3-3.2-15

AI24BTECH11012 - Pushkar Gudla

Question: The construction of a $\triangle ABC$, given that $BC = 6cm, \angle B = 45°$ is not possible when difference of AB and AC is equal to

1) $6.9cm$
2) $5.2cm$
3) $5.0cm$
4) $4.0cm$

Solution: Using the cosine formula in $\triangle ABC$,

Variable	Description
a	Length of side $BC = 6cm$
b	Length of side AC
c	Length of side AB
k	$k = b - c$
$\angle B$	$45°$

TABLE 4: Variables and given data

$$b^2 = a^2 + c^2 - 2ac\cos B \tag{4.1}$$

$$(k + c)^2 = a^2 + c^2 - 2ac\cos B \tag{4.2}$$

$$\implies c = \frac{a^2 - k^2}{2\left(k + a\cos B\right)} \tag{4.3}$$

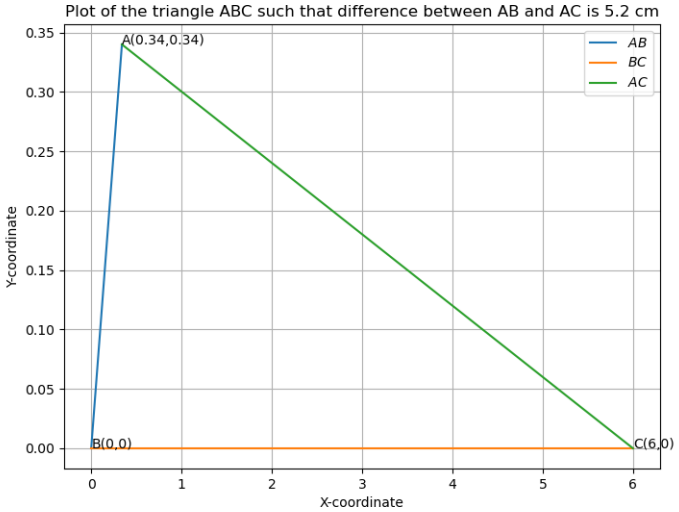
$$a = 6cm \tag{4.4}$$

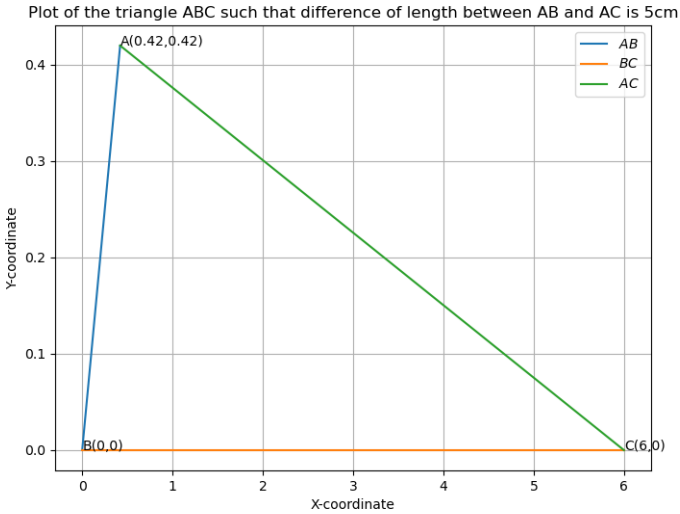
$$\angle B = 45° \tag{4.5}$$

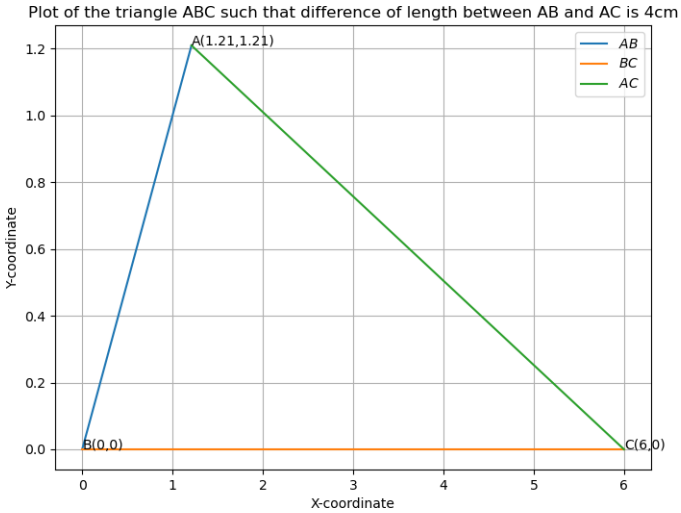
$$c = \frac{36 - k^2}{2\left(k + 3\sqrt{2}\right)} \tag{4.6}$$

$$\tag{4.7}$$

Therefore, $k \leq 6cm$.


Plot of the triangle ABC such that difference between AB and AC is 5.2 cm
A(0.34,0.34)
B(0,0)
C(6,0)
AB
BC
AC
Y-coordinate
X-coordinate
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
1
2
3
4
5
6


Plot of the triangle ABC such that difference of length between AB and AC is 5cm
A(0.42,0.42)
B(0,0)
C(6,0)
AB
BC
AC
Y-coordinate
X-coordinate
0.4
0.3
0.2
0.1
0.0
0
1
2
3
4
5
6


Plot of the triangle ABC such that difference of length between AB and AC is 4cm
A(1.21,1.21)
B(0,0)
C(6,0)
AB
BC
AC
Y-coordinate
X-coordinate
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
1
2
3
4
5
6