Examination Department

146TH EXAMINATION

PLANE GEOMETRY

Wednesday, June 16, 1897 — 9:15 a. m. to 12:15 p. m., only

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100 *credits, necessary to pass,* 75

Answer 10 questions but **no more.** *If more than 10 questions are answered only the first 10 of these answers will be considered. Division of groups is not allowed. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 10 credits.*

1 Define *surface, plane surface, axiom, theorem, problem.*

2 Prove that the sum of the angles of any triangle is equal to two right angles.

3 Prove that two right triangles are equal if the hypotenuse and a side of one are equal respectively to the hypotenuse and a side of the other.

4 Prove that an angle formed by two intersecting chords is measured by half the sum of the intercepted arcs.

5 Prove that if from a point without a circle a tangent and a secant are drawn, the secant terminating in the concave arc, the tangent will be a mean proportional between the whole secant and its external segment.

6 Prove that the area of any rectangle is equal to the product of its base and altitude.

7 Given two sides of a triangle and the angle opposite one of them; show how to construct the triangle.

8 The area of an equilateral triangle is A and its side is S; derive an expression for the value of A in terms of S.

9 Given two lines a and b; construct a third line x so that $x = \sqrt{ab}$.

10 One of the interior angles of a regular polygon is 150°; how many sides has the polygon? What is its name?

11–12 Prove that the four triangles formed by the diagonals of any parallelogram are equal in area.

13–14 Find in terms of R the length of a side and the area of a regular octagon inscribed in a circle whose radius is R.

15 Given the hypotenuse and one leg of a right triangle; show how to construct the triangle.