

The University of the State of New York

212TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, January 19, 1915 — 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.

Students taking this examination may use textbooks and notes prepared previous to the examination, but there must be no communication among students after the examination has begun.

To receive credit for plane trigonometry students should answer group I and group II.

To receive credit for both plane and spheric trigonometry students should answer group I and group III.

Group I

1 (a) Without using tables, derive in radical form cos 165°.

(b) Prove the identity $\frac{1 - \tan^2 x}{1 + \tan^2 x} = \cos 2x$

2 State all the formulas that should be used to solve completely the following triangles and to find their areas:

(a) a = 47, b = 34, c = 57

(b) a = 275.1, c = 151.6, B = 46° 21'

[No solutions desired.]

3 A flagstaff on top of a tower 75 feet high subtends an angle of 9° at a point level with the base of the tower and 100 feet from the base of the tower; how tall is the flagstaff?

Group II

4 From two points A and B, 15 miles apart, on a straight road, a mountain top M is observed. The angle BAM = 64° 35', ABM = 79° 46'. What is the shortest distance from M to the road?

5 Solve for angles less than 360°

$$2 \cos x + \sin x = 2$$

6 (a) If $\sin x = \frac{4}{5}$, $\cos y = \frac{1}{3}$, find $\cos(x + y)$

(b) If $\tan x = 3$, find $\cos \frac{x}{2}$

Group III

7 (a) Simplify $3^{\log_3 10} - \log_5 5^{\frac{3}{2}} + \log_4 8 - \log_7 1$

(b) Given $\log x = a$, $\log y = b$; express $\log \frac{\sqrt[5]{x^3}}{(x^{\frac{1}{2}} y^5)^4}$ in terms of a and b.

8 Given the spheric triangle in which a = 126° 20', b = 54° 36', C = 56°; find A and c.

9 In a right spheric triangle whose right angle is at C, derive from a figure the formula $\tan a = \sin b \tan A$.