

High School Department

169TH EXAMINATION

SOLID GEOMETRY

Friday, June 21, 1901 — 1.15 to 4.15 p. m., only

Answer eight questions but no more, including at least two from each division. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive $12\frac{1}{2}$ credits. Papers entitled to 75 or more credits will be accepted.

First division 1 Define five of the following: adjacent diedral angles, diagonal of a polyedron, truncated prism, frustum of a pyramid, cylindric surface, zone, spheric polygon.

2 Prove that if two straight lines are intersected by three parallel planes, their corresponding segments are proportional.

3 Prove that if a straight line is perpendicular to a plane, every plane passed through the line is perpendicular to that plane.

4 Prove that two prisms are equal if three faces including a triedral angle of the one are equal respectively to the three faces including a triedral angle of the other and are similarly placed.

5 Complete and demonstrate the following: the lateral area of a regular pyramid is equal to . . .

6 Complete and demonstrate the following: the volume of a cone is equal to . . .

7 Prove that every section of a cone made by a plane passing through its vertex is a triangle.

8 Prove that the sum of the sides of a spheric polygon is less than 360° .

Second division NOTE—Use π instead of its approximate value 3.1416.

9 Find the entire surface and the volume of a right prism 18 inches high whose base is a rhombus having diagonals 12 and 16 inches long respectively.

10 An iron hemisphere 8 inches in diameter is melted and cast into a right circular cylinder whose altitude is 6 inches; find the entire surface of the cylinder.

11 The circumferences of the upper and lower bases of a tower in the form of a frustum of a cone are 24 feet and 36 feet respectively; the distance between the bases is 4 feet. How many cubic feet must be added to the frustum to complete the cone?

12 Find the volume of a regular pyramid 15 inches high whose lateral edge is 17 inches and whose base is a triangle.

13 Find the volume of a sphere whose surface is S .

14 Prove that if a straight line intersects two parallel planes it makes equal angles with them.

15 Prove that the volume of a sphere is to the volume of the circumscribed cube as π is to 6.