High School Department

178TH EXAMINATION

SOLID GEOMETRY

Friday, June 19, 1903 — 1.15 to 4.15 p. m., only

Answer eight questions but **no more.** *If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division 1 From a point in a perpendicular to a plane, lines are drawn to the plane; prove that lines meeting the plane at equal distances from the perpendicular are equal, and of two lines meeting the plane at unequal distances from the perpendicular, that which meets it at the greater distance is the greater.

2 Prove that every point in a plane which bisects a diedral angle is equidistant from the faces of the angle.

3 Prove that the sections of a prism made by parallel planes cutting all the lateral edges, are equal polygons.

4 Complete and demonstrate the following: the volume of any parallelepiped is equal to . . .

5 Complete and demonstrate the following: the lateral area of a cone of revolution is equal to . . .

6 Complete and demonstrate the following: the area of any spheric polygon is equal to . . .

NOTE — Use π instead of its approximate value 3.1416.

Second division 7 The altitude of a cone and the diameter of its base are each equal to a, the diameter of a sphere; find the ratio of the volumes of the cone and sphere.

8 Find the entire surface and the volume of a regular tetraedron inscribed in a cone the radius of whose base is 10 inches.

9 The lateral area of a right cylinder is 48π; the volume of the cylinder is 96π. Find the radius and the hight of the cylinder.

10 An isosceles trapezoid revolves about its longer base as an axis; the bases are respectively 14 inches and 8 inches, the legs each 5 inches. Find the surface of the solid generated.

11 The radius of a sphere is 20 inches; find the area of a section made by a plane 5.6 inches from the center of the sphere.

12 Prove that a line parallel to each of two intersecting planes is parallel to their intersection.