184TH HIGH SCHOOL EXAMINATION

TRIGONOMETRY

Thursday, January 26, 1905—9.15 a. m. to 12.15 p. m., only

Answer eight questions but no more. *Include at least three from the* ***third division if credit is desired for both plane and spheric trigonometry.*** *If more than eight are answered only the first eight answers will be considered. 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. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

Give special attention to arrangement of work.

First division

1 Define trigonometry, spheric triangle, natural function, quadrantal triangle, radian.

2 Show why the sum of the logarithmic tangent and the logarithmic cotangent of any angle is equal to 20.

3 In a given right triangle $\tan A = \frac{3}{4}$ and $b = 6$; find the values of a, c, $\sin A$, $\sin B$ and $\sec B$.

4 How many radians are there in 80° 30′? How many degrees are there in 2.5 radians?

Second division

5 From the top of a tower 120 feet high the angle of depression to an object in the plane of the base of the tower is 57° 40′; find the distance of the object from the tower.

6 Prove by means of the law of sines, that the bisector of an angle of a triangle divides the opposite side into parts which are proportional to the adjacent sides.

7 In a plane triangle $b = 20$ feet, $c = 35$ feet, $A = 62° 24'$; find a and the area of the triangle.

8 In a plane triangle $a = 21$ feet, $b = 30$ feet, $c = 45$ feet; find C. Why is not the formula $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ ordinarily used for this purpose?

Third division

9 In a right spheric triangle prove that $\cos c = \cos a \cos b$ and that $\sin a = \sin c \sin A$.

10 In a spheric triangle $a = 110°$, $b = 70°$, $c = 90°$; find A and B.

11 In an oblique spheric triangle $a = 81° 10'$, $b = 60° 20'$, $c = 112° 25'$; find A.

12 What is the time of sunrise at Boston, latitude 42° 21′, on the longest day of the year, when the declination of the sun is 23° 27′?