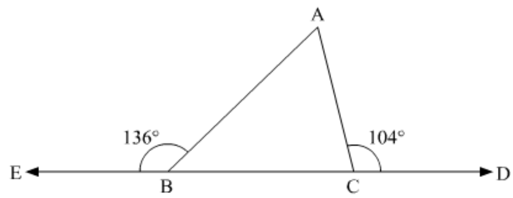
Triangles and Its Angles Ex 9.2 Q1

Answer :

In the given problem, the exterior angles obtained on producing the base of a triangle both ways are 104° and 136°. So, let us draw ΔABC and extend the base BC, such that:

$\angle ACD = 104^\circ$

$\angle ABE = 136^\circ$



Here, we need to find all the three angles of the triangle.

Now, since BCD is a straight line, using the property, "angles forming a linear pair are supplementary", we get

$$\angle ACB + \angle ACD = 180^\circ$$
$$\angle ACB + 104^\circ = 180^\circ$$
$$\angle ACB = 180^\circ - 104^\circ$$
$$\angle ACB = 76^\circ$$

Similarly, EBC is a straight line, so we get,

$$\angle ABC + \angle ABE = 180^\circ$$
$$\angle ABC + 136^\circ = 180^\circ$$
$$\angle ABC = 44^\circ$$

Further, using angle sum property in ΔABC

$$\angle ABC + \angle ACB + \angle BAC = 180^\circ$$
$$44^\circ + 76^\circ + \angle BAC = 180^\circ$$
$$\angle BAC = 180^\circ - 120^\circ$$
$$\angle BAC = 60^\circ$$

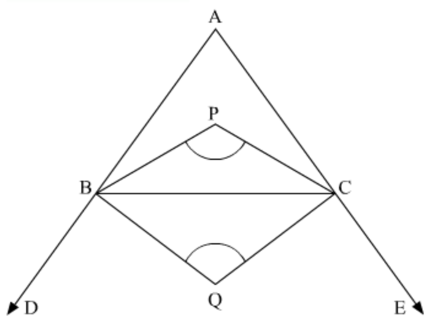
Therefore, $\boxed{\angle ACB = 76^\circ, \angle BAC = 60^\circ, \angle ABC = 44^\circ}$.

Triangles and Its Angles Ex 9.2 Q2

Answer :

In the given problem, BP and CP are the internal bisectors of $\angle B$ and $\angle C$ respectively. Also, BQ and CQ are the external bisectors of $\angle B$ and $\angle C$ respectively. Here, we need to prove:

$\angle BPC + \angle BQC = 180^\circ$



We know that if the bisectors of angles $\angle ABC$ and $\angle ACB$ of ΔABC meet at a point O then

We know that if the bisectors of angles $\angle ABC$ and $\angle ACB$ of ΔABC meet at a point O then $\angle BOC = 90^{\circ} + \frac{1}{2}\angle A$.

Thus, in ΔABC

$\angle BPC = 90^{\circ} + \frac{1}{2}\angle A$ ......(1)

Also, using the theorem, "if the sides AB and AC of a ΔABC are produced, and the external bisectors of $\angle B$ and $\angle C$ meet at O, then $\angle BOC = 90^{\circ} - \frac{1}{2}\angle A$".

Thus, ΔABC

$\angle BQC = 90^{\circ} - \frac{1}{2}\angle A$ ......(2)

Adding (1) and (2), we get

$$\angle BQC + \angle BQC = 90^{\circ} + \frac{1}{2}\angle A + 90^{\circ} - \frac{1}{2}\angle A$$

$$\angle BQC + \angle BQC = 180^{\circ}$$

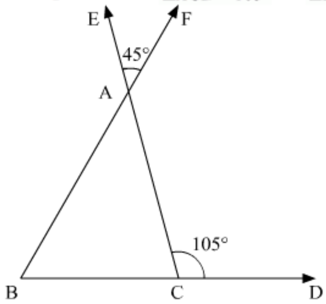
Thus, $\boxed{\angle BQC + \angle BQC = 180^{\circ}}$

Hence proved.

Triangles and Its Angles Ex 9.2 Q3

Answer :

In the given ΔABC, $\angle ACD = 105^{\circ}$ and $\angle EAF = 45^{\circ}$. We need to find $\angle ABC, \angle ACB$ and $\angle BAC$.



Here, $\angle EAF$ and $\angle BAC$ are vertically opposite angles. So, using the property, "vertically opposite angles are equal", we get,

$$\angle EAF = \angle BAC$$

$$\angle BAC = 45^{\circ}$$

Further, BCD is a straight line. So, using linear pair property, we get,

$$\angle ACB + \angle ACD = 180^{\circ}$$
$$\angle ACB + 105^{\circ} = 180^{\circ}$$
$$\angle ACB = 180^{\circ} - 105^{\circ}$$
$$\angle ACB = 75^{\circ}$$

$$\angle ACB + \angle ACD = 180^{\circ}$$
$$\angle ACB + 105^{\circ} = 180^{\circ}$$
$$\angle ACB = 180^{\circ} - 105^{\circ}$$
$$\angle ACB = 75^{\circ}$$

Now, in ΔABC, using "the angle sum property", we get,

$$\angle ABC + \angle ACB + \angle BAC = 180^{\circ}$$
$$45^{\circ} + 75^{\circ} + \angle ABC = 180^{\circ}$$
$$\angle BAC = 180^{\circ} - 120^{\circ}$$
$$\angle BAC = 60^{\circ}$$

Therefore, $\boxed{\angle ACB = 75^{\circ}, \angle BAC = 45^{\circ}, \angle ABC = 60^{\circ}}$.

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