The University of the State of New York

232d High School Examination

PLANE TRIGONOMETRY

Wednesday, January 21, 1925 — 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 five recitations a week for half a school year, or the equivalent.

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 In a right triangle given $A = 24^\circ\ 15'$, $a = 136.25$; find b and c and check the results. [14, 2]

2 To find the distance of a ship S from a point on shore a base line AB, 900′ long, is laid off along the shore, the angle SAB is found to be $33^\circ\ 20'$ and the angle SBA is $120^\circ\ 10'$. Find the distance of the ship from the point B. [16]

3 Given $a = 143.7$, $b = 125.3$, $C = 114^\circ\ 42'\ 24''$. Find A, B and c. [16]

4 A plot of ground ABC is in the form of a triangle at the intersection of two streets with B the point of intersection. If $AB = 275.15'$, $CB = 234.17'$ and $AC = 162.34'$, find the angle ABC at which the streets intersect. [16]

Group II

Answer four questions from this group.

5 *a* Through how many radians does the minute hand of a clock move in 48 minutes? [2]

b Express the following as functions of positive angles less than 45°:

$\sin 150^\circ$, $\cos 210^\circ$, $\tan(-110^\circ)$. [2, 2, 2]

c Prove:

$$\sin A + \sin B = 2 \sin \tfrac{1}{2}(A + B) \cos \tfrac{1}{2}(A - B) \quad [5]$$

6 Prove: $\sin(x + y) = \sin x \cos y + \cos x \sin y$, where x, y and $x + y$ are acute angles. [13]

7 Answer either *a* or *b*: [13]

a Draw the figure showing the line values of all functions of an angle in the second quadrant, labeling each line with its proper function.

b Plot the graph of $\cos x$ as x varies from 0° to 360°.

8 *a* Given $\tan^{-1} \frac{8}{15} = A$, A being in the third quadrant. Find $\sin \frac{1}{2} A$. [7]

b Prove the identity: $\cot x - \tan x = 2 \cos 2x \csc 2x$. [6]

9 Solve the following equation for all values of x between 0° and 360° and check *one* of these values:

$$6 \sin x = 5 - \frac{4}{\sec 2x} \quad [13]$$