The University of the State of New York

235TH HIGH SCHOOL EXAMINATION

PLANE TRIGONOMETRY

Wednesday, January 20, 1926 — 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 $A = 27° \ 18' \ 30''$, $b = 236.27$; find a and c. [16]

2 Given $a = 54.62$, $b = 65.87$, $c = 43.65$; find A, B, C and check the results. [14, 2]

3 The angle of elevation of an aeroplane from a point A due west of it is 55° and from a point B on the same level as A and due east of the aeroplane the angle of elevation is 48°. The distance between A and B is 1500 feet. Find the height of the aeroplane. [16]

4 Two stations A and B on opposite sides of a mountain are both visible from a third station C in the same horizontal plane with A and B. The distances AC, CB and the angle ACB are measured and found to be 12.5 miles, 23.4 miles and 62° 45′ respectively; find the angle ABC. [16]

Group II

Answer four questions from this group.

5 *a* Derive the formula for tan $(A + B)$. [7]

  b Derive the formula cos $2A = 1 - 2 \sin^2 A$, starting with the formula for cos $(A + B)$. [6]

6 *a* Construct a table of values for tan x at intervals of 30° as x varies from 0° to 360°. [7]

  b Plot the graph of $y = \tan x$ for the range 0° to 360°. [6]

7 *a* Prove the following identity:
  $$\sin A \ (\sec A + \csc A) - \cos A \ (\sec A - \csc A) = \sec A \csc A. \quad [9]$$

  b Given $A = \tan^{-1} (-\frac{3}{4})$, A being in the second quadrant; find cos $\frac{1}{2} A$, sin $2A$. [2, 2]

8 *a* Solve the following equation for all values of A between 0° and 360°:
  $$3 \cos^2 A + 3 \cos A + \sin^2 A = 0. \quad [10]$$

  b If log csc $A = .64325$, find A. [3]

9 *a* Change tan $(-215°)$ to a function of an angle less than 45°. [4]

  b Without the use of tables, find sin 75°; cos $(-135°) \times$ sin 15°. [4, 5]