CHAPTER 06

Lines and Angles

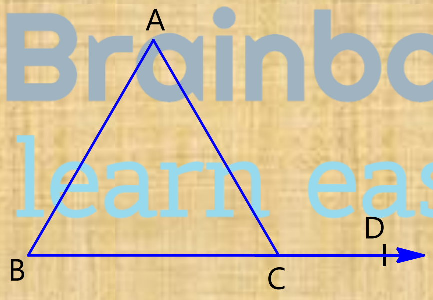
Exterior angle property of a triangle:

Theorem:

Statement:

If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of two interior opposite angles.

Given:



In ΔABC, side BC is extended to point 'D'.

$\angle ACD$ is an exterior angle.

To Prove:

$\angle ACD = \angle CAB + \angle ABC$

Proof:

$\angle ABC + \angle CAB + \angle BAC = 180^{o}$ .... (1)

(Angle sum property of triangle)

Also, $\angle BCA + \angle ACD = 180^o$ .... (ii) (Linear pair)

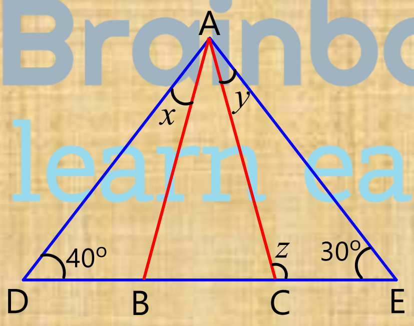
From (1) & (2), we get

$\angle ABC + \angle CAB + \angle BCA = \angle BCA + \angle ACD$

$\Rightarrow \quad \angle ACD = \angle ABC + \angle CAB$

Example:

In the diagram, alongside ABC is an equilateral triangle. Find x, y, z.



Sol.

Given, ΔABC is an equilateral triangle

$\therefore \quad \angle A = \angle B = \angle C = 60^o$

In ΔADB,

$\angle ABC = 40^o + x$ (Ext. angle = Sum of Int. opposite angle)

$\Rightarrow \quad 60^\circ = 40^\circ + x$

$\therefore \quad x = 20^\circ$

In ΔACE,

$\angle BCA = 30^\circ + y$ (Ext. angle = Sum of Int. opposite angle)

$\Rightarrow \quad 60^\circ = 30^\circ + y$

$\Rightarrow \quad y = 30^\circ$

$z = 180^\circ - 60^\circ$ (Linear pair)

$\Rightarrow \quad z = 120^\circ$

$\therefore \quad x = 20^\circ, y = 30^\circ, z = 120^\circ$