High School Department

174TH EXAMINATION

PLANE GEOMETRY

Wednesday, June 18, 1902—9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more,** *including at least 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 Prove that of two oblique lines drawn from the same point in a perpendicular to a given line, cutting off unequal distances from the foot of the perpendicular, the line that cuts off the greater distance is the longer.

2 Prove that two triangles are equal if the three sides of the one are equal respectively to the three sides of the other.

3 Prove that lines which meet in a point intercept proportional segments on two parallel lines.

4 Complete and demonstrate the following: an angle formed by two chords intersecting within the circumference is measured by . . .

5 Complete and demonstrate the following: the square on the hypotenuse of a right triangle is equivalent to . . .

Second division

6 The sides of a triangle inscribed in a circle intercept arcs which have the ratio of 3:7:8; find the number of degrees in each angle of the triangle.

7 How many sides has the polygon the sum of whose interior angles is twice the sum of its exterior angles made by producing each of the sides in succession?

8 The base of a triangle is 20 inches and the altitude is 8 inches; find the area of the trapezoid cut off by a line parallel to the base and 6 inches from the vertex.

9 The areas of two circles are as 9:4; the radius of the larger circle is 6 inches. Find the circumference of the smaller circle.

10 The distance from the center of a chord 12 feet long, to the center of its arc is 2½ feet; find the radius of the circle.

Third division

11 On a given base, show how to construct a rectangle equivalent to a given rhombus. Give proof.

12 Show how to construct a circumference having a given radius and passing through two given points. Give proof.

13 Prove that the sum of the perpendiculars drawn from any point in the base of an isosceles triangle to the legs is equal to the altitude on one of the legs.

14 Prove that if from any point in the circumference of a circle a chord and a tangent are drawn, the perpendiculars to them from the middle point of the subtended arc are equal.

15 Prove that if the inscribed and circumscribed circles of a triangle are concentric, the triangle is equilateral.