192D High School Examination

Plane Geometry

Tuesday, June 18, 1907 — 9:15 a.m. to 12:15 p.m., only

Answer eight questions, selecting two from each group.

Group I  1. Prove that two angles whose sides are perpendicular each to each are either equal or supplementary.

2. Complete and demonstrate the following: The sum of the interior angles of a polygon is equal to . . .

3. Prove that the angle between two chords which intersect within a circumference is measured by one half the sum of the intercepted arcs.

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

5. Prove that if through a fixed point within a circle two chords are drawn, the product of the two segments of one is equal to the product of the two segments of the other.

6. Prove that the side of a regular hexagon inscribed in a circle equals the radius of the circle.

Group III  7. A point \( A \) is 4 feet from the circumference of a circle; the length of a tangent from \( A \) to the circle is 10 feet. Find the diameter of the circle.

8. The bases of a trapezoid are respectively 29 feet and 37 feet and its area is 247.5 square feet; find its altitude.

9. The radius of a circle is 6 feet; find the diameter of a circle one third as large.

Group IV  10. Show how to divide a given rectangle into four equivalent parts by lines drawn from one of the vertices of the rectangle. Give proof.

11. Given a straight line and two points on the same side of that line and at unequal distances from it, construct a circumference passing through the two points and having its center in the given line.

12. Prove that the area of a square inscribed in a circle is twice the square of the radius of the circle.