SAN LEANDRO UNIFIED SCHOOL DISTRICT
COURSE PROPOSAL

SECTION A. COVER PAGE

1. Course Title:

Geometry CP

7. Action:

☐ New Course
☒ Course Revision
☐ Title Change Only

2. Date Submitted:

May 11, 2015

8. Grade Level:

☒ 9 ☒ 10
☒ 11 ☒ 12

3. Transcript Title/Abbreviation(s):

Geometry CP

9. Prerequisites: (Please list.)

☒ Required: Algebra 1 CP

☐ Recommended:

4. Transcript Course Code/Course Number:

2284
22849
2284EL

10. Seeking Program Distinction?

☐ YES ☒ NO
☐ Honors
☐ AP

5. Subject Area:

Mathematics

11. Is this a CTE course?

☐ YES
☒ NO

If YES, complete Section C.

6. Department:

Mathematics

12. Previously approved by UC?

☒ YES ☐ NO

13. Course proposed to meet UC requirement:

Already eligible? ☒ YES ☐ NO
☐ a ☐ b ☒ c ☐ d ☐ e ☐ f ☐ g

Proposing eligibility? ☒ YES ☐ NO
☐ a ☐ b ☒ c ☐ d ☐ e ☐ f ☐ g

Please mark one for approved eligibility or proposed eligibility.

14. Unit Value/Course Credit/Length of Course:

☐ 0.5 (semester or half-year)
☒ 1.0 (one year equivalent)
☐ 2.0 (two year equivalent)
☐ Other

15. School Contact:

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16. Signatures:

Department Chair: Fred Lobe

Principal: [signature] 5/11/15

DISTRICT OFFICE USE ONLY

Date Approved by Board Curriculum Committee: 5-11-15

Date Approved by Board:

SECTION B. COURSE CONTENT

17. Course Description

The Geometry course is aligned with the California Common Core State Standards and the San Leandro Unified School District K-12 Mathematics Curriculum Model. Student learning activities focus on Essential School-wide Learning Results.

Geometry is a rigorous course and includes additional work in trigonometry and coordinate geometry. The student is exposed to formal foundations in plane and solid geometry, along with introductions to discrete geometry and Graph Theory. The course covers logic and reasoning in arriving at valid conclusions. Students will develop their ability to construct formal logical arguments and proofs in geometric settings and problem solving. The properties of geometric figures are studied, such as triangles, quadrilaterals, and other polygons, parallel lines, circles, pyramids, etc. Students are expected to not only acquire knowledge, but also organize, analyze, evaluate, predict, problem solve, and apply their knowledge. The student must read and comprehend a variety of material; demonstrate understanding by creatively applying various mathematical principles and operations to solve a range of problems; ask questions and provide explanations by speaking with clarity, meaning, and confidence; convey ideas in written and visual form; use technology in research, accessing information, establishing patterns confirming mathematical formulas, and developing concepts. Students learn to appreciate and respect individual differences, and demonstrate the ability to work collaboratively. The Geometry student must be able to manage their time wisely, be organized, and meet due dates.

18. Course Goals and/or Major Student Outcomes

Unit 1: Constructions and Geometric Terminology

- How can students create constructions in a plane using various tools and methods, while building a foundational knowledge of geometric terms and definitions?
- How can students evaluate triangle congruence through constructions and transformations?

Unit 2: Congruence and Proof

- How can students utilize their knowledge of triangle congruence to develop formal proofs, using strong logic and reasoning?
- How can students prove theorems about lines, angles, triangles, quadrilaterals, and other polygons, using a variety of methods including reasoning and proof by contradiction?

Unit 3: Similarity, Right Triangles, and Trigonometry

- How can students apply their earlier experience with dilations and proportional reasoning to build a formal understanding of similarity?
- How can students identify criteria for similarity triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean Theorem?
- How can students derive the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles, building on their work with quadratic equations done in Model Algebra I?
- How can students learn to distinguish whether three given measures (angles or sides) define 0, 1, 2 or infinitely many triangles?

Unit 4: Geometric Measurement and Dimension

- How can students' experience with three-dimensional objects be extended to include informal explanations of circumference, area, and volume formulas?

- How can students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line?

Unit 5: Expressing Geometric Properties with Equations

- How can students use coordinates to prove simple geometric theorems algebraically?
- How can students prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems?
- How can students find the point on a directed line segment between two given points that partitions the segment in a given ratio?
- How can students use coordinates to compute perimeters of polygons and areas of triangles and rectangles?
- How can students derive the equation of a parabola given a focus and directrix?

Unit 6: Circles

- How can students learn to prove basic theorems about circles, with particular attention to perpendicularity and inscribed angles, in order to see symmetry in circles and as an application of triangle congruence criteria?
- How can students study relationships among segments on chords, secants, and tangents as an application of similarity?
- How can students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center?
- How can students given an equation of a circle, draw the graph in the coordinate plane, and apply techniques for solving quadratic equations- which relates back to work done in the Model Algebra I course- to determine intersections between lines and circles or parabolas and between two circles?

