3-3.2-31

EE24BTECH11064 - Harshil Rathan

Question:

A triangle ABC can be constructed $\angle B = 60°$, $\angle C = 45°$ and $AB + BC + CA = 12$cm.

Solution:

Find $\angle A$

Values	Given
K	$\frac{48}{\sqrt{6}+2\sqrt{2}+2\sqrt{3}}$
$\angle B$	$60°$
$\angle C$	$45°$
$AB + BC + CA$	12

$$\angle A + \angle B + \angle C = 180° \tag{0.1}$$

$$\angle A = 75° \tag{0.2}$$

Applying law of Sines,

$$\frac{AB}{\sin 75°} + \frac{BC}{\sin 60°} + \frac{CA}{\sin 45°} = K \tag{0.3}$$

It is given that

$$AB + BC + CA = 12 \tag{0.4}$$

$$AB = K \sin 75° \tag{0.5}$$

$$BC = K \sin 60° \tag{0.6}$$

$$CA = K \sin 45° \tag{0.7}$$

$$K(\frac{\sqrt{6} + \sqrt{2}}{4}) + K(\frac{\sqrt{3}}{2}) + K(\frac{1}{\sqrt{2}}) = 12 \tag{0.8}$$

$$K = \frac{48}{\sqrt{6} + 2\sqrt{2} + 2\sqrt{3}} \tag{0.9}$$

Possible values of AB BC CA are, 0.5 0.6 0.7

$$AB = \frac{48}{\sqrt{6} + 2\sqrt{2} + 2\sqrt{3}}(\frac{\sqrt{6} + \sqrt{2}}{4}) \tag{0.10}$$

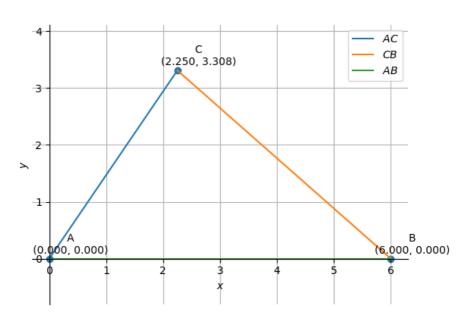$$BC = \frac{48}{\sqrt{6} + 2\sqrt{2} + 2\sqrt{3}}(\frac{\sqrt{3}}{2})^2 \tag{0.11}$$

$$CA = \frac{48}{\sqrt{6} + 2\sqrt{2} + 2\sqrt{3}}(\frac{1}{\sqrt{2}}) \tag{0.12}$$

Fig. 0.1