

High School Department

157TH EXAMINATION

PLANE GEOMETRY

Wednesday, January 25, 1899—9.15 a. m. to 12.15 p. m., only

Answer eight questions including 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 Define *plane surface*, *complementary angles*, *locus of division a point*, *trapezoid*, *theorem*.

2 Prove that if a straight line is perpendicular to one of two parallel lines it is perpendicular to the other.

3 Prove that the tangents drawn to a circle from any point are equal.

4 Prove that the bisector of an angle of a triangle divides the opposite side into segments proportional to the other two sides.

5 Prove that two circumferences have the same ratio as their radii.

Second 6 Given a triangle, ABC , the length of whose base, division AB , is 10, and whose base angles, A and B , are 30° and 120° respectively; find the area of the triangle.

7 The base of a rectangle is 15 and its area is 120; find the area of a circle circumscribing this rectangle.

8 Two circumferences intersect each other, the diameter of each being 12; the length of their common chord is equal to that of the radius. Find the area of the section common to both circles.

9 The radii of two concentric circles are 5 and 13; find the length of a chord of the larger circle which is tangent to the smaller circle.

10 Find the diameter of the circle inscribed in a rhombus whose side is 10 and whose longer diagonal is 16.

Third 11 Prove that the lines bisecting the base angles of division an isosceles triangle, and included within the triangle, are equal.

12 Prove that the line which bisects two sides of a triangle is parallel to the third side and equal to one half the third side.

13 Construct a parallelogram equivalent to a given square and having the sum of its base and altitude equal to a given line.

14 The diameter of a given circle is the radius of a second circle; prove that all chords of the larger circle drawn from the point of tangency of the two circles are bisected by the smaller circle.

15 In a given triangle construct a semicircle tangent to two sides of the triangle and having its diameter on the third side.