*New York State Education Department*

207TH HIGH SCHOOL EXAMINATION

# TRIGONOMETRY

Tuesday, June 18, 1912—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.

The minimum time requirement in either plane trigonometry or spheric trigonometry is one recitation a week for a school year or two recitations a week for half a school year.

*To receive credit for plane trigonometry students should answer three questions from group I and three questions from group II.*

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

## Group I

1 Find without the use of tables the numerical value of $\sin 195°$; of $\tan 105°$.

2 Prove that $\tan x - \tan \frac{x}{2} = \tan \frac{x}{2} \sec x$

3 Find *two* values of $x$ less than $2\pi$ that will satisfy the equation $\sec^2 x - 7 \tan x - 9 = 0$

4 Solve the equation $4^{2x-3} = 7^{x-1}$

## Group II

5 Prove the formula $\frac{a+b}{a-b} = \frac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$

In the solution of what class of triangles is this formula used?

6 Without solving the triangles, determine the number of solutions in *each* of the following cases:

| | | |
|---|---|---|
| $a = 21$ | $b = 18$ | $A = 30°$ |
| $c = 15$ | $b = 16$ | $C = 40°$ |
| $c = 51$ | $a = 142$ | $C = 32°$ |

7 Given $a = 47$, $b = 83$, $c = 64$; solve the triangle and check the work.

8 A building surmounted by a flagstaff 20′ high stands on a level ground; from a point on the ground the angles of elevation of the top and bottom of the staff are 53° 5′ and 45° 11′ respectively. Find the hight of the building.

## Group III

9 Deduce the formula $A = \sqrt{s(s-a)(s-b)(s-c)}$

10 Deduce from a figure the relation for the right spheric triangle $\sin B = \frac{\sin b}{\sin c}$, the right angle being at $C$.

11 In the right spheric triangle whose right angle is at $C$ given $A = 120° 42'$, $c = 56° 50'$; find $a$ and $B$.

12 In an oblique spheric triangle given $a = 40° 8'$, $b = 118° 20'$, $C = 29° 45''$; find $A$ and $B$.