

## High School Department

169TH EXAMINATION

## TRIGONOMETRY

Thursday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

*Answer eight questions but no more. Include at least three from the third division if credit is desired for both plane and spheric trigonometry. If more than eight are answered only the first eight 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. In a right triangle C represents the right angle. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted. Give special attention to arrangement of work.*

**First division** 1 Deduce, without using the tables, the numeric value of  $\cos 45^\circ$ , and from that result deduce the value of  $\sin 22^\circ 30'$ .

2 Write the logarithms of .001,  $100^5$ ,  $.0001^{-3}$ ,  $\sqrt[3]{10}$ ,  $\sqrt{.001}$

3-4 In any plane triangle the sum of two sides is to their difference as . . .

Complete and demonstrate the above, assuming the values of the functions of the sum and of the difference of two angles.

5 Prove that in any plane triangle  $a = b \cos C + c \cos B$ .

**Second division** 6 Given in a plane triangle  $a = 125.6$  feet,  $b = 136.8$  feet  $C = 75^\circ 15'$ ; find the remaining parts.

7 In a circle whose radius is 6 feet, find the area of a segment whose chord is 10 feet.

8 Find the area of a regular pentagon whose side is 15 feet.

9-10 Show what measurements and what computations are necessary to find the distance between two objects situated on the farther bank of an impassable river opposite the observer. [Give diagram and all formulas needed.]

**Third division** 11 What are Napier's circular parts? State Napier's two rules for the solution of right triangles.

12 Given in an oblique spheric triangle  $A = 34^\circ 15'$ ,  $B = 42^\circ 15'$ ,  $c = 76^\circ 37'$ ; find  $a$ ,  $b$  and  $C$ .

13 Given  $a = 68^\circ 46'$ ,  $b = 37^\circ 10'$ ,  $C = 39^\circ 24'$ ; find  $c$ ,  $A$  and  $B$ .

14-15 Explain fully, using diagram and giving necessary formulas, how to find the time of day, when the altitude and declination of the sun and the latitude of the place are known.