The University of the State of New York

225TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, June 20, 1921—9.15 a. m. to 12.15 p. m., only

Each pupil who takes this examination must certify that because of religious scruples he did not enter any Regents examination on Monday, June 13, 1921.

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 not more than four from group I.

Group I

Answer not more than four questions from this group.

1 Prove that if two straight lines are cut by three parallel planes, the corresponding segments are proportional.

2 Prove that if a point on a sphere is at a quadrant's distance from each of two given points on the surface which are not the extremities of a diameter, it is a pole of the great circle through the two points.

3 Prove that the lateral area of a prism is equal to the product of a lateral edge and the perimeter of a right section of the prism.

4 Prove that if each of two intersecting planes is perpendicular to a third plane, their intersection is also perpendicular to that plane.

5 Prove that similar cones of revolution are to each other as the cubes of their altitudes or as the cubes of the radii of their bases.

Group II

Irrational results may be left in the form of π and radicals unless otherwise stated.

6 A coffee pot is 5 inches in diameter at the top, 6½ inches at the bottom and 10 inches deep. If 49 square inches are allowed for spout, seams and waste, how much metal is necessary for the construction, excluding the cover? [Express the result decimally, using $\pi = \frac{22}{7}$]

7 If the opposite sides of a spheric quadrangle are equal, prove that the diagonals bisect each other.

8 A cube whose edge is 2 inches is inscribed in a cone of revolution whose slant height is 5 inches. Find the volume of the cone.

9 The outer diameter of a hollow rubber ball is 3 inches and the rubber is ¼ of an inch thick. How much rubber would be used in the manufacture of 100 such balls? [Use $\pi = \frac{22}{7}$]

10 If a line is perpendicular to one plane and parallel to another, prove that the planes are perpendicular to each other.

11 Prove that the lines joining the mid points of the opposite edges of a tetrahedron meet in a point and bisect each other.

12 Prove that the volume of a regular prism is equal to the product of its lateral area and one half the apothem of the base.