Unit 7: Probability

- How can students identify the changes in probability for different scenarios and situations?
- How can students connect geometric area models to the concepts of probability?
- How can students use the laws of probability to help them in their decision making process?

19. Course Objectives (standards)

Unit 1: Constructions and Geometric Terminology
- *Experiment with transformations in the plane*
- *Make geometric constructions*

Unit 2: Congruence and Proof
- *Understand congruence in terms of rigid motions*
- *Prove geometric theorems*

Unit 3: Similarity, Right Triangles, and Trigonometry
- *Understand similarity in terms of similarity transformations*
- *Prove theorems involving similarity*
- *Define trigonometric ratios and solve problems involving right triangles*
- *Apply trigonometry to general triangles*

Unit 4: Geometric Measurement and Dimension
- *Explain volume formulas and use them to solve problems*
- *Visualize relationships between two-dimensional and three-dimensional objects*
- *Apply geometric concepts in modeling situations*

Unit 5: Expressing Geometric Properties with Equations
- *Use coordinates to prove simple geometric theorems algebraically*

- *Translate between the geometric description and the equation for a conic section*

Unit 6: Circles

- *Understand and apply theorems about circles*
- *Find arc lengths and areas of sectors of circles*
- *Translate between the geometric description and the equation for a conic section*

Unit 7: Probability

- *Understand independence and conditional probability and use them to interpret data*
- *Use the rules of probability to compute probabilities of compound events*
- *Use probability to evaluate outcomes of decisions*

20. Course Outline

Unit 1: Constructions and Geometric Terminology

1.1: Identify Points, Lines, and Planes	Standard 01.1
1.2: Use Segments and Congruence	Standards 01.1 and 01.12
1.3: Use Midpoint and Distance Formulas	Standards 01.1 and 01.12
1.4: Measure and Classify Angles	Standards 01.1 and 01.12
1.5: Describe Angle Pair Relationships	Standard 01.1
1.6: Classify Polygons	Standards 01.3
4.8: Perform Congruence Transformations	Standards 01.2 and 01.3
9.1: Translate Figures and Use Vectors	Standard 01.3
9.3: Perform Reflections	Standards 01.4 and 01.5
9.4: Perform Rotations	Standards 01.4 and 01.5
9.5: Apply Compositions of Transformations	Standards 01.2 and 01.3
11.6: Areas of Regular Polygons (#40)	Standard 01.13

Unit 2: Congruence and Proof

3.1: Identify Pairs of Lines and Angles	Standard 01.9
3.2: Use Parallel Lines and Transversals	Standard 01.9
3.3: Prove Lines are Parallel	Standard 01.9
3.6: Prove Theorems About Perpendicular Lines	Standard 01.11
4.1: Apply Triangle Sum Properties	Standard 01.10
4.2: Apply Congruence and Triangles	

4.3: Prove Triangles Congruent by SSS	Standard 01.6 and 01.7
4.4: Prove Triangles Congruent by SAS and HL	Standard 01.8
4.5: Prove Triangles Congruent by ASA and AAS	Standard 01.8
4.6: Use Congruent Triangles	Standard 01.8
4.7: Use Isosceles and Equilateral Triangles	Standard 01.6
5.1: Mid-segment Theorem and Coordinate Proof	Standard 01.9
5.2: Use Perpendicular Bisectors	Standard 01.10
5.3: Use Angle Bisectors of Triangles	Standard 01.8
5.4: Use Medians and Altitudes	Standard 01.10
8.2: Use Properties of Parallelograms	Standard 01.9
8.3: Show that a Quadrilateral is a Parallelogram	Standard 01.11
	Standard 01.11

Unit 3: Similarity, Right Triangles, and Trigonometry

6.7: Perform Similarity Transformations	Standard 02.1
9.7: Identify and Perform Dilations	Standard 02.1
6.3: Use Similar Polygons	Standard 02.2
6.4: Prove Triangle Similar By AA	Standard 02.3
6.6: Use Proportionality Theorems	Standard 02.4
6.5: Prove Triangles Similar by SSS & SAS	Standards 02.4 and 02.5
7.1: Apply the Pythagorean Theorem	Standard 02.4 and 02.8
7.5: Apply the Tangent Ratio	Standard 02.6, 02.7, and 02.8
7.6: Apply the Sine and Cosine Ratios	Standard 02.6, 02.7, and 02.8
7.7: Solve Right Triangles	Standard 02.8
Extension Lesson Law of Sines and Cosines	Standard 02.10 and 02.11

