

High School Department

177TH EXAMINATION

PLANE GEOMETRY

Wednesday, March 25, 1903—9.15 a. m. to 12.15 p. m., only

Answer eight questions but no more, including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.

First 1 Prove that if two straight lines are parallel to a division third straight line they are parallel to each other.

2 Prove that parallel chords intercept equal arcs on a circumference.

3 Prove that two triangles whose sides are respectively proportional are similar.

4 Prove that the product of the segments of a chord drawn through a fixed point in a circle, is constant in whatever direction the chord is drawn.

5 Complete and demonstrate the following: the area of a regular polygon is equal to . . .

Second 6 The perimeter of a square is 36 inches; find the division area of the circumscribing circle.

7 The side of an equilateral triangle is a ; find the altitude of a similar triangle six times as large as the given triangle.

8 A rhombus is formed by two radii and two chords of a circle whose radius is 10 inches; find the area of the rhombus and the number of degrees in each of its angles.

9 The bases of a trapezoid are 8 inches and 12 inches respectively, the angles at one base are each 60° ; find the area of the trapezoid.

10 Find the length, between the points of tangency, of the common exterior tangent to two tangent circles whose diameters are respectively 8 inches and 12 inches.

Third 11 Show how to construct a triangle when the altitude and the angles at the base are given.

12 Show how to construct a common tangent to two given circumferences not tangent.

13 Prove that an angle formed by two tangents is the supplement of the angle formed by radii drawn to the points of contact.

14 Prove that the sum of the three perpendiculars drawn from any point within an equilateral triangle to the sides is equal to the altitude of the triangle.

15 Prove that the median of a circumscribed trapezoid is equal to $\frac{1}{4}$ the perimeter of the trapezoid.