195TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, June 16, 1908 — 9.15 a. m. to 12.15 p. m., only

Answer eight questions, selecting two from each group.

Group I 1 Prove that if two opposite sides of a quadrilateral are equal and parallel the figure is a parallelogram.

2 Prove that an angle formed by two secants, two tangents, or a tangent and a secant intersecting without the circumference, is measured by one half the difference of the intercepted arcs.

3 Prove that if two parallels are cut by three or more transversals that pass through the same point, the corresponding segments are proportional.

Group II 4 Define trapezoid. State and prove the theorem for the area of a trapezoid.

5 Define similar polygons. State *three* theorems that conclude "the triangles are similar." Prove *one* of them.

6 State and prove the theorem (formula) for the area of a circle.

Group III 7 The radius of a circle is 10 feet; the area of a sector of that circle is 120 square feet. What is its arc in degrees?

8 Two sides and a diagonal of a parallelogram are 7, 9 and 8 respectively; find the length of the other diagonal.

9 One of two secants meeting without a circle is 12.5 inches and its external segment is 4 inches; the other secant is divided into two equal parts by the circumference. Find the length of the second secant.

Group IV 10 $ABCD$ is any parallelogram and E any point within it. Prove that the sum of the triangles EAD and EBC equals one half the area of the parallelogram.

11 Given two lines a and b; construct a mean proportional between them. Give demonstration.

12 Prove that the perpendiculars from any two vertices of a triangle on the opposite sides are inversely proportional to those sides.