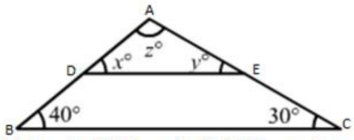
Properties of Triangles Ex 15.2 Q15

Answer :



(i) In $\triangle ABC$ and $\triangle ADE$, we have :

$\angle ADE = \angle ABC$ (corresponding angles)

$\Rightarrow \mathbf{x^\circ = 40^\circ}$

$\angle AED = \angle ACB$ (corresponding angles)

$\Rightarrow \mathbf{y^\circ = 30^\circ}$

We know that the sum of all the three angles of a triangle is equal to 180°.

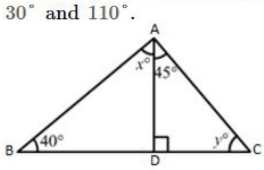
$\therefore$ $x^\circ + y^\circ + z^\circ = 180^\circ$ (Angles of $\triangle ADE$)

Which means : $40^\circ + 30^\circ + z^\circ = 180^\circ$

$\Rightarrow z^\circ = 180^\circ - 70^\circ$

$\Rightarrow \mathbf{z^\circ = 110^\circ}$

Therefore, we can conclude that the three angles of the given triangle are 40°, 30° and 110°.



(ii) We can see that in $\triangle ADC$, $\angle ADC$ is equal to 90°.

($\triangle ADC$ is a right triangle)

We also know that the sum of all the angles of a triangle is equal to 180°.

Which means : $45^\circ + 90^\circ + y^\circ = 180^\circ$ (Sum of the angles of $\triangle ADC$)

$\Rightarrow 135^\circ + y^\circ = 180^\circ$

$\Rightarrow y^\circ = 180^\circ - 135^\circ$

$\Rightarrow \mathbf{y^\circ = 45^\circ}$

We can also say that in $\triangle ABC$, $\angle ABC + \angle ACB + \angle BAC$ is equal to 180°.

(Sum of the angles of $\triangle ABC$)

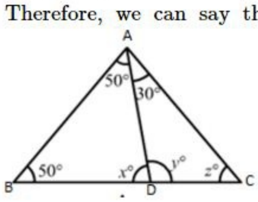
$\Rightarrow 40^\circ + y^\circ + (x^\circ + 45^\circ) = 180^\circ$

$\Rightarrow 40^\circ + 45^\circ + x^\circ + 45^\circ = 180^\circ \quad (\because y^\circ = 45^\circ)$

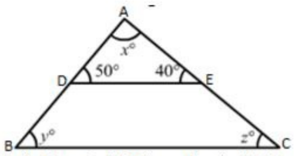
$\Rightarrow x^\circ = 180^\circ - 130^\circ$

$\Rightarrow \mathbf{x^\circ = 50^\circ}$

Therefore, we can say that the required angles are 45° and 50°.



(iii) We know that the sum of all the angles of a triangle is equal to 180°.
Therefore, for $\triangle$ ABD :
$\angle ABD + \angle ADB + \angle BAD = 180^\circ$ (Sum of the angles of $\triangle$ ABD)
$\Rightarrow 50^\circ + x^\circ + 50^\circ = 180^\circ$
$\Rightarrow 100^\circ + x^\circ = 180^\circ$
$\Rightarrow x^\circ = 180^\circ - 100^\circ$
$\Rightarrow \mathbf{x^\circ = 80^\circ}$
For $\triangle$ ABC :
$\angle ABC + \angle ACB + \angle BAC = 180^\circ$ (Sum of the angles of $\triangle$ ABC)
$\Rightarrow 50^\circ + z^\circ + (50^\circ + 30^\circ) = 180^\circ$
$\Rightarrow 50^\circ + z^\circ + 50^\circ + 30^\circ = 180^\circ$
$\Rightarrow z^\circ = 180^\circ - 130^\circ$
$\Rightarrow \mathbf{z^\circ = 50^\circ}$
Using the same argument for $\triangle$ ADC :
$\angle ADC + \angle ACD + \angle DAC = 180^\circ$ (Sum of angles of $\triangle$ ADC)
$\Rightarrow y^\circ + z^\circ + 30^\circ = 180^\circ$
$\Rightarrow y^\circ + 50^\circ + 30^\circ = 180^\circ \quad (\because z^\circ = 50^\circ)$
$\Rightarrow y^\circ = 180^\circ - 80^\circ$
$\Rightarrow \mathbf{y^\circ = 100^\circ}$
Therefore, we can conclude that the required angles are 80°, 50° and 100°.



(iv) In $\triangle$ ABC and $\triangle$ ADE :
$\angle ADE = \angle ABC$ (Corresponding angles)
$\Rightarrow \mathbf{y^\circ = 50^\circ}$
Also, $\angle AED = \angle ACB$ (Corresponding angles)
$\Rightarrow \mathbf{z^\circ = 40^\circ}$
We know that the sum of all the three angles of a triangle is equal to 180°.
Which means : $x^\circ + 50^\circ + 40^\circ = 180^\circ$ (Angles of $\triangle$ ADE)
$x^\circ = 180^\circ - 90^\circ$
$\Rightarrow \mathbf{x^\circ = 90^\circ}$
Therefore, we can conclude that the required angles are 50°, 40° and 90°.

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