191ST HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, January 22, 1907—9.15 a. m. to 12.15 p. m., only

Answer eight questions, including at least one from each of the three divisions. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted if written by students in class A; those entitled to 60 or more credits will be accepted if written by students in class B.

First division

1 Define tangent, inscribed angle, parallelogram, segment of a circle.

Write the converse of the following theorem: If two parallel lines are cut by a transversal, the exterior interior angles are equal.

2 Prove that a point equidistant from the sides of an angle is in the bisector of that angle.

3 Complete and demonstrate the following: An angle formed by two secants intersecting without a circumference is measured by . . .

4 Write *three* theorems that conclude "the triangles are similar," and demonstrate *one* of them.

Second division

5 Write the formula for the number of degrees in one of the interior angles of a regular polygon having n sides. Apply this formula to find the number of degrees in one of the angles of a regular decagon.

6 Find the area and the perimeter of a regular hexagon whose apothem is 3 feet.

7 Find the radius of the circle inscribed in a rhombus whose shorter diagonal and whose sides are each 12 inches.

8 An equilateral triangle is inscribed in a circle whose radius is 10 feet; find the area of the segment included between one side of the triangle and its corresponding arc.

Third division

9 Show how to draw a circle tangent to a given line and to a given circle at a given point.

10 Show how to construct a triangle similar to a given triangle and having twice the area of the given triangle.

11 Prove that in an isosceles triangle the vertical angle is twice the angle formed by the base and the altitude on one of the legs.

12 Prove that the sum of the lines drawn from the extremities of any diameter of a circle perpendicular to a tangent is equal to a diameter of the circle.