University of the State of New York

201ST HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Friday, June 10, 1910—9.15 a. m. to 12.15 p. m., only

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

One recitation a week for a school year (or two recitations a week for half a school year), in a recognized academic school, is the regular requirement for admission to the examination in plane trigonometry or spheric trigonometry, and any statement showing less or other than this should be accompanied by a satisfactory claim or explanation made by the candidate and certified by the principal; otherwise such paper will be returned.

For the purpose of marking answers, plane and spheric trigonometry will be regarded as two separate subjects. Candidates taking both at the same examination must attain a passing mark in each.

Candidates for plane trigonometry will answer five questions from groups I, II and III. Answers 20 credits each.

Candidates for spheric trigonometry will answer five questions from groups IV, V and VI. Answers 20 credits each.

Candidates for plane and spheric trigonometry will answer five questions, selecting one question from each group except group III. Answers 20 credits each.

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.

Give special attention to arrangement of work.

Group I 1 Find all values of x between 0° and 360° which satisfy the equation $\tan^2 x + 4\sin^2 x = 6$

2 Prove the identities $\cot x + \tan x = 2 \operatorname{cosec} 2x$

$\tan (x + 45°) = -\cot (x - 45°)$

Group II 3 One side of a regular decagon is 10 feet; find the radii of the inscribed and circumscribed circles and the area of the polygon.

4 In a plane triangle show that $\frac{a+b}{a-b} = \frac{\tan \frac{1}{2}(A+B)}{\tan \frac{1}{2}(A-B)}$

Group III 5 The three sides of a triangle are 30, 40 and 55 feet; find the largest angle of the triangle.

6 From a point A the angle of elevation of the top of a hill is 28° 36′; from a point on the same level and 148.24 farther away in a direct line, the angle of elevation is 16° 20′. Find the hight of the hill.

Group IV 7 In a right spheric triangle prove that $\tan a \cos c = \sin b \cot B$.

8 Prove that if in a right spheric triangle one oblique angle is acute and the other obtuse, the hypotenuse must be greater than 90°.

Group V 9 In an isosceles spheric triangle $a = 115°$, $b = 115°$, $C = 71° 48'$; find A and c.

10 In a right spheric triangle, given $A = 105° 59'$, $a = 128° 33'$; find b and c.

Group VI 11 In a spheric triangle $A = 75°$, $B = 82°$, $c = 57°$; find the area of the triangle, the radius of the sphere being 6 feet.

12 In a spheric triangle $A = 91° 10'$, $B = 85° 40'$, $C = 72° 30'$; find b.