PLANE TRIGONOMETRY

Thursday, June 15, 1899 — 9.15 a.m. to 12.15 p.m., only

Answer to questions but no more. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. A, B and C represent the angles of a triangle, a, b and c the opposite sides, S the area. In a right triangle C represents the right angle and c the hypotenuse. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1 If the radius of a circle is 8 inches, find the number of degrees in an arc of 6 inches.

2 Express as a function of an angle of 20° each of the following: csc 70°, ctn 110°, sin 340°, sec 200°, cos 250°.

3 Given cos A = -½ and A in the third quadrant; find the value and sign of five other functions of A.

4 Trace the variation in the value of sin A and of sec A as A increases from 0° to 360°.

5-6 Show by diagram the line values of five trigonometric functions of an angle of 150°, and find the algebraic sign and numeric value of each function.

7 Prove cos 2 A = cos² A - sin² A.

8 Prove that the sides of a triangle are proportional to the sines of the opposite angles.

9 Prove tan x - ctn x = \( \frac{1 - \frac{2}{3} \cos^2 x}{\sin x \cos x} \)

10 Given tan A + ctn A = 2; find A.

11 Given \( x = \sqrt{\frac{382 \times 7.13}{25.5 \times 919}} \); \( y = \left( \frac{17.3 \times 4.16}{63.95} \right)^{18} \). Find \( x \) and \( y \) by use of the table of logarithms.

12 In a right triangle, given \( A = 36° 45', b = 17.58 \); find the perimeter and the area of the triangle.

13 In a triangular field one side, 30 rods long, makes with the adjacent sides angles of 66° 30' and 81° 50'; find the area of the field.

14-15 From a window on a level with the base of a flagstaff the angle of elevation of the top of the flagstaff is 52° 20'; from another window, 20 feet vertically above the first, the angle of elevation is 44° 35'. Find the height of the flagstaff and the distance of its base from the lower window.