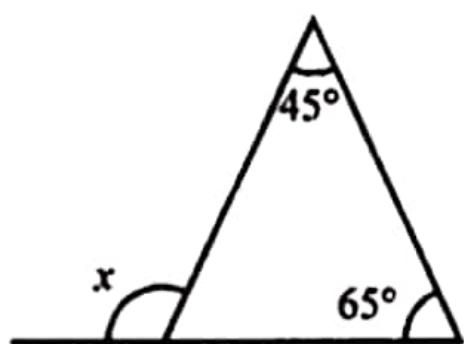


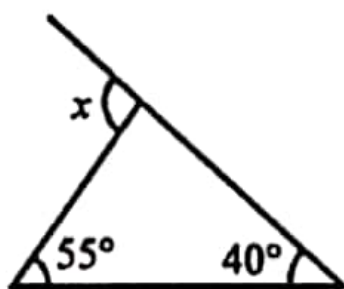
Chapter 11 Triangles and its Properties Ex 11.2

Question 1.

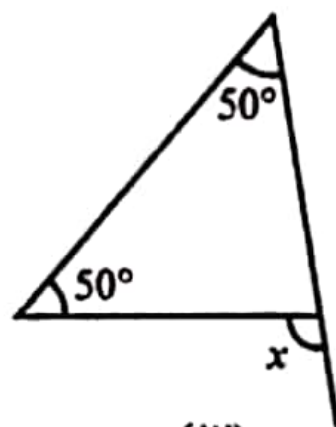
Find the value of the unknown exterior angle x in each of the following diagrams:



(i)



(ii)



(iii)

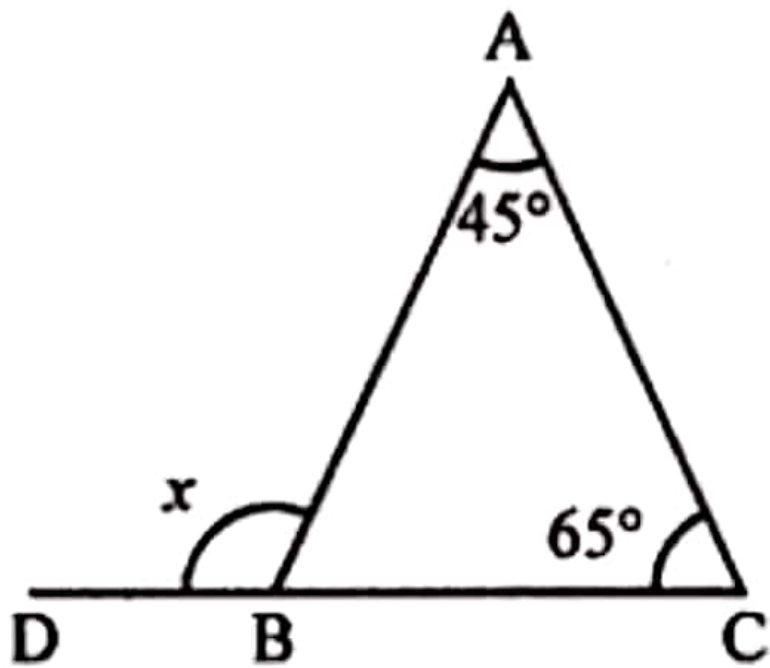
Solution:

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.

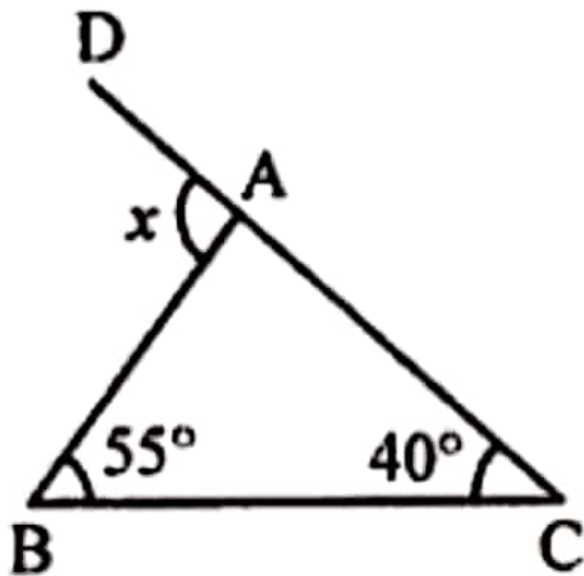
Therefore,

$$(i) \text{ Fxt. } \angle x = 45^\circ + 65^\circ = 110^\circ$$

(i) Ext. $\angle x = 45^\circ + 65^\circ = 110^\circ$

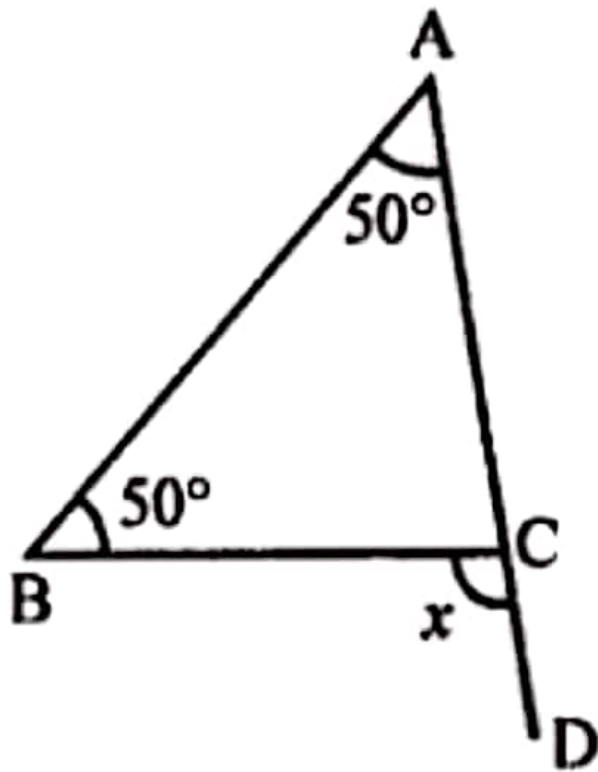


(ii) Ext. $\angle x = 55^\circ + 40^\circ = 95^\circ$



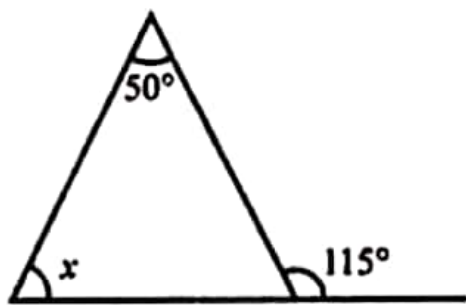
(iii) Ext. $\angle x = 50^\circ + 50^\circ = 100^\circ$

(iii) Ext. $\angle x = 50^\circ + 50^\circ = 100^\circ$

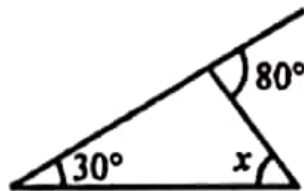


Question 2.

