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.

Answer eight questions, selecting two from each group.

Group I

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

2 Prove that a plane passed through two diagonally opposite edges of a parallelepiped divides the parallelepiped into two equivalent triangular prisms.

3 State and prove the theorem concerning the volume of a circular cylinder.

Group II

4 Prove that a section of a circular cone made by a plane parallel to the base is a circle.

5 Prove that in two polar triangles each angle of the one is the supplement of the opposite side in the other.

6 Prove that a plane tangent to a sphere is perpendicular to the radius drawn to the point of contact.

Group III

7 An open cistern is 4' 6" long, 2' 8" wide and contains 42 cu. ft; how many square feet of tin will be required to line it?

8 A regular hexagon whose side is R revolves about a diagonal as an axis; find in terms of R the entire surface generated.

9 In each of two right circular cones the diameter of the base is equal to the height; what is the ratio of the heights if the volumes of the cones are 3:4?

Group IV

10 The altitude of the frustum of a regular square pyramid is 12 in. and the areas of the bases are 64 sq. in. and 16 sq. in. respectively; find the slant height of the frustum.

11 The entire surface of a cube is 1014 sq. ft; find the volume of the cube and the length of one diagonal.

12 Find the ratio of the area of an equilateral spheric triangle, each of whose angles is 86°, to the area of a lune of the same sphere whose angle is 70°.