

TRIGONOMETRY

Thursday, January 24, 1918—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.

The minimum time requirement for plane trigonometry is two recitations a week for a school year; for plane and spheric trigonometry three recitations a week for a school year.

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.

Candidates for plane trigonometry should answer five questions from group I.

Candidates for plane and spheric trigonometry should answer five questions, including three from group I and two from group II. To receive credit for plane and spheric trigonometry, a candidate must secure at least 24 credits from group II.

Group I

1 Given $A = 74^\circ 28'$, $B = 82^\circ 34'$, $a = 477.4$ ft; find b and c correct to the nearest tenth of a foot.

2 Given $a = 750$ ft, $b = 400$ ft, $A = 22^\circ 15'$; find c correct to the nearest tenth of a foot.

3 Prove that if $\frac{\cos A}{b} = \frac{\cos B}{a}$, the triangle is either an isosceles or a right triangle.

4 A circular piece of cardboard 12 inches in diameter is fixed flat on a table. Two pins are stuck in the table in line with a diameter and 3 inches from the edge of the cardboard, on opposite sides. A string is stretched on the table from one pin round the cardboard to the other pin. Find the length of the string and the portion of the circumference of the cardboard which is in contact with the string.

5 Solve the equation $4 \cot 2x = \cot^2 x - \tan^2 x$ for all values of x between 0° and 360° [16]. Check [4].

6 Two ships are 4 miles apart. The angular distance of the first ship from a hostile warship, as observed by the second ship, is $52^\circ 20'$; the angular distance of the second ship from the hostile warship, as observed by the first

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ship, is $63^\circ 10'$. Find the distance of each ship from the hostile warship.

7 Two forces, one of 350 pounds and the other of 275 pounds, make an angle of $48^\circ 30'$. Find the intensity and the direction of their resultant. [The resultant is represented by the longer diagonal of the parallelogram whose sides are 350 and 275, the included angle being $48^\circ 30'$.]

8 A regular pentagon is inscribed in a circle whose radius is 16 inches; find the length of each side.

Group II

9 In a right spheric triangle, given $a = 48^\circ$, $b = 73^\circ$; solve the triangle.

10 In an oblique spheric triangle, given $a = 89^\circ 10'$, $b = 123^\circ 15'$, $C = 48^\circ 20'$; find c .