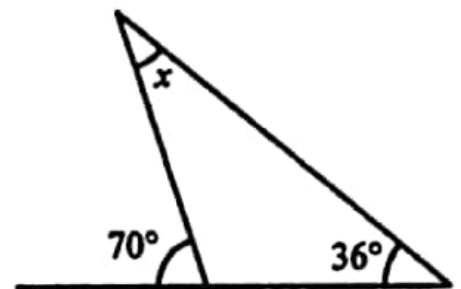
Find the value of the unknown interior angle x in each of the following diagrams:



(i)



(ii)



(iii)

Solution:

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.

Solution:

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.

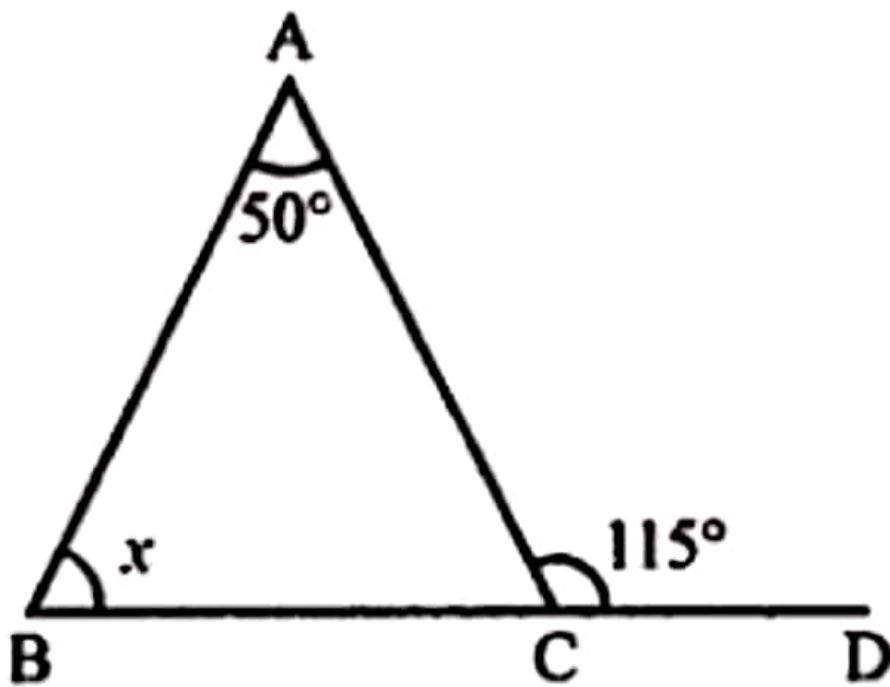
Therefore,

(i) In the given triangle,

$$\text{Ext. } \angle 115^\circ = x + 50^\circ$$

$$\Rightarrow x = 115^\circ - 50^\circ = 65^\circ$$

$$\Rightarrow x = 65^\circ$$

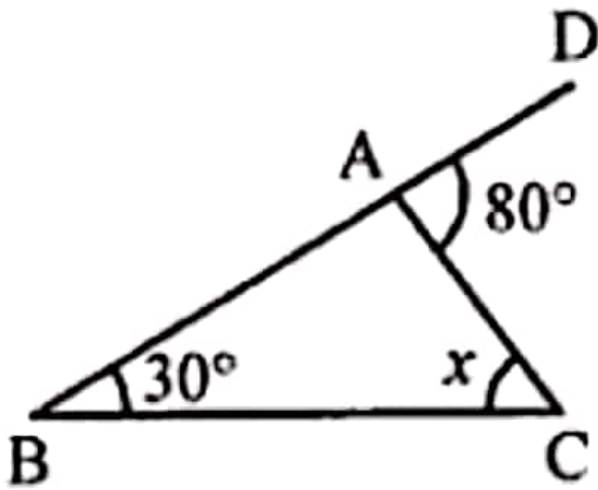


(ii) In given triangle,

$$\text{Ext. } \angle 80^\circ = 30^\circ + x$$

$$\Rightarrow x = 80^\circ - 30^\circ = 50^\circ$$

$$\Rightarrow x = 50^\circ$$

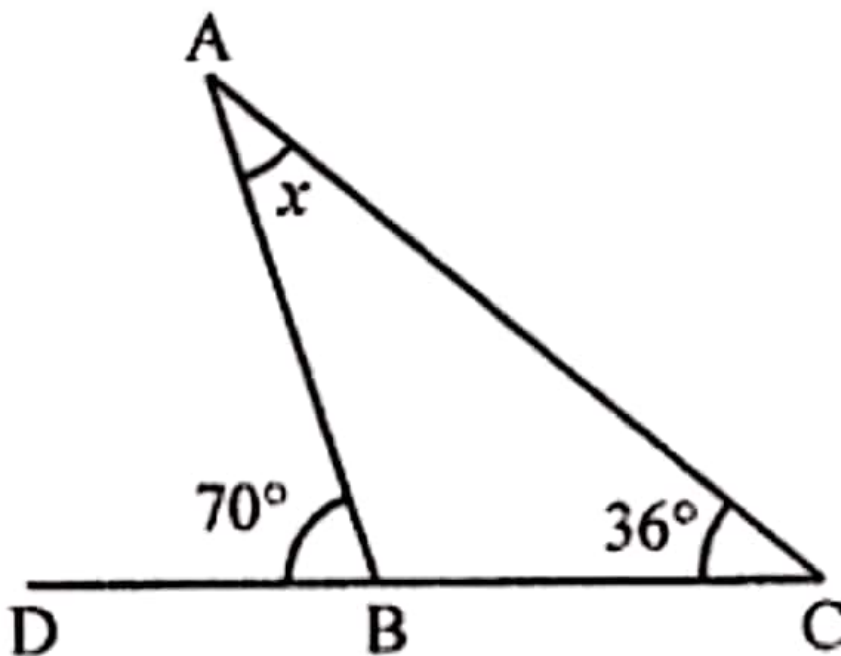


(iii) In given triangle,

$$\text{Ext. } \angle 70^\circ = x + 36^\circ$$

