High School Department

176TH EXAMINATION

PLANE GEOMETRY

Wednesday, January 28, 1903—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 Define *five* of the following: postulate, demonstration, alternate interior angles, hypotenuse, chord, trapezoid, similar figures.

2 Prove that from a point without a straight line one perpendicular and only one can be drawn to the line.

3 Complete and demonstrate the following: an angle formed by a tangent and a chord is measured by . . .

4 Prove that if two triangles have an angle of the one equal to an angle of the other and the including sides proportional, they are similar.

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

Second division

6 Two sides of a triangle are respectively 17 inches and 25 inches, and the altitude on the third side is 15 inches; find the area of the triangle.

7 Two intersecting chords and two secants intercept the same arcs on a given circumference; the angle formed by the chords is 42°, the angle formed by the secants is 6°. Find the number of degrees in the intercepted arcs.

8 The ratio of the triangles ABC and ABE is 3:1; AB is 2 inches and AC is 9 inches. Find the side AE, if E is on AC.

9 Find the area of a circle inscribed in a regular hexagon whose perimeter is 30 inches.

10 In a circle whose radius is $2\frac{1}{2}$ inches a chord 3 inches long subtends a certain arc; find the chord of half this arc.

Third division

11 Show how to construct a triangle having given the base, altitude and vertical angle.

12 Show how to construct a circumference which shall have a given radius and shall be tangent to two given oblique lines.

13 The common chord of two intersecting circles is MN; if MA and MB are diameters of their respective circles, prove that AB will pass through N.

14 Prove that in a rhomboid the sum of the squares of the sides is equal to the sum of the squares of the diagonals.

15 Prove that the area of a trapezoid is equal to the product of one of the legs and the distance from this leg to the middle point of the other leg.