Examination Department

146TH EXAMINATION

SOLID GEOMETRY

Friday, June 18, 1897 — 1:15 to 4:15 p. m., only

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 *parallelopiped, conic surface, element of a conic surface, spheric sector, zone.*

2 Prove that two lines perpendicular to the same plane are parallel.

3–4 The base of a right prism whose altitude is 15 inches is a rhombus; the shorter diagonal of the rhombus is 12 inches and one of its sides is 10 inches. Find the entire surface and the volume of the prism.

5 Prove that the angle between a straight line and its projection on a plane is the least angle which it makes with any line in the plane.

6 Prove that the sum of any two face angles of a triedral angle is greater than the third face angle.

7 The altitude of the frustum of a right cone is $\frac{2}{5}$ of the altitude of the entire cone; compare the volume of the frustum with that of the entire cone.

8 A box, without a cover, made of 2-inch planks, measures on the outside 3 feet 2 inches long, 2 feet 3 inches wide and 1 foot 6 inches high; how many cubic feet of material are used?

9 Prove that two prisms are equal when the faces including a triedral angle of one are similarly placed and equal respectively to the faces including a triedral angle of the other.

10 Prove that the volume of a pyramid is equal to one third the product of its base and altitude.

11 Find the surface and the volume of a sphere circumscribing a cube whose volume is 64 cubic inches.

12 A zone whose altitude is 13 is drawn on a sphere whose radius is 16; find the area of the zone.

13 Prove that a section of a sphere made by a plane is a circle.

14–15 Prove that the area generated by the revolution of a straight line about an axis in the plane of this line but not parallel to it is equal to the projection of the line on the axis, multiplied by the circumference of a circle, whose radius is the perpendicular erected at the middle point of the line and terminating in the axis.