

Examination Department

150TH EXAMINATION

SOLID GEOMETRY

Friday, January 28, 1898—1:15 to 4:15 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 *diedral angle, cone, cylinder, sphere, lune.*
- 2 State *four* ways in which a plane is determined and prove *one* of them.
- 3 Prove that the sum of the face angles of any convex polyedral angle is less than four right angles.
- 4 Prove that any two rectangular parallelopipeds are to each other as the product of their three dimensions.
- 5-6 Prove that if a pyramid is cut by a plane parallel to the base, (*a*) the edges and altitude are divided proportionally, (*b*) the section is a polygon similar to the base.
- 7 Prove that every section of a sphere made by a plane is a circle.
- 8 Give the formula for the volume of (*a*) the cone, (*b*) the cylinder, (*c*) the sphere. Derive *one* of these formulas.
- 9 The volumes of two similar polyedrons are 64 and 216 cubic feet respectively; if the area of the surface of the first is 25 square feet, what is the area of the surface of the second?
- 10 The slant hight of the frustum of a right cone is 35 inches; the diameters of the upper and lower bases are 14 inches and $5\frac{5}{8}$ feet respectively; find the volume of the frustum.
- 11-12 A solid cylinder 20 inches long and 2 inches in diameter is melted and molded into a sphere; find the diameter of the sphere.
- 13 Assuming the atmosphere to extend to a hight of 50 miles above the earth's surface and the earth to be a sphere whose radius is 4000 miles, what is the volume of the atmosphere?
- 14-15 Prove that the area generated by the revolution of a straight line about an axis in its plane is equal to the projection of the line on the axis, multiplied by the circumference of the circle whose radius is the perpendicular erected at the middle of the line and terminated by the axis.