PLANE TRIGONOMETRY—concluded

6 a Evaluate (without the use of tables):
   \[ \frac{\cos 60^\circ + \cot 225^\circ + \sin 270^\circ}{\sec (-60^\circ) - \tan 180^\circ + \sin 210^\circ} \]

   \[ 7 \]

b Express \( \tan x \) and \( \sec x \) in terms of \( \sin x \).

   \[ 6 \]

Group III

Answer three questions from this group.

7 A tree is broken by the wind; its top strikes the ground 32 feet from the foot of the tree and makes an angle of \( 35^\circ 54' \) with the ground. Find the original height of the tree.

   \[ 16 \]

8 The sides of a triangle are 18.723, 28.14 and 35.817; find the length of the perpendicular from the largest angle upon the opposite side.

   \[ 16 \]

9 Two forces, 125.0 lb and \( F \) lb, include an angle of \( 72^\circ 15' \) between their directions; if their resultant force makes an angle of \( 31^\circ 8' \) with the 125.0 lb force, find \( F \). The resultant is represented by the longer diagonal of the parallelogram whose sides are 125.0 and \( F \), the included angle being \( 72^\circ 15' \).

   \[ 16 \]

10 At two stations on the same horizontal plane the height of a kite subtends the same angle \( A \). The angle which the line joining one station and the kite subtends at the other station is \( B \); the distance between the two stations is \( a \). Show that the height of the kite is \( \frac{1}{2} a \sin A \sec B \).

   \[ 16 \]