

## Examination Department

148TH EXAMINATION

## PLANE GEOMETRY

Wednesday, September 29, 1897—9:15 a. m. to 12:15 p. m., only

100 credits, necessary to pass, 75

Answer 10 questions but no more. If more than 10 are answered only the first 10 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 secant, rhomboid, inscribed angle, similar polygons, regular polygon.
- 2 Prove that the diagonals of any parallelogram bisect each other.
- 3 Prove that if four quantities are in proportion they will be in proportion by composition or division.
- 4 Prove that if two sides of a quadrilateral are equal and parallel the figure is a parallelogram.
- 5 Prove that an angle formed by two secants which intersect without the circle is measured by one half the difference of the intercepted arcs.
- 6 Prove that two triangles which are mutually equiangular are similar.
- 7 Show how to draw a circumference through three given points. Give proof.
- 8 The area of a certain triangle is  $a$  and its altitude is  $h$ ; find the altitude of a similar triangle whose area is  $A$ . State the theorem applied.
- 9 Given the base  $AB$ , of a triangle, its altitude  $CD$ , and the angle  $BAC$ , construct the triangle.
- 10 An isosceles triangle whose equal angles are each  $72^\circ$  is inscribed in a circle; prove that the base of this triangle is equal to the side of a regular inscribed pentagon.
- 11 Given two lines  $a$  and  $b$ , show how to construct a third line  $x$  so that  $x = \sqrt{a^2 - b^2}$
- 12-13 The base of a certain triangle is 8 feet and the other sides are 10 feet and 14 feet respectively; compute the altitude of the triangle.
- 14-15 With radius given, construct a circle tangent to two given circles. Give proof.