

SOLID GEOMETRY

Monday, January 19, 1914—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.

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

Answer seven questions, selecting three from group I and two from each of the other two groups.

Assign 12 credits to each question in group I and 16 credits to each question in groups II and III.

Group I

1 Prove that through a given line not perpendicular to a given plane, one plane and only one plane can be passed perpendicular to the given plane.

2 Prove that any section of a pyramid parallel to the base is to the base as the square of its distance from the vertex is to the square of the altitude of the pyramid.

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

4 Prove that two dihedral angles are equal if their plane angles are equal.

Group II

5 Given a plane and two points not in the plane; what is the locus of points that lie in the plane and that are equidistant from the two given points? State the propositions on which you base your answer.

6 Two angles of a spheric triangle are 120° and 40° respectively; what must be the size of the third angle if the area of the triangle is one tenth the area of the entire sphere?

7 What portion of the surface of the earth could be seen if one were lifted above the earth a distance equal to the radius?

Group III

8 A right circular cylinder whose radius is 7 is equivalent in volume to a sphere whose surface is 616; find the altitude of the cylinder. $[\pi = \frac{22}{7}]$

9 Given the base edge a and the total surface t of a regular pyramid with a square base; find the height h .

10 Prove that any section of a prism made by a plane parallel to the lateral edges but not containing them is a parallelogram.