University of the State of New York

210TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, January 20, 1914—1.15 to 4.15 p. m., only

Write at top of first page of answer paper (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in trigonometry.

Students taking this examination may use textbooks and notes prepared previous to the examination, but they must not communicate or use material prepared by another after the examination has begun.

To receive credit for plane trigonometry students should answer group I and group II.

To receive credit for both plane and spheric trigonometry students should answer group I and group III.

Group I

1 *a* Prove the identity

$$\sin 420^\circ \cos 390^\circ + \cos(-300^\circ) \sin(-330^\circ) = 1$$

b Prove the identity $\cot y + \frac{\sin y}{1+\cos y} = \csc y$

2 State what formula you should employ to solve *each* of the following triangles:

$a = 41$	$c = 62$	$B = 30^\circ$	Find b.
$a = 41$	$c = 62$	$C = 26^\circ\ 41'$	Find a.
$b = 214$	$a = 411$	$B = 47^\circ$	Find C.

3 In a parallelogram a diagonal whose length is 271.3 makes angles of 23° 42′ and 46° 30′ respectively with the sides; find the area of the parallelogram.

Group II

4 *a* A chord 1 foot long subtends an angle of 1° at the center of a circle; find the distance of the chord from the center.

b If $\sin x = \frac{5}{13}$, find $\tan 2x$.

5 Solve for angles less than 360°

$$\sin(30^\circ + x) - \cos(60^\circ + x) = -\frac{\sqrt{3}}{2}$$

6 Prove the identity $\frac{\sin(2x-3y) + \sin 3y}{\cos(2x-3y) + \cos 3y} = \tan x$

Group III

7 *a* Prove that $\log\left(b - \frac{a^2}{b}\right) = \log(b+a) + \log(b-a) - \log b$

b Find all positive angles less than 360° which satisfy

$$\cos 2x + \cos x = -1$$

8 Solve the spheric triangle when $C = 86^\circ$, $c = 114^\circ\ 21'$, $b = 96^\circ$

9 *a* Derive geometrically $\cos c = \cot A \cot B$

b Prove $\tan a \cos c = \sin b \cot B$ for the spheric triangle in which $C = 90^\circ$