The University of the State of New York

217TH HIGH SCHOOL EXAMINATION

SOLID GEOMETRY

Monday, June 18, 1917 — 9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (a) name of school where you
have studied, (b) number of weeks and recitations a week in solid geometry.
The minimum time requirement is two recitations a week for a school year
or four recitations a week for half a school year.

Name the author of the textbook you have used in your study of solid
geometry.

*Answer eight questions, including four from group I and four from
group II.*

Group I

Answer four questions from this group.

1 Prove that if two angles, not in the same plane, have
their sides respectively parallel and lying in the same
direction, they are equal.

2 Prove that if a pyramid is cut by a plane parallel to its
base, the edges and the altitude are divided proportionally
and the section is a polygon similar to the base.

3 Prove that the lateral area of a regular pyramid is
equal to the product of the perimeter of its base and half
its slant hight. ($S = \frac{1}{2} pl$.)

4 Write the formulas for the surface and the volume of
a sphere and prove *one* of them.

5 If two planes are perpendicular to each other, a straight
line drawn in one of them, perpendicular to their inter-
section, is perpendicular to the other.

6 A point is at a given distance from a fixed point P and
is also equidistant from two other fixed points Q and R.
What is the locus of the point? Prove one of the locus
propositions on which your answer depends.

Group II

Answer four questions from this group.

7 The edge of a cube is e, its total surface is s and its
volume is v.

a Find s and v in terms of e.

b Find s in terms of v.

8 The dimensions of a rectangular block are to be con-
secutive integers and the total surface is to be 94 square
units; find the dimensions.

9 A cylindric tank having an internal diameter of 14 feet
is filled with water to a hight of 10 feet; what is the length
of a six inch pipe which this water will exactly fill?

10 On the base of a right circular cone a hemisphere
is constructed so that it lies outside the cone. The surface
of the hemisphere is equal to the lateral surface of the
cone. The radius of the hemisphere is r. Find (a) the
slant hight of the cone, (b) the volume of the entire solid.

11 On the six faces of a cube as bases regular pyramids
are constructed, all lying without the cube. The hight of
each pyramid is one half the edge e of the cube. Find (a)
the surface of the entire solid, (b) the volume of the entire
solid.

12 A solid has the form of a regular hexagonal prism of
base edge e and of hight h, through which a circular,
cylindric hole of diameter e has been cut perpendicularly
from base to base. Find (a) the total surface of the
resulting solid, (b) the volume of the resulting solid.

13 What fraction of the surface of a sphere is covered
by a spheric triangle whose angles are 90 degrees, 100 de-
grees and 110 degrees? What is the area of the triangle if
the radius of the sphere is 10 inches?