DP AI SL Planner – Unit 4 Topic 3: Geometry and Trigonometry

Teacher(s)	Jessica Vaughn	Subject group and course	Mathematics – Applications and Interpretations		
Course part and topic	Topic 3 – Geometry & trigonometry 3.1-3.6	SL or HL/Year 1 or 2	SL, Yr 2	Dates	5 weeks Late January – early March

Unit description and texts	DP assessment(s) for unit
The geometry and trigonometry unit will teach students to visualize and problem solve in two and three-dimensional space. Topics include coordinate geometry, right and non-right triangle relationships, volume and surface area in three dimensions. Oxford AI textbook: Chapter 1: 1.5-1.6 Chapter 2: Representing space: non-right angled trigonometry and volumes Chapter 4: Dividing up space: coordinate geometry, lines, Voronoi diagrams	Assessment #8 (3.1- 3.3) Assessment #9 (3.4-3.6) All assessments will use previous IB exam questions from the Questionbank Additional questions will be adapted from Oxford text to cover new content not previously included in IB exams.

INQUIRY: establishing the purpose of the unit

Transfer goals

List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply, their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.

Students should be able to:
- Use geometric formulas in two and three-dimensional space (distance, midpoint, volume, surface area, perpendicular bisectors)
- Calculate angle measures and side lengths of right and non-right triangles.
- Calculate arc length and sector areas in circles.

- Write equations of perpendicular bisectors of a given segment.
- Complete a Voronoi Diagram missing one edge, given no more than 3 points (sites).

ACTION: teaching and learning through inquiry

Content/skills/concepts—essential understandings	Learning process
	Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.

Students will know the following content:
- Midpoint and distance formula in two and three dimensions.
- Right triangle trigonometric ratios for angle measures and side lengths.
- Non right triangle calculations for angle measures and side lengths – sine rule and cosine rule. Area formula for non-right triangles.
- Arc length and sector areas in circles.
- Equations of perpendicular bisectors.
- Voronoi diagrams.

Students will develop the following skills:
- Apply geometric formulas to find distance and midpoints on a coordinate plane.
- Apply trigonometric formulas for right and non-right triangles.
- Apply surface area and volume formulas for three-dimensional solids.

Students will grasp the following concepts:
- Perpendicular bisectors and how they relate to voronoi diagrams
- Bearings - how to create and use the bearing from North in geometry problems.
- The properties of shapes are highly dependent on the dimension they occupy in space.
- Volume and surface area of shapes are determined by formulae, or general mathematical
- relationships or rules expressed using symbols or variables.
- The relationships between the length of the sides and the size of the angles in a triangle can be used to solve many problems involving position, distance, angles and area.
- Different representations of trigonometric expressions help to simplify calculations.
- Systems of equations often, but not always, lead to intersection points.
- In two dimensions, the Voronoi diagram allows us to navigate, path-find or establish an optimum position.

Learning experiences and strategies/planning for self-supporting learning:

☒ Lecture

☐ Socratic seminar

☒ Small group/pair work

☒ PowerPoint lecture/notes

☐ Individual presentations

☐ Group presentations

☐ Student lecture/leading

☐ Interdisciplinary learning

Details:

Each section will start with direct instruction and introduction from the instructor. Students will work in small groups to solve problems and complete explorations. Discussions regarding method, alternate approaches, and efficiency will be regularly included in the class.

Students have a background in many of these topics from previous math courses.

The teacher will provide multiple resources electronically and in person to support student learning.

☐ Other/s:

Formative assessment:

IB Questionbank Practice problem sets

TOTD – quick checks

HW quizzes: non-right triangles,

	Summative assessment: Assessment #8 (3.1-3.3) Assessment #9 (3.4-3.6)
	Differentiation: ☒Affirm identity—build self-esteem ☒Value prior knowledge ☒Scaffold learning ☒ Extend learning Details: Students have seen geometric topics in previous courses. This unit will build on their background in geometry and trigonometry. They will also be given multiple opportunities to practice math skills with IB questionbank problems and optional resources from Delta Math, where available.

Approaches to learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

☒ Thinking

☒ Social

☒ Communication

☐ Self-management

☐ Research

Details:

Thinking - making connections within the content and applications, choosing appropriate formulas

Social – partner/group work

Communication – utilizing the language and notation of geometry – using appropriate formulas and units of measurement

Language and learning	TOK connections	CAS connections
Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.	Check the boxes for any explicit TOK connections made during the unit	Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.
☒ Activating background knowledge ☐ Scaffolding for new learning ☒ Acquisition of new learning through practice ☒ Demonstrating proficiency Details: Students have a background in geometric and trigonometric formulas from previous courses. This unit will build on their knowledge of geometry and trigonometry and extend into new concepts applications.	☐ Personal and shared knowledge ☐ Ways of knowing ☐ Areas of knowledge ☐ The knowledge framework Details: N/A	☒ Creativity ☐ Activity ☐ Service Details: Geometry can be connected to art around us. Students will be encouraged to see where they recognize geometric shapes in the world around them.

Resources

List and attach (if applicable) any resources used in this unit

Oxford Textbook - Mathematics: Applications & Interpretations.
IB QuestionBank
Khan Academy
Delta Math

Stage 3: Reflection—considering the planning, process and impact of the inquiry

What worked well	What didn't work well	Notes/changes/suggestions:
List the portions of the unit (content, assessment, planning) that were successful	*List the portions of the unit (content, assessment, planning) that were not as successful as hoped*	*List any notes, suggestions, or considerations for the future teaching of this unit*