PLANE TRIGONOMETRY

Thursday, January 28, 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 Two observers stationed on directly opposite sides of an airplane observe its angles of elevation to be 34° 56′ and 46° 10′. The observers are 850 feet apart. Find the distance from the airplane to the nearer observer. [12½]

22 A town A lies 75 miles north of another town B. A third town C lies farther west than A and B. The distance from A to C is 52 miles and from B to C is 60 miles.

a Find the angle ABC. [11½]

b In what direction does C lie from B? [1]

23 To determine the distance between two objects separated by a swamp, a point is chosen 250.7 feet from one of the objects and 143.9 feet from the other. The angle formed at this point by lines to the objects is 58° 50′. What is the distance between the objects? [12½]

Group II

Answer two questions from this group.

24 *a* Derive the law of cosines for an acute triangle. [8½]

b Prove the following identity:

$$\sec B - \sin B \tan B = \cos B \qquad [4]$$

25 *a* Solve for positive values of x less than 360°:

$$\cos 2x + \sin x = 1 \qquad [8\tfrac{1}{2}]$$

b Solve for the positive acute value of x: $\dfrac{2 + 2 \sin x}{\sin x} = 5$ [4]

26 *a* Draw the graph of $y = \tan x$, using the following values of x:

0°, 10°, 30°, 50°, 70°, 90°, 110°, 130°, 150°, 170°, 180° [10½]

b On the graph made in answer to *a* draw the ordinate at the point that shows tan 160°. [2]