PLANE TRIGONOMETRY
Thursday, June 23, 1932

Write at top of first page of answer paper to part II (a) name of school where you have studied, (b) number of weeks and recitations a week in plane trigonometry. The minimum time requirement for plane trigonometry is five recitations a week for half a school year, or the equivalent.

Part II

Answer four questions from this part, selecting two questions from each group.

Group I

Answer two questions from this group.

21 A flagstaff known to be 20 feet long stands on top of a building. An observer across the street notes that the angle of elevation of the bottom of the staff is 69° 14' and the angle of elevation of the top of the staff is 76° 44'. What is the height of the building above the eye of the observer? \[12\frac{1}{2}\]

22 Given the sides of a triangle \(a = 34.25, \ b = 52.45, \ c = 71.40\); find the angles correct to the nearest minute. \[12\frac{1}{2}\]

23 The town \(A\) is 25.2 miles due north of \(B\), and the town \(C\) is 18.3 miles N. 37° 20' E. of \(B\). What is the direction from \(A\) to \(C\)? [Note — Give your answer in the form S. . . . E.] \[12\frac{1}{4}\]

Group II

Answer two questions from this group.

24 The lengths of the sides of a right triangle \(ABC\) are \(AC = 28, \ BC = 21, \ AB = 35\). On the hypotenuse \(AB\) another right triangle \(ABD\) is constructed with \(AB\) as one leg, \(BD\) equal to 5 as the other leg and \(AD\) as hypotenuse. Show that the angle \(CAD\) is exactly 45°. [Suggestion — Find \(\tan CAD\), using the formula for the tangent of the sum of two angles.] \[12\frac{1}{4}\]

25 Find to the nearest minute the angle between \(90^\circ\) and \(180^\circ\) that satisfies the equation

\[3 \cos x + \tan x = 3 \sec x \quad [12\frac{1}{2}]\]

26a Prove the following identity:

\[(1 + \sec x) (1 - \cos x) = \cos x \tan^2 x \quad [6]\]

26b Prove the law of sines for an acute triangle. \[6\frac{3}{4}\]