Assignment 1

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1 Question No. 2.20

Draw a $\triangle ABC$ with side $\angle B = 30^{\circ}$, $\angle A = 60^{\circ}$, AB= 5.8.

2 Explanation

Given,

$$\angle A = 60^{\circ}, \angle B = 30^{\circ} \, and \, \text{AB} = 7 \tag{2.0.1}$$

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

$$\angle A + \angle B + \angle C = 180^{\circ} \tag{2.0.2}$$

$$60^{\circ} + 30^{\circ} + \angle C = 180^{\circ} \tag{2.0.3}$$

$$90^{\circ} + \angle C = 180^{\circ} \tag{2.0.4}$$

$$\angle C = 180^{\circ} - 90^{\circ} \tag{2.0.5}$$

$$\angle C = 90^{\circ} \tag{2.0.6}$$

By law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \tag{2.0.7}$$

$$\frac{\sin 60^{\circ}}{a} = \frac{\sin 30^{\circ}}{b} = \frac{\sin 90^{\circ}}{5.8} \tag{2.0.8}$$

we have:

$$\frac{\sin 30^{\circ}}{b} = \frac{\sin 90^{\circ}}{5.8} \tag{2.0.9}$$

$$b \cdot \sin 90^{\circ} = 5.8 \cdot \sin 30^{\circ} \tag{2.0.10}$$

$$b = \frac{5.8 \cdot \sin 30^{\circ}}{\sin 90^{\circ}} \tag{2.0.11}$$

$$b = 2.9 \tag{2.0.12}$$

similarly,

$$\frac{\sin 60^{\circ}}{a} = \frac{\sin 30^{\circ}}{b} \tag{2.0.13}$$

$$a \cdot \sin 30^{\circ} = 2.9 \cdot \sin 60^{\circ} \tag{2.0.14}$$

$$a = \frac{2.9 \cdot \sin 60^{\circ}}{\sin 30^{\circ}} \tag{2.0.15}$$

$$a = 5.02294 \tag{2.0.16}$$

we get values :

$$\implies a = 5.02294; \tag{2.0.17}$$

$$\implies b = 2.9; \tag{2.0.18}$$

$$\implies c = 5.8; \tag{2.0.19}$$

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

$$\mathbf{A} = \begin{pmatrix} 0 \\ c \end{pmatrix} = \begin{pmatrix} 0 \\ 5.8 \end{pmatrix} \tag{2.0.20}$$

$$\mathbf{B} = \begin{pmatrix} a \\ 0 \end{pmatrix} = \begin{pmatrix} 5.02294 \\ 0 \end{pmatrix} \tag{2.0.21}$$

$$\mathbf{C} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{2.0.22}$$

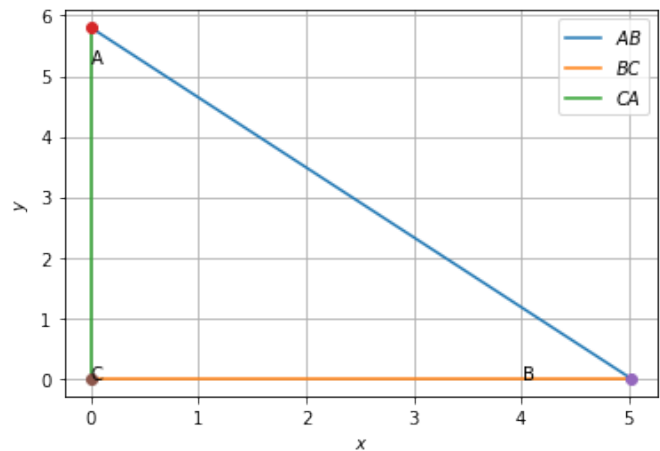Now,$\triangle ABC$ can be plotted using vertices a ,b and c
Plot of the angle $\triangle ABC$:

Fig. 2.1: $\triangle ABC$