The University of the State of New York

224TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, January 17, 1921—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 Prove that if two angles, not in the same plane, have their sides respectively parallel and extending in the same direction, they are equal.

2 Prove that if a straight line is perpendicular to a plane, every plane passed through the line is perpendicular to the given plane.

3 Complete and prove: The lateral area of a regular pyramid is equal to . . .

4 Prove that all points of a circle on a sphere are equidistant from a pole of that circle.

5 Prove that two spheric triangles on the same sphere are either equal or symmetric when the three angles of the one are respectively equal to the three angles of the other.

Group II

Answer four questions from this group.

6 Show how to pass a plane (*a*) perpendicular to a given line through a given external point, (*b*) through a given point parallel to each of two given straight lines not in the same plane.

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

8 Prove that the volume of a right triangular prism is equal to one half the product of any lateral face and the altitude to that face.

9 A sphere is inscribed in a cube. Find the ratio of their volumes and of their surfaces.

10 How many feet of iron piping can be made from 4752 cubic inches of iron, if the outer diameter of the pipe is 8 inches and the thickness of the iron is 1 inch? [Assume that $\pi = \frac{22}{7}$]

11 The total surface of a regular tetrahedron is equal to the lateral surface of a right circular cone. An edge of the tetrahedron is 6 inches long. If the altitude of the cone is equal to $\sqrt{2}$ times the radius of the base of the cone, what is the volume of the cone? [Leave answer in radical form.]

12 From the vertices of a triangle ABC, perpendiculars AD, BE and CK are dropped upon a straight line RS in the same plane. $AD=2$, $BE=3$, $CK=1$, $DE=2$, $EK=1$ and $KD=3$. Find the volume generated by the revolution of the triangle ABC about RS as an axis. [Assume that $\pi = \frac{22}{7}$]