EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE GEOMETRY

Tuesday, September 15, 1914 — 9.15 a. m. to 12.15 p. m., only

Answer four questions from group I and four from group II. Papers entitled to less than 75 credits will not be accepted.

Group I

1 Prove that the base angles of an isosceles triangle are equal.

2 Prove that the opposite sides of a parallelogram are equal.

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

4 Prove that in any right triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

5 Prove that two triangles which have an angle of one equal to an angle of the other are to each other as the product of the sides including the equal angles.

Group II

6 The length of the bisector of the angle opposite the longest side a of a triangle whose sides are respectively a, b and c is $\frac{2}{b+c} \sqrt{bcs(s-a)}$. Find the length of the bisector of the angle opposite the longest side of a triangle whose sides are 14, 22 and 26.

7 In a circle a chord 24 inches long is 5 inches from the center; how far from the center is a chord one half as long?

8 Two parallel lines are 12 ft apart and from a point on one of them two lines, one 20 ft and the other 13 ft long, are drawn to the other parallel line; what is the area of the triangle thus formed?

9 Prove that a line terminated by the sides of a parallelogram and passing through the point of intersection of its diagonals is bisected at that point.

10 Prove that if two circles are tangent externally, their common internal tangent bisects their common external tangent.