New York State Education Department

208TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, January 21, 1913—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 Write the exact numerical values of the following: tan 30°, cot 300°, csc 225°, sin 840°, sec (−150°). Illustrate each case with a figure.

2 Solve for all values of x less than 360° the equation $\tan^2 x + \cot^2 x = 2$. Express the result in circular measure.

3 Prove $\frac{\sin(180° - y)}{\sin(270° - y)} \tan(90° + y) + \frac{1}{\sin^2(270° - y)} = 1 + \sec^2 y$

4 In an oblique plane triangle given $a=236$, $b=421$, $c=385$; find A.

Group II

5 Prove completely for the oblique plane triangle

$$c^2 = a^2 + b^2 - 2ab \cos C$$

6 The angles of a triangle are as 3:4:5 and the shortest side is 10; find the other sides.

7 Prove that

$$(\sec y + \csc y)(1 - \cot y) = (\sec y - \csc y)(1 + \cot y)$$

8 Solve the exponential equation $3^{2x-4} = 5^x$

Group III

9 Prove that the logarithm of a power of a number is found by multiplying the logarithm of the number by the exponent of the power.

10 Derive from a figure the following formulas for the right spheric triangle whose right angle is at C:

$$\cos B = \tan a \cot c$$

$$\cos c = \cot A \cot B$$

11 Solve the right spheric triangle in which $a = 122° 16'$, $b = 78° 41'$

12 In an oblique spheric triangle given $a = 130° 50'$, $B = 102°$, $b = 120° 18'$; find A and c.