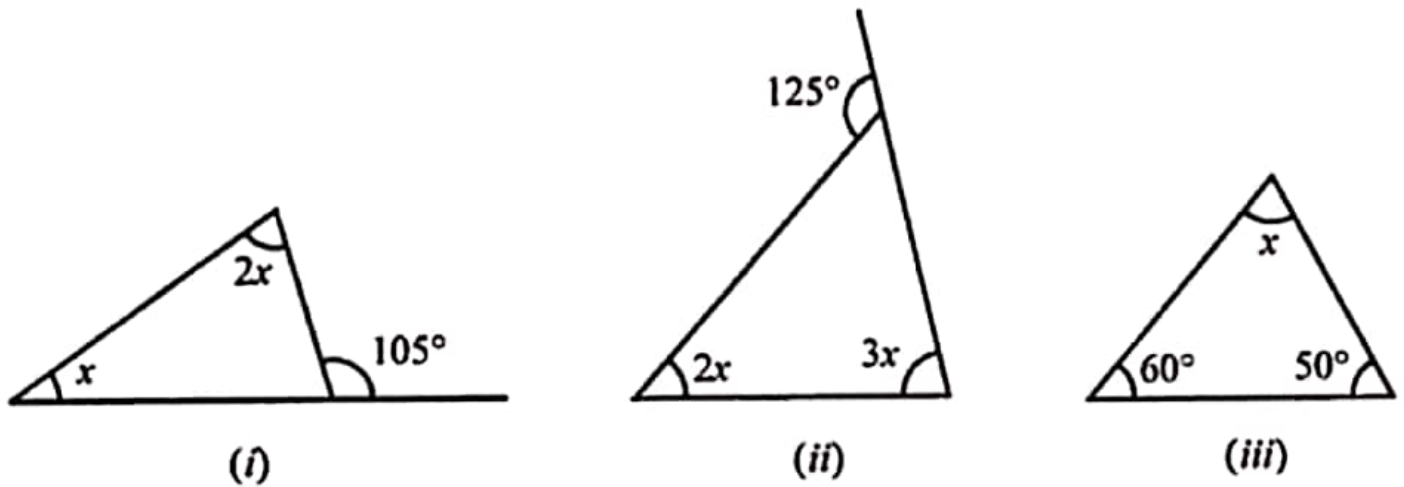
$$\Rightarrow x = 70^\circ - 36^\circ = 34^\circ$$

$$\Rightarrow x = 34^\circ$$



Question 3.

Find the value of x in each of the following diagrams:



Solution:

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles. Therefore,

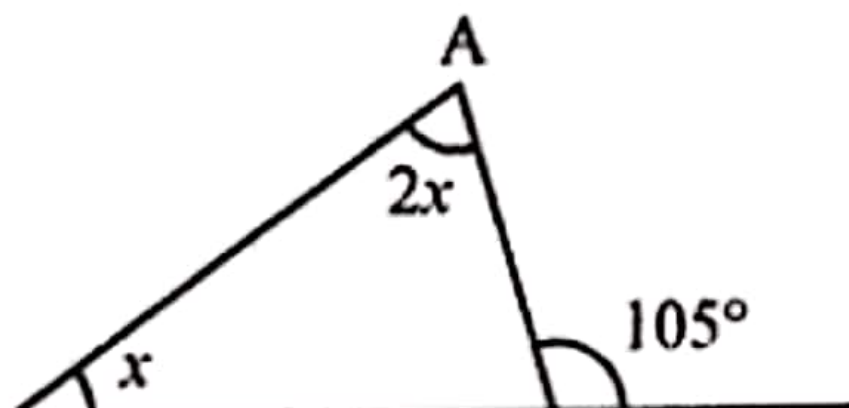
(i) In a given triangle,

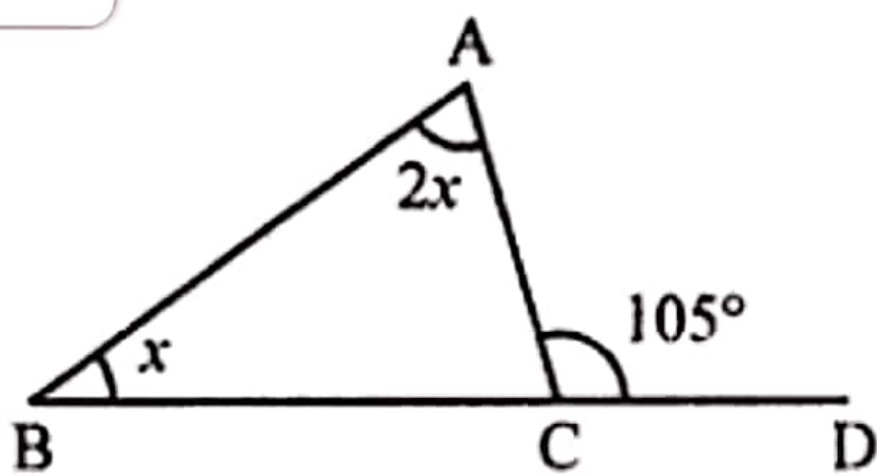
$$\text{Ext. } \angle 105^\circ = 2x + x$$

$$\Rightarrow 3x = 105^\circ$$

$$\Rightarrow x = 35^\circ$$

$$x = 35^\circ$$





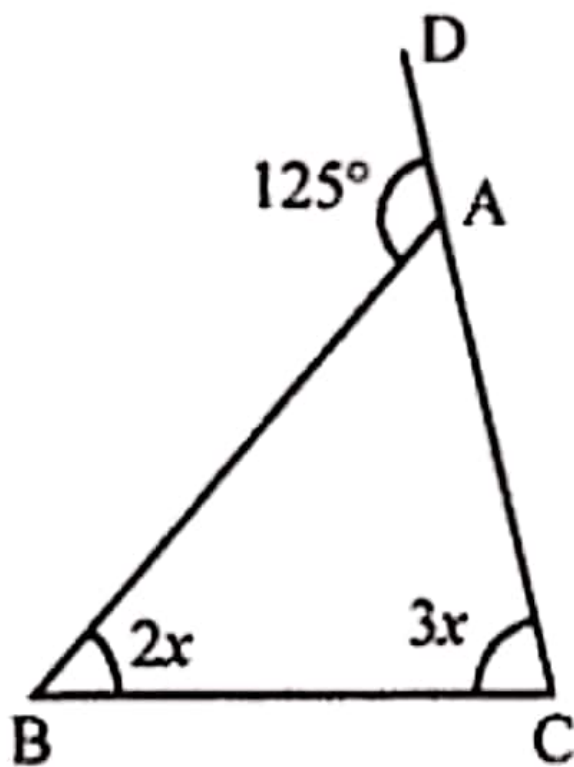
(ii) In given triangle,

$$\text{Ext. } \angle 125^\circ = 2x + 3x$$

$$\Rightarrow 5x = 125^\circ$$

$$\Rightarrow x = 25^\circ$$

$$x = 25^\circ$$



(iii) In given triangle,

$$\angle A + \angle B + \angle C = 180^\circ$$

(Sum of angles of a triangle)

