

SOLID GEOMETRY

Monday, January 17, 1910—9.15 a. m. to 12.15 p. m., only

Write at the top of the first page of your answer paper (a) the name of the school where you have studied, (b) the number of weeks and recitations a week that you have had in solid geometry.

Two recitations a week for a school year (or four recitations a week for half a school year), in a recognized academic school, is the regular requirement, and any statement showing less or other than this should be accompanied by a satisfactory claim or explanation made by the candidate and certified by the principal; otherwise such paper will be returned.

Answer eight questions, selecting two from each group.

Group I 1 Prove that two lines perpendicular to the same plane are parallel.

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

3 Prove that the plane section of a sphere is a circle.

Group II 4 Prove that the volumes of two similar tetraedrons are to each other as the cubes of any two homologous edges.

5 Prove that each angle of a spheric triangle is the supplement of the opposite side of its polar triangle.

6 Prove that every point in the plane which bisects a given dihedral angle is equidistant from the faces of the angle.

Group III 7 Prove that every section of a parallelepiped made by a plane intersecting all of its lateral edges is a parallelogram.

8 Construct a spheric surface with radius r which shall pass through two given points and be tangent to a given plane. Prove your construction.

9 Let PQ be a line drawn from a given point P , meeting a given plane in Q ; find the locus of the point midway between P and Q when Q moves arbitrarily in the given plane. Give proof.

Group IV 10 On a sphere whose radius is 10 inches find the area of a zone with altitude 3 inches.

11 A right cone and a cylinder of revolution on the same base with radius 3 inches, have the same altitude 4 inches; find the ratio of their volumes and of their lateral areas.

12 Find the capacity of a circular pail 15 inches high, the radius of the lower base being 4 inches and the radius of the upper base 6 inches.