Sine and Cosine Formulae and their Applications Ex-10.1 Q26

Let $\sin A = ak, \sin B = bk, \sin C = ck$

$\sin^2 A + \sin^2 B = \sin^2 C$

$\Rightarrow k^2a^2 + k^2b^2 = k^2c^2$[Using sine rule]

$\Rightarrow a^2 + b^2 = c^2$

Since the triangle satisfies the Pythagoras theorem, therefore it is right angled.

Sine and Cosine Formulae and their Applications Ex-10.1 Q27

a^2, b^2, c^2 are in A.P.

$\Rightarrow -2a^2, -2b^2, -2c^2$ are in A.P.

$\Rightarrow (a^2 + b^2 + c^2) - 2a^2, (a^2 + b^2 + c^2) - 2b^2, (a^2 + b^2 + c^2) - 2c^2$ are in A.P.

$\Rightarrow (b^2 + c^2 - a^2), (c^2 + a^2 - b^2), (b^2 + a^2 - c^2)$ are in A.P.

$$\Rightarrow \frac{(b^2 + c^2 - a^2)}{2abc}, \frac{(c^2 + a^2 - b^2)}{2abc}, \frac{(b^2 + a^2 - c^2)}{2abc} \text{ are in A.P.}$$

$$\Rightarrow \frac{1}{a}\frac{(b^2 + c^2 - a^2)}{2bc}, \frac{1}{b}\frac{(c^2 + a^2 - b^2)}{2ac}, \frac{1}{c}\frac{(b^2 + a^2 - c^2)}{2ab} \text{ are in A.P.}$$

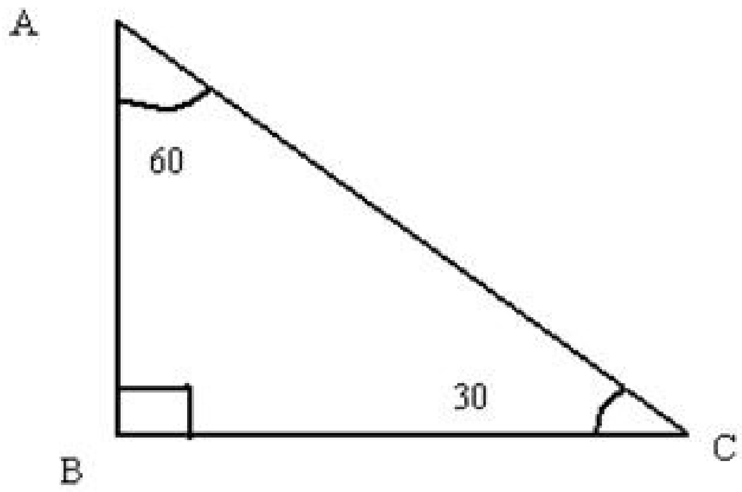
$$\Rightarrow \frac{1}{a}\cos A, \frac{1}{b}\cos B, \frac{1}{c}\cos C \text{ are in A.P.}$$

$$\Rightarrow \frac{k}{a}\cos A, \frac{k}{b}\cos B, \frac{k}{c}\cos C \text{ are in A.P.}$$

$$\Rightarrow \frac{\cos A}{\sin A}, \frac{\cos B}{\sin B}, \frac{\cos C}{\sin C} \text{ are in A.P.}$$

$\Rightarrow \cot A, \cot B, \cot C$ are in A.P.

Sine and Cosine Formulae and their Applications Ex-10.1 Q28



BC=15m,AB=h

From the diagram we can calculate, $\angle A = 60°$

Using sine rule,

$$\frac{\sin A}{15} = \frac{\sin C}{h}$$

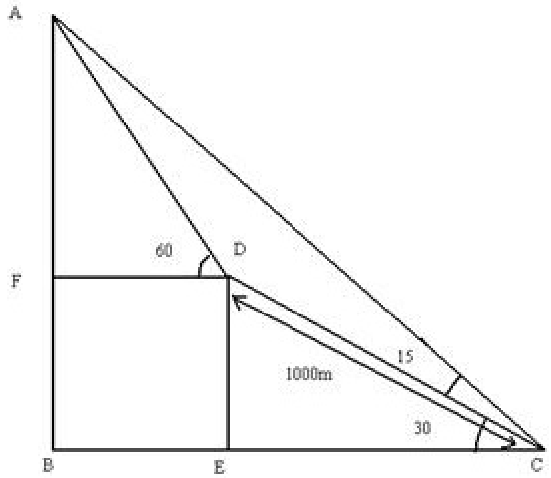
$$\Rightarrow \frac{\sin 60}{15} = \frac{\sin 30}{h}$$

$$\Rightarrow \frac{\sqrt{3}}{2 \times 15} = \frac{1}{2 \times h}$$

$$\Rightarrow \frac{\sqrt{3}}{15} = \frac{1}{h}$$

$$\Rightarrow h = \frac{15}{\sqrt{3}} \Rightarrow h = 5\sqrt{3}$$

Sine and Cosine Formulae and their Applications Ex-10.1 Q29



$$DE = 1000\sin 30 = 1000\times\frac{1}{2} = 500m = FB$$

$$EC = 1000\cos 30 = 1000\times\frac{\sqrt{3}}{2} = 500\sqrt{3}m$$

Let $AF = x\ m$

$$DF = \frac{x}{\sqrt{3}}m = BE$$

We know,

From ΔABC,

$$\tan 45 = \frac{AB}{BC}$$

$$\Rightarrow 1 = \frac{AF + FB}{BE + EC}$$

$$\Rightarrow 1 = \frac{x + 500}{\frac{x}{\sqrt{3}} + 500\sqrt{3}}$$

$$\Rightarrow \frac{x}{\sqrt{3}} + 500\sqrt{3} = x + 500$$

$$\Rightarrow x + 1500 = x\sqrt{3} + 500\sqrt{3}$$

$$\Rightarrow 1500 - 500\sqrt{3} = x\sqrt{3} - x$$

$$\Rightarrow 500\sqrt{3}(\sqrt{3} - 1) = x(\sqrt{3} - 1)$$

$$\therefore x = 500\sqrt{3}m$$

The height of the triangle is $AB = AF + FB = 500(\sqrt{3} + 1)m$

*********** END **********