

SPHERIC TRIGONOMETRY

Wednesday, June 15, 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: Group 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

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

2 In the solution of a right spheric triangle what is the conclusion if by computation (a) the sine of a quantity is found to be positive, (b) the sine of a quantity is found to be negative, (c) the cosine of a quantity is found to be positive, (d) the cosine of a quantity is found to be negative? State the reason in each case.

3 In any right spheric triangle prove that (a) an oblique angle and its opposite side are always in the same quadrant, (b) if the hypotenuse is greater than 90° , the two oblique angles are in different quadrants.

4 In any right spheric triangle if d is the length of the great circle arc drawn from the right angle perpendicular to the hypotenuse c , show that $\cot d = \sqrt{\cot^2 a + \cot^2 b}$

Group II

Answer one question from this group.

5 Given $c = 32^\circ 24'$, $A = 44^\circ 44'$, $C = 90^\circ$; find B , a and b , and check your results.

6 Solve the isosceles spheric triangle, given $A = 49^\circ 37'$, $B = 49^\circ 37'$, $c = 79^\circ 49'$

Group III

Answer two questions from this group.

7 Two places are in latitude 37° north and latitude 71° north respectively; if they are 2760 miles apart, what is their difference in time? [69 miles = 1° ; $15^\circ = 1$ hour]

8 Given $A = 110^\circ 20'$, $B = 133^\circ 28'$, $a = 147^\circ 6'$; find b .

9 In a right spheric triangle on a sphere of diameter 2 feet, $a = 75^\circ$, $b = 75^\circ$; find the length of c in inches.