Dr. K. Karuppasamy

(www.drkk.in)

Yahoo Answer dated 26-09-2013

Question: ABC is a triangular framework with AB horizontal and length of 15m, AC of length 10m and BC of length 13m. A vertical strut is to be fixed with one end at a point D on AB such that $BD : DA = 1 : 2$, and the other end at E on CB. Find the length of this strut, to the nearest centimetre.

Solution: Since $AB = 15m$ and $BD : DA = 1 : 2$, we have $BM = 5m$ and $AM = 10m$.

In $\triangle ABC$, $\cos B = \frac{c^2 + a^2 - b^2}{2ca} = \frac{15^2 + 13^2 - 10^2}{2 * 15 * 13} = \frac{294}{390}$.

Angle $B = \arccos\left(\frac{294}{390}\right) = 41°5'$

Now in the right angled $\triangle BME$, $\tan B = \frac{DE}{BM}$

$\implies DE = BM * \tan B = 5 * \tan(41°5') = 4.36$ m $= 4$ m 36 cm.