Unit 4: Geometric Measurement and Dimension

11.4: Circumference and Arc Length	Standard 05.1

11.5: Areas of Circles and Sectors	Standard 05.1
12.1: Explore Solids	Standard 05.4
12.2: Surface Area of Prisms and Cylinders	Standards 05.1 and 05.3
12.3: Surface Area of Pyramids and Cones	Standards 05.1 and 05.3
12.4: Volume of Prisms and Cylinders	Standards 05.1 and 05.3
12.5: Volume of Pyramids and Cones	Standards 05.1 and 05.3
12.6: Surface Area and Volume of Spheres	Standard 05.3
12.7: Explore Similar Solids	

Unit 5: Expressing Geometric Properties with Equations

1.3: Use Midpoint and Distance Formulas	Standard 04.7
1.7: Find Perimeter, Circumference, and Area	Standard 04.7
3.4: Find and Use Slopes of Lines	Standard 04.5
3.5: Write and Graph Equations of Lines	Standard 04.5
4.3: Prove Triangles Congruent by SSS	Standard 04.7
Chapter 8: Quadrilaterals	Standard 04.4

Unit 6: Circles

10.1: Use Properties of Tangents	Standards 05.1 and 05.2
10.2: Find Arc Measures	Standards 05.1, 05.4 and 05.5
10.3: Apply Properties of Chords	Standards 05.3
10.4: Use Inscribed Angles and Polygons	Standards 05.7
10.5: Apply Other Angle Relationships in Circles	Standards 05.2, and 05.3
10.6: Finding Segment Lengths in Circles	Standards 05.3, and 05.7
10.7: Write and Graph Equations of Circles	Standards 05.11
SRH: Quadratic Equations and Functions (pp. 882-884)	

Unit 7: Probability

11.7: Use Geometric Probability

Skills Review Handbook (SRH): Sampling and Surveys (p. 890)

SRH: Counting Methods (pp. 891-892)

SRH: Probability (p. 893)

21. Instructional Materials

Board approved required text: Larson, Ron. *Geometry.* Canada: McDougal Littell, 2007.

Supplementary materials:

- College Preparatory Math Geometry/Algebra Connections
- www.geogebra.com
- National Library of Virtual Manipulatives
- Khan Academy
- College Preparatory Math Statistics Supplement

22. Key Assignments

Unit 1: Constructions and Geometric Terminology

Use appropriate tools strategically

'Construct an Equilateral Triangle': Students learn how to construct an equilateral triangle, using a compass, a straightedge, and a protractor. Students then compare their own methods to Euclid's approach of the same problem.

Unit 2: Congruence and Proof

Use appropriate tools strategically

'Move Geometric Figures on a Coordinate Plane': Students learn the different ways they can translate, reflect, and rotate geometric figures on a coordinate plane. Beginning with triangles, students will build toward an understanding of congruence by transposing two congruent shapes on top of one another.

Construct viable arguments and critique the reasoning of others

'Stability of a Triangle': Students design and build support for a miniature door, utilizing the idea that the triangle is a stable, rigid shape. Students must consider use of this support by firefighters, and thus must consider both strength and ease of entry.

Unit 3: Similarity, Right Triangles, and Trigonometry

Make sense of problems and persevere in solving them

'Applying Trigonometric Ratios': Students will solve real world problems that require the application of trigonometric ratios. If an adventure team needs to construct a makeshift bridge to cross a raging river, how can they determine the length of the rope needed?

Unit 4: Geometric Measurement and Dimension

Model with mathematics

'Designing a Three-Dimensional Structure': Students design a solid three dimensional structure, and then calculate the volume, surface area, and dimensions of their design.

Unit 5: Expressing Geometric Properties with Equations

Reason abstractly and quantitatively

'Finding the Area of a Plot of Land': Students will make use of the distance and midpoint formulas, by comparing the areas and perimeters of different plots of land on a map. Students will compare plots of land with different shapes, and must apply learned formulas and scale factor.

Unit 6: Circles

Attend to precision
'Using Inscribed Angles and Polygons': Students will use properties of tangents and arc measures to determine how far a satellite will travel in space. *Attend to precision*

Unit 7: Probability

Attend to precision
'Using Geometric Probability': Students will calculate probabilities with respect to length and area, in various situations.

23. Instructional Methods and/or Strategies

Student learning is provided by teacher led discussions, combined with student centered activities. These activities may be provided in a group setting, and include graphing, drawing with a ruler, a compass, a protractor, etc. Coursework promotes student problem solving ability by identifying information needed in solving problems, organizing, planning, analyzing, making conjectures and proving their validity, evaluating, applying information to new situations, and making predictions. Drawing, measuring, and analyzing patterns are part of the learning process. Students may be assigned projects and presentations, to apply the mathematical principles learned and demonstrates their understanding of the material.

24. Assessment Methods and/or Tools

Students may be evaluated by demonstrating their knowledge through the following instruments:

1. Test and quiz scores.
2. Projects and/or presentations.
3. Daily homework and/or class work.
4. Final exam.