

The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

SOLID GEOMETRY

Monday, September 8, 1919—1.15 to 4.15 p. m., only

Answer eight questions. Papers entitled to less than 75 credits will not be accepted.

1 Prove that if two planes are perpendicular to each other, a straight line drawn in one of them, perpendicular to their intersection, is perpendicular to the other.

2 Prove that the volume of any prism is equal to the product of its base and its altitude.

3 Prove that the lateral area of a regular pyramid is equal to the product of the perimeter of its base and half of its slant height.

4 Prove that if a point on a sphere is at a quadrant's distance from each of two given points of the surface which are not the extremities of a diameter, it is a pole of the great circle through them.

5 A regular hexagon whose side is a revolves about a diagonal through the center as axis. Find, in terms of a , the volume generated.

6 Prove that if a line is perpendicular to a plane, any plane parallel to the line is perpendicular to the plane.

7 In a sphere whose radius is 5, a plane is passed at the distance 3 from the center. On the section thus formed as a base a cone is formed whose lateral elements are tangent to the sphere. Find the lateral surface of the cone.

8 From a right circular cone whose slant height is 30 feet, and the circumference of whose base is 10π feet, there is cut off by a plane parallel to the base a cone whose slant height is 6 feet. Find the volume of the frustum.

9 An iron ball 4 inches in diameter weighs 9 pounds. Find the weight of an iron shell 2 inches thick, whose external diameter is 20 inches.

10 Prove that any section of a regular square pyramid made by a plane through the axis is an isosceles triangle.