High School Department

176TH EXAMINATION

SOLID GEOMETRY

Friday, January 30, 1903 — 1.15 to 4.15 p. m., only

Answer eight questions but **no more,** *including at least two from each division. 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. Division of groups is not allowed. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Define triedral angle, face angle, pyramid, directrix, spheric segment.

2 Prove that through a given point in a plane one perpendicular to that plane can be drawn and only one.

3 Prove that if two angles not in the same plane have their sides respectively parallel and lying in the same direction, they are equal and their planes are parallel.

4 Give the formula for the volume of (*a*) a cylinder, (*b*) a frustum of any pyramid. Derive *one* of these formulas.

5 Complete and demonstrate the following: a truncated triangular prism is equivalent to the sum of three pyramids. . . .

6 Prove that in an isosceles spheric triangle, the angles opposite the equal sides are equal.

NOTE — Use π instead of its approximate value 3.1416.

Second division

7 Find the locus of points in space equidistant from four given points not all in the same plane.

8–9 A triangle whose sides are respectively 15 inches, 13 inches and 4 inches, revolves about its shortest side as an axis; find the volume of the solid generated by the revolving triangle.

10 The volume of a regular hexagonal prism is $81\sqrt{3}$; the altitude of the prism is equal to the longest diagonal of the base. Find the total area of the prism.

11 The altitude of the frustum of a cone of revolution is 12 inches; the radii of the bases are respectively 5 inches and 14 inches. Find the total area of the frustum.

12 Find the volume of a hemisphere whose entire surface equals S.