

SOLID GEOMETRY

Friday, January 26, 1906—1.15 to 4.15 p. m., only

Answer eight questions but no more. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.

First division 1 Prove that every point in a plane which bisects a dihedral angle is equidistant from the faces of the angle.

2 Prove that two trihedral angles are equal or symmetric when the three face angles of the one are equal respectively to the three face angles of the other.

3 Complete and demonstrate the following: The volume of the frustum of any pyramid is equal to . . .

4 Prove that every section of a cylinder made by a plane passing through an element is a parallelogram.

5 Prove that a side of a spheric triangle is less than the sum of the other two sides.

6 Complete and demonstrate the following: The area of the surface generated by a straight line revolving about an axis in its plane is equal to . . .

NOTE—Use π instead of its approximate value 3.1416.

Second division 7 What is the locus of points equidistant from two given planes and equidistant from two given points without the planes? Explain.

8 Find the total surface of a regular hexagonal pyramid each side of whose base is $\sqrt{3}$ and whose altitude is 2.

9 The volumes of two similar polyhedrons are 27 cubic feet and 512 cubic feet respectively; the area of the surface of the first is 36 square feet. Find the area of the surface of the second.

10 The legs of a trapezoid are each 5 feet, the shorter base 6 feet and the altitude 3 feet; find the total surface and the volume of the solid generated by the revolution of the trapezoid on the altitude bisecting the trapezoid.

11 Find the volume of a sphere in which the number of square units in the surface equals the number of linear units in the circumference of a great circle.

12 The angles of a spheric triangle are 96° , 100° and 134° respectively, and its area is 70π square inches; find the radius of the sphere.