.1, G.2, G.3**
	***Communication***	Explaining reasoning verbally and in writing Using precise mathematical language and representations Constructing and defending logical arguments	Mathematical representation Argumentation and justification	PA Core Geometry Anchors: **G.1, G.2**
	***Problem Solving***	Applying geometric concepts to real-world contexts Selecting appropriate tools and strategies Persevering through challenging tasks	Transformations and modeling Coordinate and trigonometric reasoning Quantitative interpretation	PA Core Geometry Anchors: G.3, G.4, G.5, G.6

	***Self-Motivated Learner***	Monitoring understanding and adjusting strategies Engaging in productive struggle during proof and modeling Reflecting on errors and revising reasoning	Logical reasoning and proof Growth mindset through reasoning progression Strategic use of feedback and revision	PA Core Geometry Anchors: G.1 (Reasoning & Proof), G.2 (Transformations)
	***Global Citizen***	Applying geometry to real-world and societal contexts Interpreting spatial and quantitative information to inform decisions	Modeling with geometry Measurement and proportional reasoning	PA Core Geometry Anchors: G.5, G.6 Supporting Standards: Probability and Statistics