SOLID GEOMETRY

Monday, January 27, 1908 — 9.15 a.m. to 12.15 p.m., only

Answer eight questions, selecting at least two from each group.

Group I 1 Prove that the sum of any two face angles of a
triedral angle is greater than the third face angle.

2 Prove that the acute angle which a straight line makes with
its projection upon a plane is the least angle which it makes
with any line of the plane.

3 Prove that the volume of a triangular pyramid is equal to
one third of the product of its base and altitude.

4 State and prove the formula for finding the area of a zone.

Group II 5 Find, in square feet, the area of a spheric triangle
whose angles are 125°, 140°, 95°, the area of the surface of the
sphere being 64 square feet.

6 A solid glass ball 6 inches in diameter is expanded by a
glass blower till the glass is an inch thick; find the outer
diameter of the hollow globe.

7 The diameter of the base of a right circular cone is 10.24
feet, its altitude is 18.3 feet; find the altitude of a right circular
cylinder of equivalent volume, the diameter of whose base is
14.38 feet.

8 Find the number of square centimeters in the surface of a
globe which is one decimeter in diameter.

Group III 9 Prove that if from any point in a diedral angle
perpendiculars are drawn to the faces, the plane determined
by these perpendiculars is perpendicular to the edge of the
diedral angle.

10 Prove that the square of a diagonal of any rectangular
solid is equal to the sum of the squares of its three dimensions.

11 A right triangle whose altitude is 4 inches and whose area
is 6 square inches is revolved about its shortest side as an axis;
find the volume of the solid generated.

12 Find the locus of points equidistant from two given points
in space and also equidistant from two given parallel lines.