The University of the State of New York

261ST HIGH SCHOOL EXAMINATION

PLANE TRIGONOMETRY

Tuesday, August 21, 1934 — 3 30 to 6 30 p m , only

Instructions

Do not open this sheet until the signal is given

Answer all questions in part I and five questions from part II

Part I is to be done first and the maximum time to be allowed for this part is one and one half hours Merely write the answer to each question in the space at the right, no work need be shown

If you finish part I before the signal to stop is given you may begin part II However, it is advisable to look your work over carefully before proceeding to part II, since *no credit will be given any answer in part I which is not correct and reduced to its simplest form*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached The sheets will then be collected and you should continue with the remainder of the examination

In this examination the customary lettering is used A, B and C represent the angles of a triangle ABC, a, b and c represent the respective opposite sides In a right triangle, C represents the right angle

Give special attention to neatness and arrangement of work

In both parts of this examination the use of the slide rule will be allowed for checking, in part II all computations with tables must be shown on the answer paper

PLANE TRIGONOMETRY

Tuesday, August 21, 1934

Write at top of first page of answer paper (*a*) names of schools where you have studied, (*b*) number of weeks and recitations a week in plane trigonometry previous to entering summer high school, (*c*) number of recitations in this subject attended in summer high school of 1934

The minimum time requirement for plane trigonometry previous to entering summer high school is five recitations a week for half a school year, or the equivalent

For those pupils who have met the time requirement previous to entering summer high school the minimum passing mark is 65 credits, for all others 75 credits

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1934 is required

Part II

Answer five questions from this part

21 From a point 40 5 feet above the plane on which a building stands the angle of elevation of the top of the building is 61° 10′ and the angle of depression of its base is 32° 13′ Find the height of the building [10]

22 A tree stands on a street that is inclined at an angle of 17° to the horizontal At a point 75 feet up the street from the tree the angle subtended by the tree is 29° How tall is the tree? [10]

23 If a man rows east at the rate of 4 miles an hour across a river flowing south at the rate of 3 miles an hour, his boat will be carried along a line corresponding to the diagonal of a rectangle whose sides are 4 and 3 If the river is 480 feet wide, how far down the river will he land [5]? What angle will his course make with the course of the river [4]? In what direction will his boat move [1]?

24 In triangle ABC, $B = 36° 20'$, $a = 3\,16$ and $c = 2\,41$, find A [10]

25 The three sides of a triangle are 6 432, 7 252 and 3 390, find the largest angle [10]

26 *a* Prove the identity

$$\left(\frac{1 - \sin x}{\cos x}\right)^2 = \frac{1 - \sin x}{1 + \sin x} \quad [4]$$

b Solve for all values of x between 0° and 360°

$$\cos x + \sin 2x = 0 \quad [6]$$

27 Derive the formula for $\sin (x + y)$, in which x and y are positive acute angles whose sum is less than 90° [10]

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Fill in the following lines

Name of school Name of pupil

Detach this sheet and hand it in at the close of the one and one half hour period

Part I

Answer all questions in this part Each question has $2\frac{1}{2}$ credits assigned to it Each answer must be reduced to its simplest form

1 Find log cos 21° 4′ *Ans*

2 Find, correct to the *nearest minute*, the smallest positive angle whose tangent is 2350 *Ans*

3 Express in degrees the distance between any two consecutive points in which the graph of $y = \sin x$ cuts the x-axis *Ans*

4 A surveyor's line runs 1000 feet N 8° E from A to B, how far east of A is B? *Ans*

5 Find the area of triangle ABC, in which $a = 4$, $b = 6$ and $C = 30°$ *Ans*

6 Express 900° in radians [Answer may be left in terms of π] *Ans*

7 As a positive angle in the second quadrant increases, does its tangent increase or decrease? *Ans*

8 Express $\sin^2 \frac{A}{2}$ in terms of a function of A *Ans*

9 In triangle ABC, $A = \tan^{-1}(-1)$, find A *Ans*

10 In triangle ABC, $A = 60°$, $b = 2$ and $c = 6$, find a [Answer may be left in radical form] *Ans*

11 If $\cos x = \frac{3}{5}$, find $\cos 2x$ *Ans*

12 Simplify $\cos(A - B) - \cos(A + B)$ *Ans*

13 Express $\sec A$ in terms of $\tan A$ *Ans*

14 If $2 \cos x = \sqrt{3}$, what is the smallest positive value of x? *Ans*

15 In triangle ABC, $\sin A = 3 \cos A$, find A correct to the *nearest degree* *Ans*

16 If $\log \sin A = 9.3415 - 10$, find, correct to the *nearest minute*, the value of acute angle A *Ans*

17 Express cos 265° in terms of the cosine of a positive acute angle *Ans*

18 Find the value of $\tan 60° \cos 45° - \sin 45° \cot 30°$ *Ans*

19 Express $\frac{2 \csc A}{\tan A + \cot A}$ in terms of $\cos A$ *Ans*

20 The slope of a line is the tangent of the angle which the line makes with the horizontal If the slope of a street is 6.7%, what angle does it make with the horizontal? *Ans*