(iii) In given triangle,

$$\angle A + \angle B + \angle C = 180^\circ$$

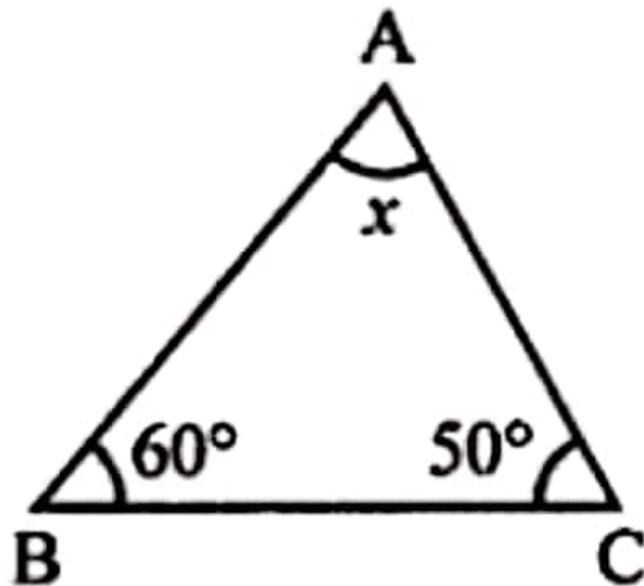
(Sum of angles of a triangle)

$$\Rightarrow x + 60^\circ + 50^\circ = 180^\circ$$

$$\Rightarrow x + 110^\circ = 180^\circ$$

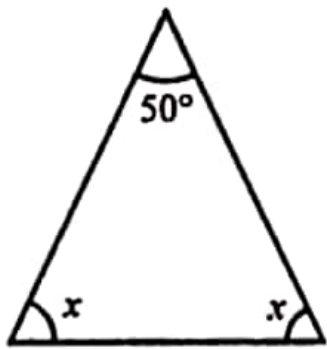
$$\Rightarrow x = 180^\circ - 110^\circ = 70^\circ$$

$$x = 70^\circ$$

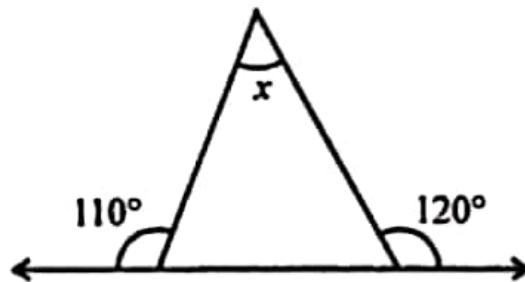


Question 4.

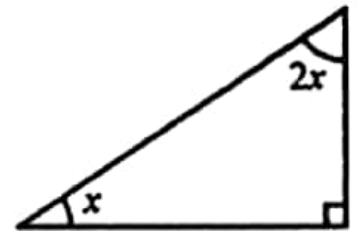
Find the value of unknown x in each of the following:



(i)



(ii)



(iii)

Solution:

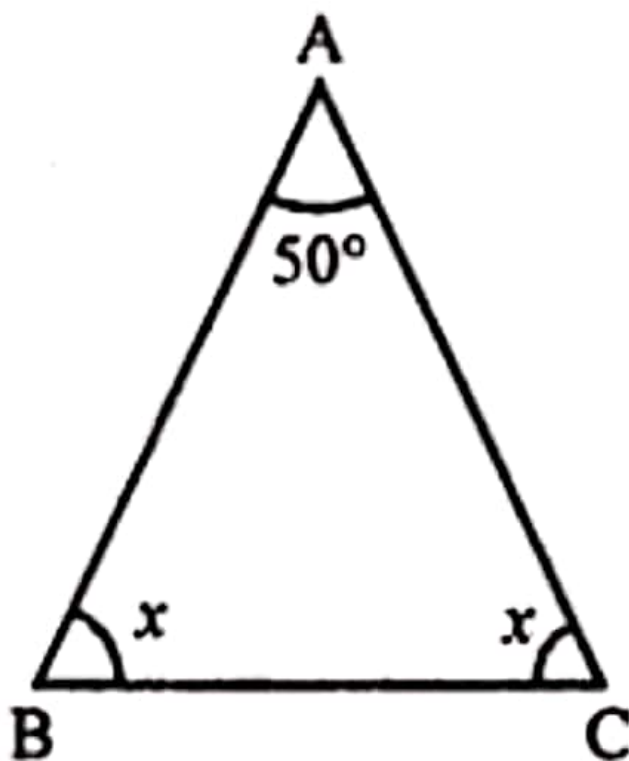
(i) In given triangle = Let $\triangle ABC$

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow 50^\circ + x + x = 180^\circ$$

