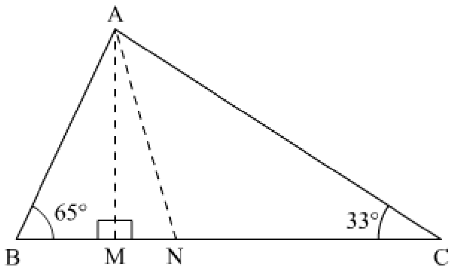
Triangles and Its Angles Ex 9.2 Q8

Answer :

In the given ΔABC, $AM \perp BC$, AN is the bisector of $\angle A$, $\angle B = 65^\circ$ and $\angle C = 33^\circ$

We need to find $\angle MAN$



Now, using the angle sum property of the triangle

In ΔAMC, we get,

$$\angle MAC + \angle AMC + \angle ACM = 180^\circ$$
$$\angle MAC + 90^\circ + 33^\circ = 180^\circ$$
$$\angle MAC + 123^\circ = 180^\circ$$
$$\angle MAC = 180^\circ - 123^\circ$$

$\angle MAC = 57^\circ$ ....(1)

Similarly,

In ΔABM, we get,

$$\angle ABM + \angle AMB + \angle BAM = 180^\circ$$
$$\angle BAM + 90^\circ + 65^\circ = 180^\circ$$
$$\angle BAM + 155^\circ = 180^\circ$$
$$\angle BAM = 180^\circ - 155^\circ$$

$\angle BAM = 25^\circ$ .....(2)

So, adding (1) and (2)

$$\angle BAM + \angle MAC = 25^\circ + 57^\circ$$
$$\angle BAM + \angle MAC = 82^\circ$$

Now, since AN is the bisector of $\angle A$

$$\angle BAN = \angle NAC$$

Thus,

$$\angle BAN + \angle NAC = 82^\circ$$
$$2\angle BAN = 82^\circ$$
$$\angle BAN = \frac{82^\circ}{2}$$
$$= 41^\circ$$

Now,

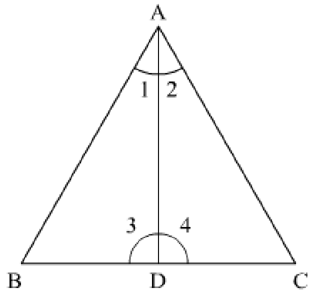
$$\angle MAN = \angle BAN - \angle BAM$$
$$= 41^\circ - 25^\circ$$
$$= 16^\circ$$

Therefore, $\boxed{\angle MAN = 16^\circ}$.

Triangles and Its Angles Ex 9.2 Q9

Answer :

In the given ΔABC, AD bisects $\angle A$ and $\angle C > \angle B$. We need to prove $\angle ADB > \angle ADC$.



Let,

$\angle BAD = \angle 1$
$\angle DAC = \angle 2$
$\angle ADB = \angle 3$
$\angle ADC = \angle 4$

Also,

As AD bisects $\angle A$,

$\angle 1 = \angle 2$ .....(1)

Now, in ΔABD, using exterior angle theorem, we get,

$$\angle 4 = \angle B + \angle 1$$

Similarly,

$$\angle 3 = \angle 2 + \angle C$$

$$\angle 3 = \angle 1 + \angle C \quad \text{[using (1)]}$$

Further, it is given,

$$\angle C > \angle B$$

Adding $\angle 1$ to both the sides

$$\angle C + \angle 1 > \angle B + \angle 1$$

$$\angle 3 > \angle 4$$

Thus, $\boxed{\angle 3 > \angle 4}$

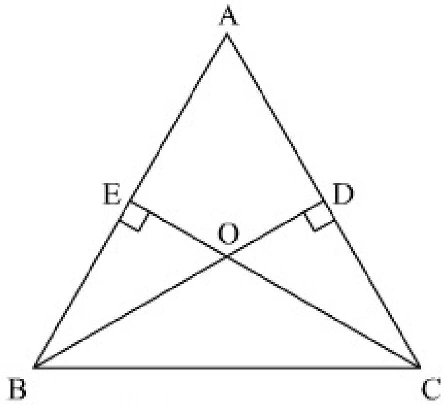
Hence proved.

Triangles and Its Angles Ex 9.2 Q10

Answer :

In the given ΔABC, $BD \perp AC$ and $CE \perp AB$.

We need prove $\angle BOC = 180^\circ - \angle A$



Here, in ΔBDC, using the exterior angle theorem, we get,

$$\angle BDA = \angle DBC + \angle DCB$$

$$90^\circ = \angle DBC + \angle DCB \quad \text{.........(1)}$$

Similarly, in ΔEBC, we get,

$$\angle AEC = \angle EBC + \angle ECB$$

$$90^\circ = \angle EBC + \angle ECB \quad \text{.........(2)}$$

Adding (1) and (2), we get,

$$90^\circ + 90^\circ = \angle DBC + \angle DCB + \angle EBC + \angle ECB$$

$$180^\circ = (\angle DCB + \angle EBC) + (\angle DBC + \angle ECB) \quad \text{.........(3)}$$

Now, on using angle sum property,

In ΔABC, we get,

$$\angle BAC + \angle ABC + \angle ACB = 180^\circ$$

$$\angle ABC + \angle ACB = 180^\circ - \angle BAC$$

This can be written as,

$$\angle EBC + \angle DCB = 180^\circ - \angle A \quad \text{........(4)}$$

Similarly, using angle sum property in ΔOBC, we get,

$$\angle BOC + \angle OBC + \angle OCB = 180^\circ$$

$$\angle OBC + \angle OCB = 180^\circ - \angle BOC$$

This can be written as,

$$\angle DBC + \angle ECB = 180^\circ - \angle BOC \quad \text{........(5)}$$

Now, using the values of (4) and (5) in (3), we get,

$$180^\circ = 180^\circ - \angle A + 180^\circ - \angle BOC$$

$$180^\circ = 360^\circ - \angle A - \angle BOC$$

$$\angle BOC = 360^\circ - 180^\circ - \angle A$$

$$\angle BOC = 180^\circ - \angle A$$

Therefore, $\boxed{\angle BOC = 180^\circ - \angle A}$.

Hence proved

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