The University of the State of New York

224TH HIGH SCHOOL EXAMINATION

SPHERIC TRIGONOMETRY

Wednesday, January 19, 1921—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 one recitation a week for a school year.

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.

Credits: Groups I, 15 each; group II, 15 each; group III, 20 each.

Group I

Answer three questions from this group.

1 In a right spheric triangle in which all parts except the right angle C are less than 90°, prove that

(a) $\cos c = \cos a \cos b$, (b) $\cos A = \tan b \cot c$

2 State Napier's rules concerning a right spheric triangle. Using these rules, give *two* values of $\cos B$ and *two* values of $\sin a$.

3 If the sides a and b of a right spheric triangle are equal, prove that $\cos a = \cot A = \sqrt{\cos c}$

4 Prove that in any spheric triangle the sines of the sides are to each other as the sines of the angles opposite.

Group II

Answer one question from this group.

5 Solve and check the right spheric triangle, given $a = 37° 18'$, $B = 42° 13'$, $C = 90°$

6 In an isosceles spheric triangle $c = 63° 24'$, $b = 63° 24'$, $a = 48° 20'$; find the angles.

Group III

Answer two questions from this group.

7 Find the area (in square units) of a spheric triangle

whose angles are 85° 30′, 29° 45′, 72° 15′, if the radius of the sphere is 5 feet.

8 Given $a = 59° 48'$, $b = 115° 43'$, $c = 135°$; find C.

9 Find the distance in miles between two points on the earth's surface that are in latitude 40° north, longitude 74° west and latitude 49° 58′ north, longitude 5° 12′ west respectively. [Assume the radius of the earth to be 3956 miles.]