$$\Rightarrow 2x = 180^\circ - 50^\circ = 130^\circ$$

Hence, $x = 65^\circ$



(ii) In the given figure,

Let the name of Δ be ABC

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

$$\Rightarrow \angle ABC + 110^\circ = 180^\circ$$

$$\Rightarrow \angle ABC = 180^\circ - 110^\circ = 70^\circ$$

Similarly,

$$\angle ACB + \angle ACD = 180^\circ$$

$$\Rightarrow \angle ACB + 120^\circ = 180^\circ$$

$$\Rightarrow \angle ACB = 180^\circ - 120^\circ = 60^\circ$$

Now in ΔABC

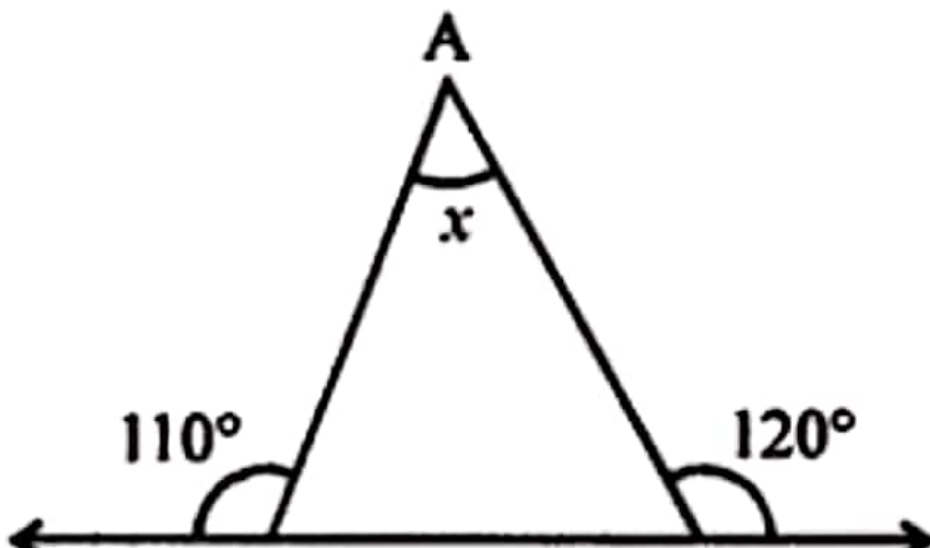
$$\angle BAC + \angle ABC + \angle ACB = 180^\circ$$

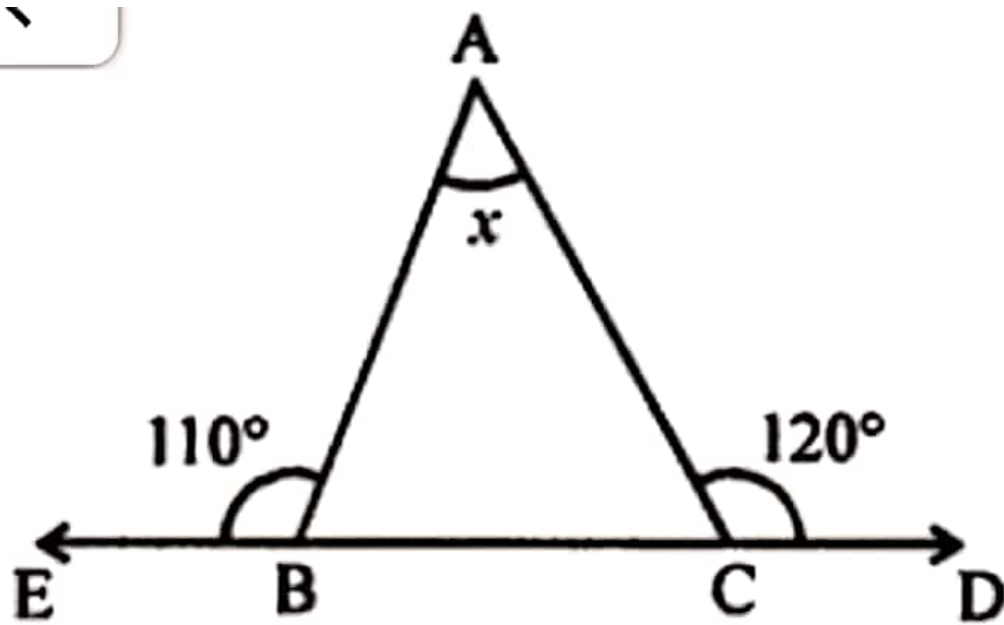
$$\Rightarrow x + 70^\circ + 60^\circ = 180^\circ$$

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

$$\Rightarrow x = 180^\circ - 130^\circ = 50^\circ$$

$$\Rightarrow x = 50^\circ$$





(iii) Let the given triangle be named as $\triangle ABC$,
where $\angle C = 90^\circ$

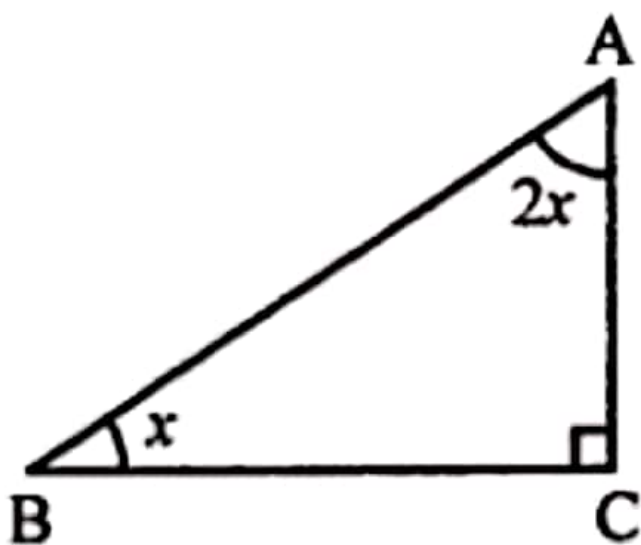
In $\triangle ABC$,

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow 2x + x + 90^\circ = 180^\circ$$

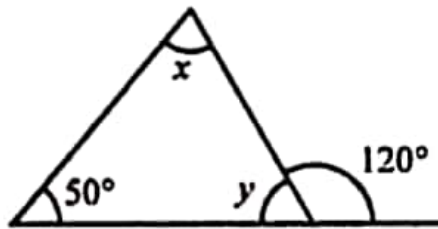
$$\Rightarrow 3x = 180^\circ - 90^\circ = 90^\circ$$

$$\Rightarrow x = 30^\circ$$

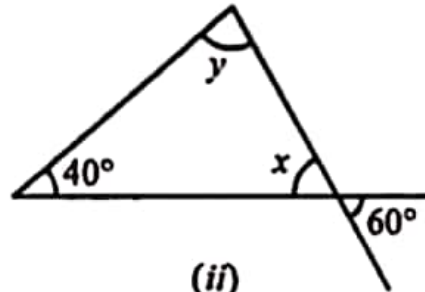


Question 5.

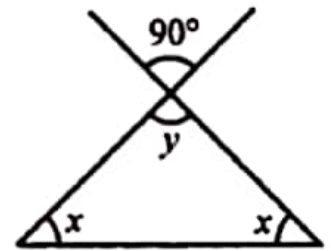
Find the values of x and y in each of the following diagrams:



(i)



(ii)



(iii)

Solution:

We know that an exterior angle of a triangle is equal to the sum of its interior opposite angle.

