226TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Wednesday, January 18, 1922 — 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 plane geometry. The minimum time requirement is five recitations a week for a school year. Name the author of the textbook you have used in plane geometry.

Answer eight questions, including at least one from group II.

Group I

1 Prove that when two tangents to the same circle intersect each other, the distances from their point of intersection to their points of contact are equal.

2 Prove that if the three angles of one triangle are respectively equal to the three angles of another, the two triangles are similar.

3 Prove that the locus of points within an angle and equally distant from its sides is the bisector of the angle.

4 Prove that the area of a trapezoid is equal to the product of its altitude and half the sum of its parallel sides.

Group II

Answer at least one question from this group.

Leave all construction lines on the paper.

5 *a* Divide the base of a given triangle into *three* equal parts.

b Construct an angle of 105°.

6 Construct a scalene triangle, given the base, one base angle and the median to the base. Explain your construction.

Group III

Irrational results may be left in the form of π and radicals unless otherwise stated.

7 The area of an equilateral triangle is $36\sqrt{3}$ square units. Find the area of the inscribed circle.

8 The longer diagonal of a rhombus is 24 feet and the shorter diagonal is 10 feet. Find (*a*) the perimeter of the rhombus, (*b*) the area of the rhombus.

9 The bisectors of the equal angles of an isosceles triangle meet the equal sides at points *A* and *B*. Prove that *AB* is parallel to the base of the triangle.

10 Prove that an exterior angle of a regular polygon made by producing one side is equal to the angle at the center of the polygon.