Answer on Question #51011 – Math – Trigonometry

Solve triangle ABC which has angle C=1250:431; a=4:2 cm and c=8:2cm. Find b

Solution

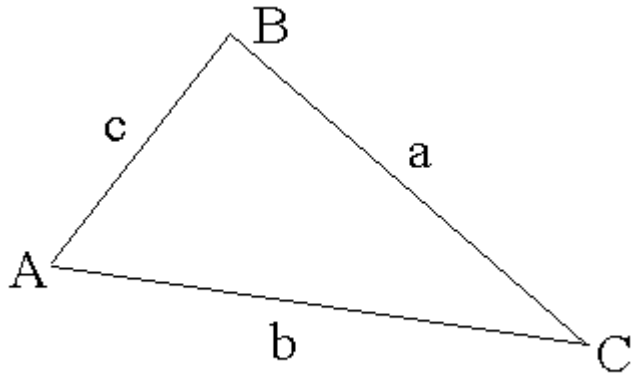

Fig.1

The law of cosines (see Fig.1) tells us that

$$c^2 = a^2 + b^2 - 2ab\cos\angle C$$

which is equivalent to

$$b^2 - 2ab\cos\angle C + a^2 - c^2 = 0$$

After plugging all known values, obtain the following equation:

$$b^2 - 2\cdot\frac{4}{2}b\cos\frac{1250}{431} + \left(\frac{4}{2}\right)^2 - \left(\frac{8}{2}\right)^2 = 0$$

that is,

$$b^2 - 4b\cos\frac{1250}{431} - 12 = 0$$

$$D = \left[4\cos\left(\frac{1250}{431}\right)\right]^2 + 4\cdot 12$$

$$b_{1,2} = \frac{4\cos\left(\frac{1250}{431}\right) \pm \sqrt{16\left[\cos\left(\frac{1250}{431}\right)\right]^2 + 4\cdot 12}}{2}$$

Because $b > 0$ as the length of triangle, then take

$$b=\frac{4\cos\left(\frac{1250}{431}\right)+\sqrt{16\left[\cos\left(\frac{1250}{431}\right)\right]^2+4\cdot 12}}{2}=2\cos\left(\frac{1250}{431}\right)+2\sqrt{\left[\cos\left(\frac{1250}{431}\right)\right]^2+3}\approx 2.03cm$$

Answer: $b=2\cos\left(\frac{1250}{431}\right)+2\sqrt{\left[\cos\left(\frac{1250}{431}\right)\right]^2+3}\approx 2.03cm$