Therefore,

(i) Let the Δ 's name = ΔABC

In ΔABC

$$\text{Ext. } \angle ACD = \angle A + \angle B$$

$$120^\circ = x + 50^\circ$$

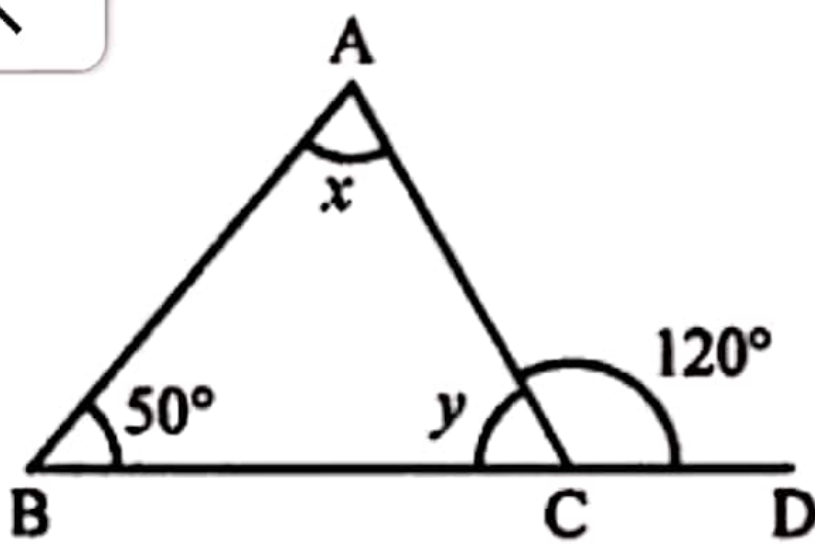
$$\Rightarrow x = 120^\circ - 50^\circ = 70^\circ$$

But $\angle ACD + \angle ABC = 180^\circ$ (Linear pair)

$$120^\circ + y = 180^\circ$$

$$\Rightarrow y = 180^\circ - 120^\circ = 60^\circ$$

$$x = 70^\circ, y = 60^\circ$$



(ii) In the given figure,

$\angle ACB = \angle DCE$ (Vertically opposite angles)

$$x = 60^\circ$$

$$\text{But } \angle A + \angle B + \angle ACB = 180^\circ$$

(Sum of angles of a triangle)

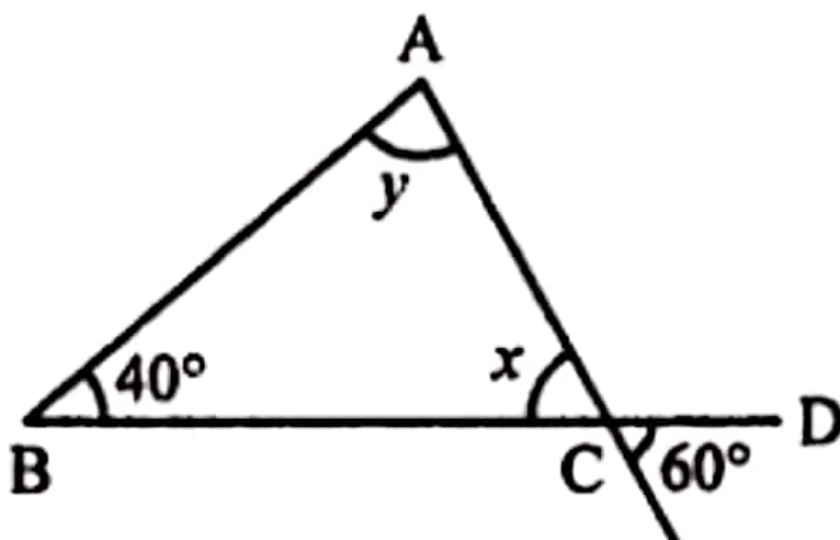
$$\Rightarrow y + 40^\circ + x = 180^\circ$$

$$\Rightarrow y + 40^\circ + 60^\circ = 180^\circ$$

$$\Rightarrow y + 100^\circ = 180$$

$$\Rightarrow y = 180^\circ - 100^\circ = 80^\circ$$

Hence, $x = 60^\circ$, $y = 80^\circ$



(iii) In the given figure,

$\angle BAC = \angle EAF$ (Vertically opposite angles)

$$y = 90^\circ$$

In $\triangle ABC$,

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

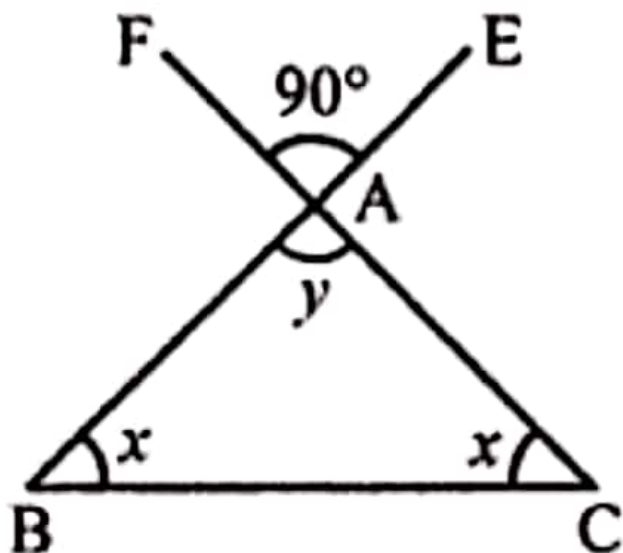
$$\Rightarrow y + x + x = 180^\circ$$

$$\Rightarrow 90^\circ + 2x = 180^\circ$$

$$\Rightarrow 2x = 180^\circ - 90^\circ = 90^\circ$$

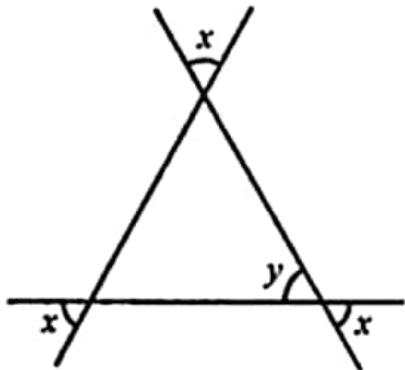
$$\Rightarrow x = 45^\circ$$

Hence, $x = 45^\circ$

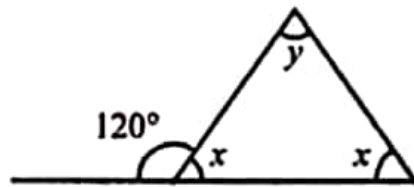


Question 6.

