198TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Tuesday, June 15, 1909—9.15 a. m. to 12.15 p. m., only

For the purpose of marking answers, plane and spheric trigonometry will be regarded as two separate subjects. To pass, candidates must attain at least 60% in each part taken.

Candidates for plane trigonometry will answer five questions, selecting at least one from each of the groups I, II and III. Answers 20 credits each.

Candidates for plane and spheric trigonometry will answer seven questions, selecting three from group IV (33⅓ credits each) and at least one from each of the other three groups (25 credits each).

Candidates for spheric trigonometry will answer three questions from group IV. Answers 33⅓ credits each.

A, B and C represent the angles of a triangle, a, b and c the opposite sides. In a right triangle C represents the right angle.

Give special attention to arrangement of work.

Group I 1 Prove the relation $\sin 2x = \frac{2 \tan x}{1 + \tan^2 x}$

2 Derive the relation $\cos A + \cos B = 2 \cos \frac{1}{2}(A+B) \cos \frac{1}{2}(A-B)$

Group II 3 Find *two* values of x that satisfy the following equation: $2 \cos^2 x + 5 \sin x = 4$

4 A corner lot between two streets is in the form of a triangle; the frontage on the first street is 60 feet, on the second street 47 feet and the third side of the lot measures 71 feet. Find (*a*) the angle between the streets, (*b*) the area of the lot.

Group III 5 One side of a parallelogram is 40 and the angles between this side and the diagonals are 34° 10′ and 43° 30′; find the other sides of the parallelogram.

6 From a certain point 6 feet above sea level, the angle of elevation of the top of an inaccessible bluff is found to be 15° 30′; from a point 975 yards nearer the bluff and on the same level with the first point, the angle of elevation is 27° 20′. Find the hight of the bluff above sea level.

Group IV 7 Prove geometrically the formula $\cos c = \cos a \cos b$.

8 In an oblique spheric triangle given $a = 130° 5'$, $b = 58° 17'$, $c = 84° 36'$; find C.

9 Given in a spheric triangle $A = 98° 25'$, $B = 106° 40'$, $a = 93° 20'$; find b and c.

10 Find the distance in degrees between Boston, latitude 42° 21′ N., longitude 71° 4′ W., and Berlin, latitude 52° 45′ N., longitude 13° 24′ E.