The University of the State of New York

215TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, June 19, 1916—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in solid geometry. The minimum time requirement is two recitations a week for a school year or four recitations a week for half a school year.

Name the author of the textbook you have used in your study of solid geometry.

Answer eight questions, including four from group I and four from group II.

Group I

Answer four questions from this group.

1 Find the locus of points in space equidistant from the extremities of a straight line. State and prove the proposition relating thereto.

2 Write the formula for the volume of each of *five* of the following: (*a*) pyramid, (*b*) frustum of a cone, (*c*) cylinder of revolution, (*d*) sphere, (*e*) prismatoid, (*f*) spherical sector.

3 Prove that an oblique prism is equal to a right prism whose base is equal to a right section of the oblique prism and whose altitude is equal to a lateral edge of the oblique prism.

4 Prove that the sum of the face angles of any convex polyhedral angle is less than four right angles.

5 Prove that in two polar triangles each angle of one is measured by the supplement of the side lying opposite to it in the other.

6 Prove that through four points not lying in a plane one sphere, and only one, can be drawn.

Group II

Answer four questions from this group.

7 The diameter of a cylindric tank that contains 60 gallons is 18 inches; allowing 231 cubic inches to a gallon, find the hight of the tank.

8 Compute the number of square inches in the area of a triangle drawn on a sphere whose diameter is 6 inches, the angles of the triangle being 91° 30′, 110° 30′, 135°.

9 Prove that the diagonals of a parallelepiped bisect one another.

10 The diagonal of a cube is 10 inches; find the volume of the cube.

11 A spheric shell of cast iron has an external diameter D inches and an internal diameter d inches; the iron weighs 0.26 pound per cubic inch. Find the weight of the shell.

12 A cube n inches on an edge is formed by placing together n^3 white inch cubes; the large cube is then painted black. (*a*) How many of the small cubes are black on one face only? (*b*) How many are black on two faces only? (*c*) How many are black on three faces only? (*d*) How many are entirely white?