Assignment 1

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Download all python codes from

https://github.com/Atlakeerthana/Assignment1/blob/main/Assignment1/assignment1.py

and latex-tikz codes from

https://github.com/Atlakeerthana/Assignment1/blob/main/Assignment1/main.tex

1 Question No. 2.5

Draw a $\triangle ABC$ with side $a = 7\text{cm}$, $\angle B = 45^\circ$, $\angle A = 105^\circ$.

2 Explanation

Given,

$$\angle A = 105^\circ, \angle B = 45^\circ and \text{a} = 7 \tag{2.0.1}$$

we first need to find $\angle C$:
Finding $\angle C$
In $\triangle ABC$,

$$\angle A + \angle B + \angle C = 180^\circ \tag{2.0.2}$$
$$105^\circ + 45^\circ + \angle C = 180^\circ \tag{2.0.3}$$
$$150^\circ + \angle C = 180^\circ \tag{2.0.4}$$
$$\angle C = 180^\circ - 150^\circ \tag{2.0.5}$$
$$\angle C = 30^\circ \tag{2.0.6}$$

By law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \tag{2.0.7}$$
$$\frac{\sin 105^\circ}{7} = \frac{\sin 45^\circ}{b} = \frac{\sin 30^\circ}{c} \tag{2.0.8}$$

we have:

$$\frac{\sin 105^\circ}{7} = \frac{\sin 45^\circ}{b} \tag{2.0.9}$$
$$b\sin 105^\circ = 7\sin 45^\circ \tag{2.0.10}$$
$$b = \frac{7\sin 45^\circ}{\sin 105^\circ} \tag{2.0.11}$$
$$b = 5.12 \tag{2.0.12}$$

similarly,

$$\frac{\sin 105^\circ}{7} = \frac{\sin 30^\circ}{c} \tag{2.0.13}$$
$$c\sin 105^\circ = 7\sin 30^\circ \tag{2.0.14}$$
$$c = \frac{7\sin 30^\circ}{\sin 105^\circ} \tag{2.0.15}$$
$$c = 3.62 \tag{2.0.16}$$

we get values :

$$\implies a = 7; \tag{2.0.17}$$
$$\implies b = 5.12; \tag{2.0.18}$$
$$\implies c = 3.62; \tag{2.0.19}$$

Now, vertices of given $\triangle ABC$ can be written as,

$$\mathbf{A} = \begin{pmatrix} 0 \\ c \end{pmatrix} = \begin{pmatrix} 0 \\ 3.62 \end{pmatrix} \tag{2.0.20}$$
$$\mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{2.0.21}$$
$$\mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix} = \begin{pmatrix} 7 \\ 0 \end{pmatrix} \tag{2.0.22}$$

Now,$\triangle ABC$ can be plotted using vertices a ,b and c
Plot of the angle $\triangle ABC$:

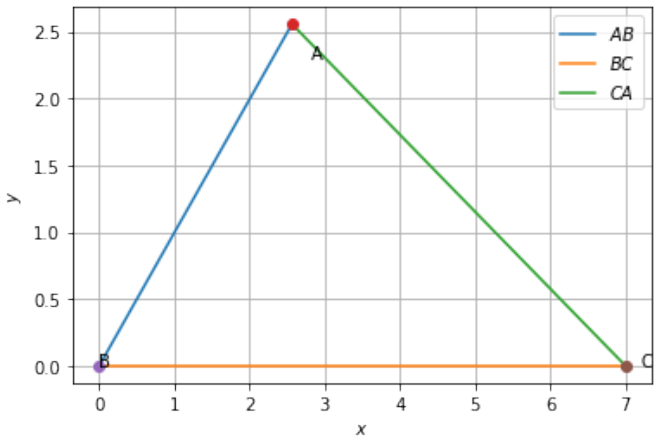

Fig. 2.1: $\triangle ABC$