The University of the State of New York

229TH HIGH SCHOOL EXAMINATION

SPHERIC TRIGONOMETRY

Wednesday, June 20, 1923—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 spheric trigonometry.

The minimum time requirement for spheric trigonometry is two recitations a week for half a school year, or the equivalent.

Answer six questions, including three from group I, one from group II and two from group III.

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 spheric 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 Prove geometrically that in any right spheric triangle in which all parts except the right angle are less than 90°

$$\sin b = \sin c \sin B \qquad [15]$$

2 State Napier's rule of circular parts and give *two* illustrations of each part of the rule. [15]

3 Show that in a right spheric triangle where c is the hypotenuse, c is greater than 90° if a is greater than 90° and b is less than 90°. [15]

4 Prove that in any oblique spheric triangle

$$\cos a = \cos b \cos c + \sin b \sin c \cos A, \text{ when angle } A$$
is acute. [15]

Group II

Answer one question from this group.

5 Solve and check the quadrantal spheric triangle in which
$$C = 116° \ 4' \ 20'', \ A = 120° \ 10', \ c = 90° \qquad [15]$$

6 Given $c = 52° \ 20' \ 10'', \ b = 52° \ 20' \ 10'', \ a = 46° \ 18' \ 20'';$ solve and check the isosceles spheric triangle. [15]

Group III

Answer two questions from this group.

7 Solve and check the spheric triangle in which
$$B = 98° \ 30', \ C = 67° \ 20', \ a = 60° \ 40' \qquad [20]$$

8 From a place 17° N. 130° W. a ship, starting on a course S. 54° 20′ W., sailed on a great circle. Find its latitude and its longitude when it has sailed 60°. [20]

9 Find the shortest distance in nautical miles from San Francisco (lat. 37° 48′ N., long. 122° 25′ W.) to Manila (lat. 14° 35′ N., long. 120° 58′ E.). A nautical mile is the length of 1′ of the arc of a great circle on the earth's surface. [20]