High School Department

166TH EXAMINATION

PLANE GEOMETRY

Wednesday, September 26, 1900—9.15 a.m. to 12.15 p.m., onl

Answer eight questions but **no more,** *including at least one from eac of the three divisions. If more than eight are answered only the firs eight answers will be considered. Draw carefully and neatly eac figure in construction or proof, using letters instead of numerals. Ar range work logically. Each complete answer will receive* 12½ *credits Papers entitled to 75 or more credits will be accepted.*

First division

1 Prove that if three or more parallels intercept equa parts on any transversal they intercept equal parts o every transversal.

2 Prove that in the same circle or equal circles, if two chord are unequally distant from the center, the greater chord is at the less distance.

3 Prove that if from a fixed point without a circle a secant is drawn terminating in the concave arc, the product of the secant and its external segment is constant.

4 Show how to construct a polygon similar to two given similar polygons and equivalent to their sum. Give proof.

5 Complete and demonstrate the following: the area of a regular polygon is equal to . . .

Second division

6 One leg of a right triangle is 24 inches, the perpendicular from the right angle to the hypotenuse is 19.2 inches; find the radius of the circumscribing circle.

7 Find the area of an equilateral triangle whose altitude is 3 inches.

8 The diameter of a circle is 12 inches; find the difference between the areas of two sectors, if the arc of the first and the chord of the second are each equal to the radius of the circle.

9 The sides of a rectangle whose area is 108 square inches have the ratio of 3 to 4; find the diagonal of the rectangle.

10 The area of a regular hexagon is 12 square inches; find the area of the circumscribed circle.

Third division

11 Prove that a circle can be circumscribed about an isosceles trapezoid.

12 Find the ratio between the diagonal and the perimeter of a square. Give proof.

13 What part of a parallelogram is cut off by a line drawn from any vertex to the middle point of one of the opposite sides? Give proof.

14 Prove that the equilateral triangle described on the hypotenuse of a right triangle, is equal to the sum of the equilateral triangles described on the legs.

15 Construct a right triangle, having given its hypotenuse and the perpendicular from the right angle to the hypotenuse.