University of the State of New York

211TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, June 16, 1914—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.

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.

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

To receive credit for both plane and spheric trigonometry students should answer group I and group III.

Group I

1 *a* In radian measure two angles of a triangle are $\frac{1}{2}$ and $\frac{3}{4}$; find in degrees the third angle, using the value $\pi=\frac{22}{7}$.

b The end of a 20-inch pendulum swings through a 4-inch arc; find the angle through which it passes.

2 *a* If $\tan A=\frac{1}{7}$ and $\tan B=\frac{3}{11}$, prove that $\tan(2A+B)=\frac{1}{2}$

b If $\tan\frac{A}{2}=2-\sqrt{3}$, find $\sin A$.

3 The north end of a tunnel through a mountain is 3526 feet from a point on the crest of the ridge; the south end is 2872 feet from the same point. The angle of depression of the north end, measured from this point, is 49° 27′; that of the south end is 67° 48′. Find the difference in elevation between the two ends of the tunnel.

Group II

4 If the sides of a triangle are x^2+x+1, $2x+1$ and x^2-1 respectively, show that the angle opposite the side x^2+x+1 is 120°.

5 By means of logarithms find the value of

$$\sqrt[5]{\frac{\sqrt[3]{476.5}\times(8.31)^2}{(.0023)^{\frac{1}{3}}}}$$

6 Prove the identity

$$\frac{\cos A}{1-\sin A}=\tan\left(45°+\frac{A}{2}\right)$$

Group III

7 Solve for all angles less than 360°

$$\sin x+\sin 2x+\sin 3x+\sin 4x=0$$

8 Find the perimeter of a right spheric triangle in which $a=48°$, $b=60°$, $C=90°$, the radius of the sphere being 18″.

9 Given $B=121°\ 43'\ 12''$, $A=105°\ 52'\ 48''$, $c=115°\ 48'\ 36''$ Find a, b and C.