High School Department

158TH EXAMINATION

PLANE GEOMETRY

Wednesday, March 29, 1899—9.15 a. m. to 12.15 p. m., only

Answer eight questions including one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.

First division

1 Define *hypothesis, corollary, apothem, rectangle, regular decagon.*

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

3 Prove that an angle formed by a tangent and a chord is measured by one half the intercepted arc.

4 Prove that the perpendicular drawn to the diameter of a circle from any point of the circumference is a mean proportional between the segments of the diameter

5 Prove that the areas of two rectangles which have equal altitudes are to each other as their bases, when their bases are incommensurable.

Second division

6 From a point within an equilateral triangle whose perimeter is 9, perpendiculars are drawn to each side; find the sum of these perpendiculars.

7 In an isosceles trapezoid the lower base is 4 units, the upper base is 2 units and the base angles are each 60°; find the area of the trapezoid.

8 AB and CD, chords of a circle, intersect at right angles; AC is an arc of 50° and BC is an arc of 108°. Find the number of degrees in the angles ABD and BAD.

9 The distance from the center of a circle to a chord 16 inches long is 15 inches; find the altitude of a segment of this circle subtended by a chord 30 inches long.

10 Find the area of a circle inscribed in an equilateral triangle whose side is a.

Third division

11 Show how to divide a given line internally in extreme and mean ratio. Give proof.

12 Construct a triangle equivalent to a given pentagon.

13 Construct a circle having a given radius, passing through a given point and tangent to a given line. Show when construction is impossible.

14 Prove that the sum of two opposite sides of a circumscribed quadrilateral is equal to the sum of the other two sides.

15 Prove that the right angle of any right triangle is bisected by a line drawn from its vertex to the middle of the square constructed on the hypotenuse