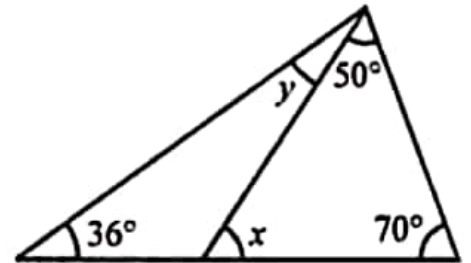
Find the values of x and y in each of the following diagrams:



(i)



(ii)



(iii)

Solution:

(i) In the given figure,

In $\triangle ABC$,

$x = y$ (Vertically opposite angles)

Similarly,

$\angle BAC = y$, $\angle ABC = y$, $\angle BCA = y$

But $\angle BAC + \angle ABC + \angle BCA = 180^\circ$

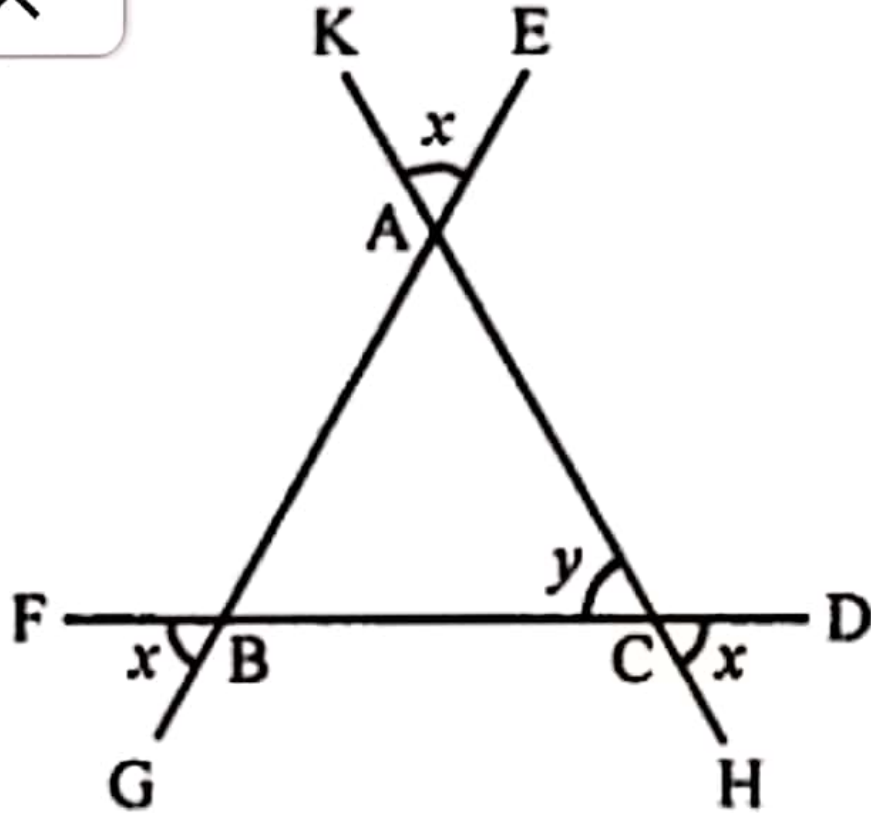
(Angles of a triangle)

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

$$\Rightarrow 3y = 180^\circ$$

$$\Rightarrow y = 60^\circ$$

$$x = 60^\circ, y = 60^\circ$$



(ii) In $\triangle ABC$,

$$\angle ABC + \angle ABD = 180^\circ$$

$$\Rightarrow x + 125^\circ = 180^\circ$$

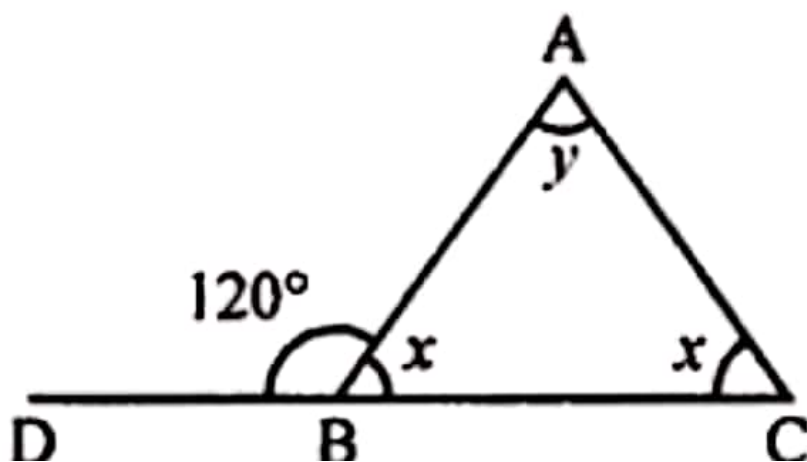
$$\Rightarrow x = 180^\circ - 125^\circ = 55^\circ$$

