The University of the State of New York

227TH HIGH SCHOOL EXAMINATION

PLANE TRIGONOMETRY

Wednesday, June 21, 1922—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 plane trigonometry.

The minimum time requirement for plane trigonometry is two recitations a week for a school year.

Answer seven questions, including three from group I and four from group II.

A, B and C represent the angles of a triangle ABC; a, b and c represent the respective opposite sides. In a right triangle, C represents the right angle.

Give special attention to neatness and arrangement of work.

In the examination in plane trigonometry the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.

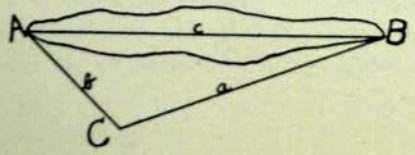
Group I

Answer three questions from this group.

1 Solve and check the triangle ABC, given $a = 64.8$, $b = 56.4$, $c = 43.2$ [16]

2 At point C in a river a buoy is located. Two observers stationed on the shore at A and B with transits find the angle BAC to be 43° 12′ and the angle ABC to be 32° 40′. The line AB is known to be 1235.8 feet long. Find the distances AC and BC. [16]

3 To find the distance AB across a pond the following measurements were made: $a = 426.5'$, $b = 204.3'$, $C = 115°\ 10'$. Find AB. [See drawing.] [16]



4 An airplane A is directly over point F in a level field. Two observers at B and C respectively, 600 feet apart on the field, at the same instant make the following measurements:

$\angle ABF = 64°\ 22'$; $\angle FBC = 42°\ 26'$; $\angle FCB = 22°\ 15'$

Find the height of the airplane. [16]

Group II

Answer four questions from this group.

5 Prove that $\sin(x + y) = \sin x \cos y + \cos x \sin y$, when x, y and $x + y$ are acute angles. [13]

6 Prove that $\frac{a-b}{a+b} = \frac{\tan \frac{1}{2}(A-B)}{\tan \frac{1}{2}(A+B)}$ where a and b are the sides of a triangle and A and B are the opposite angles. [13]

7 *a* Express as functions of positive angles less than 45°: $\sin 102°$, $\cos 114°$, $\tan(-140°)$, $\sec 310°$ [4]

b If $\cot x = -\frac{3}{4}$, and x is in the fourth quadrant, find $\sin 2x$. [6]

c Express 100° as radians. [3]

8 Prove the following identities:

$$\sin x \cos^3 x - \cos x \sin^3 x = \frac{\sin 2x \cos 2x}{2} \quad [6]$$

$$\tan(45° + x) = \frac{\cos x + \sin x}{\cos x - \sin x} \quad [7]$$

9 Solve for all values of x between 0° and 360° and check *one* of these values: $8 \sin^2 x + 2 \cos x = 7$ [11, 2]