The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES 150

SOLID GEOMETRY

Tuesday, September 7, 1920—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 parallel, a straight line perpendicular to one of the planes is perpendicular to the other.

2 Prove that the sum of any two face angles of a trihedral angle is greater than the third face angle.

3 Complete and prove: The lateral area of any prism is equal to . . .

4 Prove that every section of a circular cone made by a plane parallel to the base is a circle.

5 Prove that the sum of the angles of a spheric triangle is greater than two and less than six right angles.

6 The volume of a regular tetrahedron is $18\sqrt{2}$ cubic units. Find the length of one edge.

7 A sphere whose radius is 13 has inscribed in it a frustum of a cone whose bases are small circles of the sphere with radii 5 and 12 respectively. What is the difference in volume between the two solids?

8 Prove that if two intersecting planes are each tangent to a cylinder, their line of intersection is parallel to an element of the cylinder and also parallel to the plane containing the two elements of contact.

9 A pyramid with altitude 8 and base area 48 is cut by a plane parallel to the base and 2 from the vertex.

a What is the base area of the small pyramid?

b What is the ratio of the volumes of the two pyramids?

c What is the ratio of the total areas of the two pyramids?

10 On a sphere whose radius is 12, compare the area of a zone whose altitude is 9 with the area of a lune whose angle is 54°.