

New York State Education Department

204TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, June 13, 1911—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 in either plane trigonometry or spheric trigonometry is one recitation a week for a school year or two recitations a week for half a school year.

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

To receive credit for spheric trigonometry students should answer three questions from group I and three questions from group III.

Students who pass spheric trigonometry will receive credit for plane trigonometry also.

- Group I**
- 1 Express $\cos x$, $\sec x$ and $\tan x$ in terms of $\tan \frac{1}{2} x$.
 - 2 Find the values of A between 0° and 360° that satisfy the equation $\sin A + \cos A = \sqrt{2}$
 - 3 Prove that $\sin 45^\circ = \frac{1}{\sqrt{2}}$; $\tan 30^\circ = \frac{1}{\sqrt{3}}$; $\cos 60^\circ = \frac{1}{2}$
 - 4 Solve, for the value of x , the equation $\sin^2 x - \cos^2 x = \frac{1}{2}$. Verify the result.

- Group II**
- 5 Prove that in a plane triangle $a = b \cos C + c \cos B$
 - 6 From two points A and C , 20 feet apart, a buoy B is observed; the angle CAB is 104° , the angle ACB is 57° . How far is the buoy from A ?
 - 7 Given $b = 420$, $a = 540$, $C = 52^\circ 6'$; find the angle A .
 - 8 Complete and prove $\sin(a + b) =$

- Group III**
- 9 Deduce the following formulas for right spheric triangles [simply applying Napier's rule is not sufficient]:

$$\cos A = \cos a \sin B$$

$$\cos A = \tan b \cot c$$

- 10 Prove that if in a right spheric triangle the two oblique angles are both greater than 90° , the hypotenuse is less than 90° .
- 11 In a right spheric triangle given $c = 70^\circ 30'$, $A = 100^\circ$; find a and b .
- 12 Given $a = 58^\circ$, $b = 137^\circ 20'$, $B = 131^\circ 20'$; find A and C .