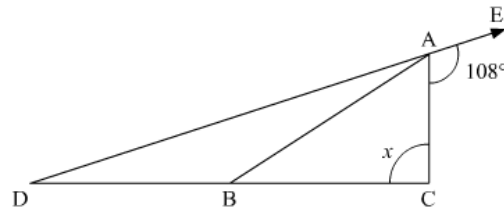Triangles and Its Angles Ex 9.2 Q5

Answer :

In the given figure, $\angle EAC = 108°$ and $DB = AB$

Since, $DB = AB$ and angles opposite to equal sides are equal. We get,

$\angle BDA = \angle BAD$ 1

Also, EAD is a straight line. So, using the property, "the angles forming a linear pair are supplementary", we get,

$\angle EAC + \angle DAC = 180°$

$\angle DAC + 108° = 180°$

$\angle DAC = 180° - 108°$

$\angle DAC = 72°$

Further, it is given AB divides $\angle DAC$ in the ratio 1 : 3.

So, let

$\angle DAB = y, \angle BAC = 3y$

Thus,

$y + 3y = \angle DAC$

$\Rightarrow 4y = 72°$

$\Rightarrow y = \frac{72°}{4}$

$\Rightarrow y = 18°$

Hence, $\angle DAB = 18°, \angle BAC = 3 \times 18° = 54°$

Using (1)

$\angle BDA = \angle DAB$

$\angle BDA = 18°$

Now, in $\triangle ABC$, using the property, "exterior angle of a triangle is equal to the sum of its two opposite interior angles", we get,

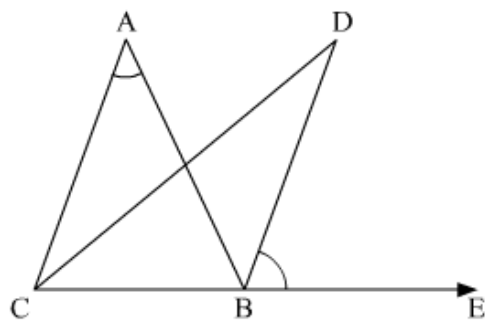$\angle EAC = \angle ADC + x$

$\Rightarrow 108° = 18° + x$

$\Rightarrow x = 90°$

Therefore, $\boxed{x = 90°}$.

Triangles and Its Angles Ex 9.2 Q6

Answer :

In the given $\triangle ABC$, the bisectors of $ext.\angle B$ and $\angle C$ intersect at D

We need to prove: $\angle D = \dfrac{1}{2}\angle A$

Now, using the exterior angle theorem,

$\angle ABE = \angle BAC + \angle ACB$ .....(1)

As $\angle ABE$ and $\angle ACB$ are bisected

$\angle DCB = \tfrac{1}{2}\angle ACB$

Also,

$\angle DBA = \tfrac{1}{2}\angle ABE$

Further, applying angle sum property of the triangle

In $\triangle DCB$

$\angle CDB + \angle DCB + \angle CBD = 180°$

$\Rightarrow \angle CDB + \tfrac{1}{2}\angle ACB + (\angle DBA + \angle ABC) = 180°$

$\angle CDB + \tfrac{1}{2}\angle ACB + \left(\tfrac{1}{2}\angle ABE + \angle ABC\right) = 180°$ .....(2)

Also, CBE is a straight line, So, using linear pair property

$\Rightarrow \angle ABC + \angle ABE = 180°$

$\Rightarrow \angle ABC + \tfrac{1}{2}\angle ABE + \tfrac{1}{2}\angle ABE = 180°$

$\Rightarrow \angle ABC + \tfrac{1}{2}\angle ABE = 180° - \tfrac{1}{2}\angle ABE$ .....(3)

So, using (3) in (2)

$\angle CDB + \tfrac{1}{2}\angle ACB + \left(180° - \tfrac{1}{2}\angle ABE\right) = 180°$

$\Rightarrow \angle CDB + \tfrac{1}{2}\angle ACB - \tfrac{1}{2}\angle ABE = 0$

$\Rightarrow \angle CDB = \tfrac{1}{2}(\angle ABE - \angle ACB)$

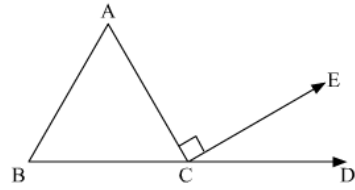$\Rightarrow \angle CDB = \tfrac{1}{2}\angle CAB$

$\Rightarrow \angle D = \tfrac{1}{2}\angle A$

Hence proved.

Triangles and Its Angles Ex 9.2 Q7

Answer :

In the given figure, $AC \perp CE$ and $\angle A : \angle B : \angle C = 3 : 2 : 1$. We need to find the value of $\angle ECD$

Since,

$\angle A : \angle B : \angle C = 3 : 2 : 1$

Let,

$\angle A = 3x$

$\angle B = 2x$

$\angle C = x$

Applying the angle sum property of the triangle, in $\triangle ABC$, we get,

$\angle A + \angle B + \angle C = 180°$

$3x + 2x + x = 180°$

$6x = 180°$

$x = \dfrac{180°}{6}$

$x = 30°$

Thus,

$\angle A = 3x = 3(30°) = 90°$

$\angle B = 2x = 2(30°) = 60°$

$\angle C = x = 30°$

Further, BCD is a straight line. So, applying the property, "the angles forming a linear pair are supplementary", we get,

$\angle C + \angle ACE + \angle ECD = 180°$

$\angle ECD + 30° + 90° = 180°$

$\angle ECD + 120° = 180°$

$\angle ECD = 180° - 120°$

$\angle ECD = 60°$

Therefore, $\boxed{\angle ECD = 60°}$.

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