

High School Department

164TH EXAMINATION

PLANE TRIGONOMETRY

Thursday, June 14, 1900—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but no more. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. A , B and C represent the angles of a triangle, a , b and c the opposite sides, S the area. In a right triangle C represents the right angle and c the hypotenuse. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1 Define each of the following a) as a ratio, b) as a line: sine, cosine, tangent, cotangent, secant.

2 Derive, without the use of the tables, the numeric value of each of the following: $\sin 30^\circ$, $\cos 150^\circ$, $\tan 225^\circ$, $\sec 120^\circ$, $\text{ctn } 300^\circ$.

3 Write in tabular form the signs of the following for each of the four quadrants: sine, cosine, tangent, cotangent, secant.

4 Assuming the values of $\sin(x+y)$ and $\cos(x+y)$, find the values of $\sin 2x$, $\cos 2x$, $\tan 2x$ and $\text{ctn } 2x$.

5 Prove that in any triangle $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

6 Prove that the mantissa of the logarithm of the number represented by any sequence of figures is independent of the position of the decimal point.

7 In a right triangle, given $c = 256$ feet, $A = 39^\circ 43'$; find the remaining parts.

8-9 Given $A = 32^\circ$, $a = 60$ feet, $b = 80$ feet; find the remaining parts. [Give two solutions.]

10-11 Given $a = 65$ feet, $b = 72$ feet, $c = 115$ feet; find the three angles.

12-13 A surveyor at a point A on the bank of a river wishes to find the distance across the stream to the point B ; he measures AC a distance of 200 feet on the bank of the stream and finds that angle $BAC = 110^\circ 30'$ and angle $BCA = 42^\circ 25'$. Find AB .

14-15 AB , BC , CD and DA , the sides of a field, are 40 rods, 65 rods, 27 rods and 70 rods respectively; the angle C is $84^\circ 30'$. Find the area of the field.