University of the State of New York

189TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, June 11, 1906—9.15 a. m. to 12.15 p. m., only

Answer eight questions. 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 if written by students in class A; those entitled to 60 or more credits will be accepted if written by students in class B.

First division

1 Prove that if from the foot of a perpendicular to a plane a line is drawn at right angles to any line in the plane, the line drawn from its intersection with the line in the plane to any point in the perpendicular, is perpendicular to the line of the plane.

2 Prove that if a line is perpendicular to a plane every plane passed through this line is perpendicular to the plane.

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

4 Give the formula for the lateral area of (1) a regular pyramid, (2) the frustum of a regular pyramid. Demonstrate *each* theorem.

5 Complete and demonstrate the following: A truncated triangular prism is equivalent to . . .

6 Prove that the sum of the sides of a spheric polygon is less than 360°.

NOTE—Use π instead of its approximate value 3.1416.

Second division

7 Find the number of cubic feet in a dam 180′ long, 15′ high, 8′ wide at the bottom and 6′ wide at the top.

8 An element of an oblique cylinder is 10′ and is at an angle of 60° to the base; the diameter of the circular base is 16′. Find the volume of the cylinder.

9 The altitude of a regular pyramid is $2a$ and the base is a triangle inscribed in a circle whose radius is a; find the lateral area of the pyramid.

10 Determine the ratio of the volume of a sphere to the volume of the inscribed cube.

11 Find the area of a lune whose angle is 36°, on the surface of a sphere whose radius is 9 inches.

12 Find the locus of points equidistant from the three edges of a triedral angle. Give proof.