

## TRIGONOMETRY

Tuesday, January 28, 1908—9.15 a. m. to 12.15 p. m., only

*Candidates for plane trigonometry will answer six questions, selecting three from group I and three from group II.*

*Candidates for plane and spheric trigonometry will answer two questions from group I, two questions from group II and three questions from group III.*

*Candidates for spheric trigonometry who have previously passed plane trigonometry will answer three questions from group III.*

*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** Given  $\sin^2 x - \cos x = \frac{1}{4}$ ; find  $x$ .

2  $\tan x = \cot 4x$ ; find  $x$ .

3 Find the sin, cos and tan of  $\frac{x}{2}$  in terms of a function of  $x$ .

4 Write the algebraic signs of the six functions of  $285^\circ$ .

**Group II** 5 From a point A the angle of elevation of the top of a building is  $28^\circ 36'$ ; from a point 148.24 feet farther away in a direct line, the angle of elevation is  $16^\circ 40'$ . Find the distance from A to the foot of the building.

6 In a triangular field one side, 1000 ft long, makes with the adjacent sides angles of  $66^\circ 30'$  and  $79^\circ 58'$ ; find the area of the field.

7 One angle of a triangle is  $67^\circ 40'$  and the sides including this angle are 50 ft and 78 ft; find the remaining angles.

8 The sides of a triangle are 13, 14 and 15; find the largest angle.

**Group III** 9 Prove that in any spheric right triangle the sine of the middle part is equal to the product of the tangents of the adjacent parts.

10 A ship starting from a point in latitude  $10^\circ 40'$  north and longitude  $125^\circ$  west sailed for 2 days on the arc of a great circle, arriving at a point in latitude  $30^\circ 20'$  north and longitude  $145^\circ 30'$  west; find its rate per hour, assuming the radius of the earth to be 3960 miles.

11 In a spheric triangle  $A = 110^\circ 45'$ ,  $B = 99^\circ 35'$ ,  $c = 120^\circ 28'$ ; find  $C$ .

12 Prove that if in a right spheric triangle the two sides including the right angle are in the same quadrant, the hypotenuse is less than  $90^\circ$ .