Assignment-4

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***Abstract*—This document contains the procedure to find value of** $\sin 60°$**.**

Download the python code from

https://github.com/ankuraditya13/EE5609–Assignment4

and latex-file codes from

https://github.com/ankuraditya13/EE5609–Assignment4

1 Problem

Show that $\sin 60° = \frac{\sqrt{3}}{2}$.

2 Solution

Consider an equilateral triangle **ABC**, and let the mid point of side BC as D. Since $\triangle$**ABC** is an equilateral, all of its angles are 60° and the line AD bisects angle A into two 30°. Hence $\triangle$**ACD** is a right-angled triangle, with $\angle 60°$ at B.

$$\because AB = BC \tag{2.0.1}$$

$$\because BC = 2BD \tag{2.0.2}$$

$$\therefore AB = 2BD \tag{2.0.3}$$

Hence, by Pythagoras theorem we get,

$$AB^2 = AD^2 + BD^2 \tag{2.0.4}$$

$$\implies (2BD)^2 = AD^2 + BD^2 \tag{2.0.5}$$

$$\implies 4BD^2 = AD^2 + BD^2 \tag{2.0.6}$$

$$\implies 3BD^2 = AD^2 \tag{2.0.7}$$

$$\therefore AD = \sqrt{3}BD \tag{2.0.8}$$

Now from the figure 0,

$$\sin 60° = \frac{AD}{AB} \tag{2.0.9}$$

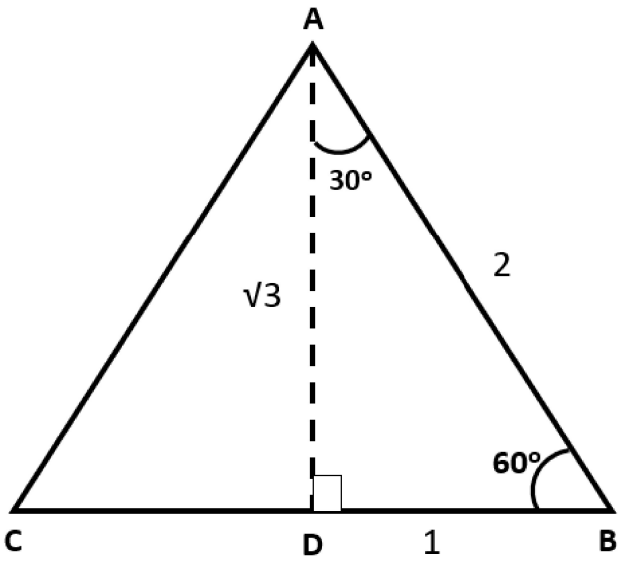

Fig. 0: Equilateral Triangle

Substituting the values of AD and AB from equations (2.0.3) and (2.0.8) we get,

$$\implies \sin 60° = \frac{\sqrt{3}BD}{2BD} \tag{2.0.10}$$

$$\implies \sin 60° = \frac{\sqrt{3}}{2}. \tag{2.0.11}$$