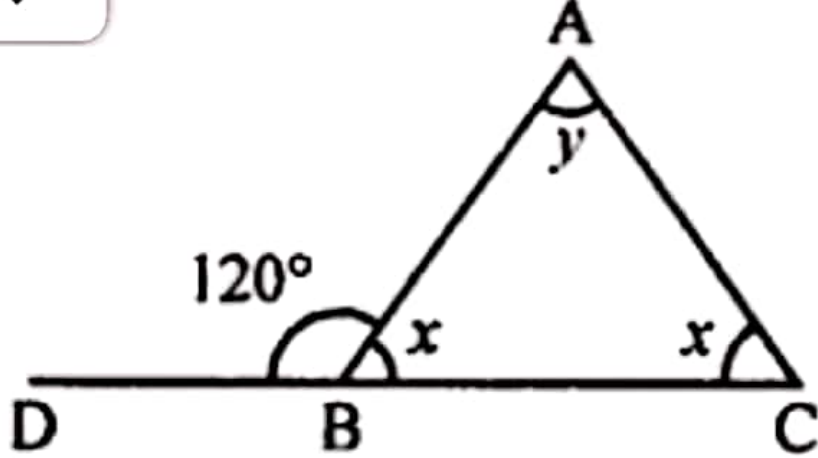
and Ext. $\angle ABD = x + y$

$$\Rightarrow 125^\circ = 55^\circ + y$$

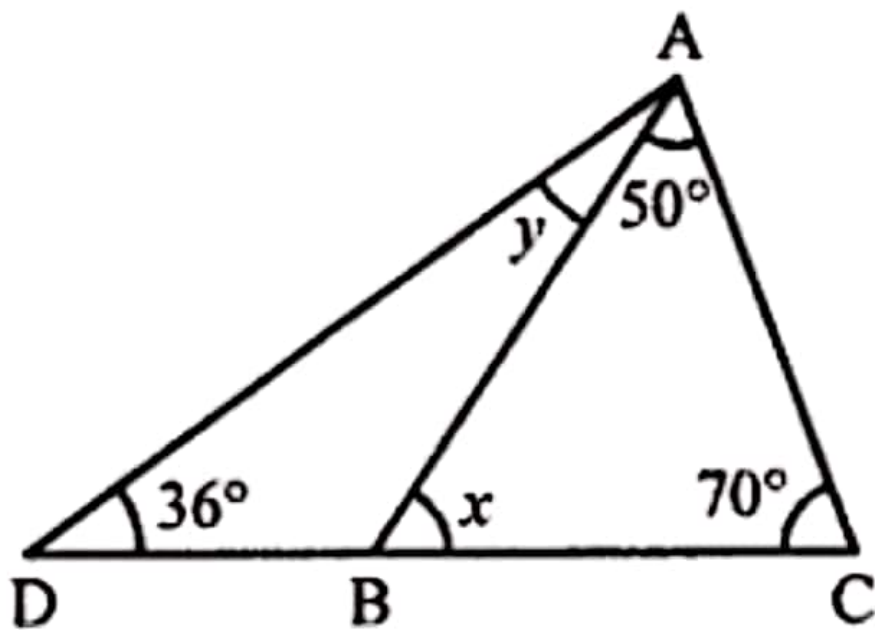
$$\Rightarrow y = 125^\circ - 55^\circ = 70^\circ$$

$$x = 55^\circ, y = 70^\circ$$





(iii) In $\triangle ABC$,



$$\text{Ext. } \angle ABD = \angle A + \angle C = 50^\circ + 70^\circ = 120^\circ$$

But $\angle ABC + \angle ABD = 180^\circ$ (Linear pair)

$$\Rightarrow x + \angle ABD = 180^\circ$$

$$\Rightarrow x + 120^\circ = 180^\circ$$

$$\Rightarrow x = 180^\circ - 120^\circ = 60^\circ$$

But in $\triangle ABD$

$$\text{Ext. } \angle ABC = \angle D + \angle DAB$$

$$\Rightarrow x = y + 30^\circ$$

$$\text{Ext. } \angle ABC = \angle D + \angle DAB$$

$$\Rightarrow x = y + 30^\circ$$

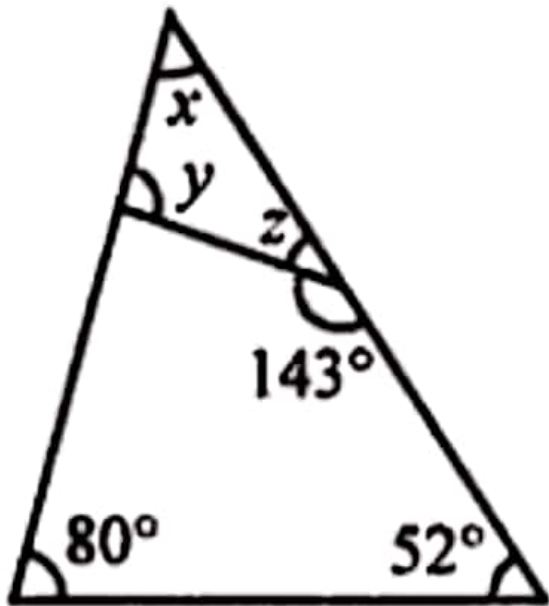
$$\Rightarrow 60^\circ = y + 30^\circ$$

$$\Rightarrow y = 60^\circ - 30^\circ = 30^\circ$$

$$x = 60^\circ, y = 30^\circ$$

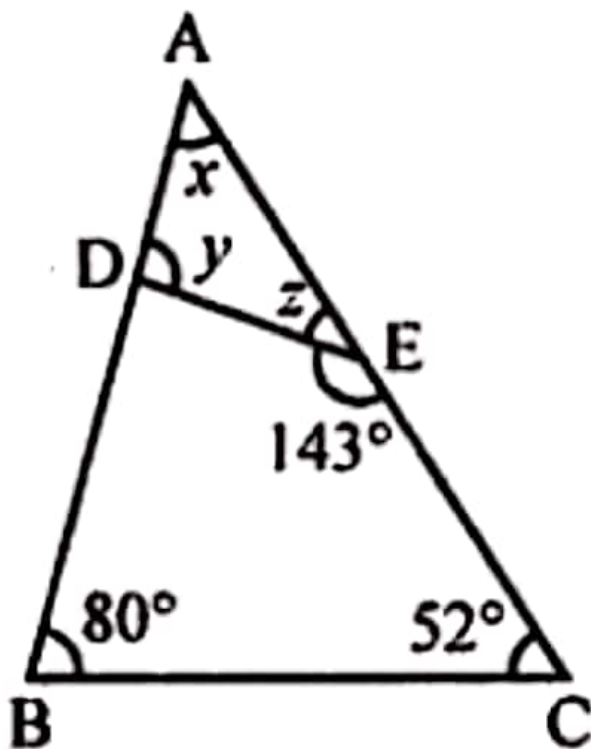
Question 7.

In the adjoining figure, find the size of each lettered angle.



Solution:

In the given figure,



In $\triangle ABC$

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow x + 80^\circ + 52^\circ = 180^\circ$$

$$\Rightarrow x + 132^\circ = 180^\circ$$

$$\Rightarrow x = 180^\circ - 132^\circ = 48^\circ$$

$\angle DEC + \angle DEA = 180^\circ$ (Linear pair)

$$\Rightarrow 143^\circ + z = 180^\circ$$

$$\Rightarrow z = 180^\circ - 143^\circ = 37^\circ$$

Now in $\triangle ADE$

Ext. $\angle DEC = \angle A + \angle ADE$

$$\Rightarrow 143^\circ = x + y$$

$$\Rightarrow 143^\circ = 48^\circ + y$$

$$\Rightarrow y = 143^\circ - 48^\circ = 95^\circ$$

$$x = 48^\circ, y = 95^\circ, z = 37^\circ$$

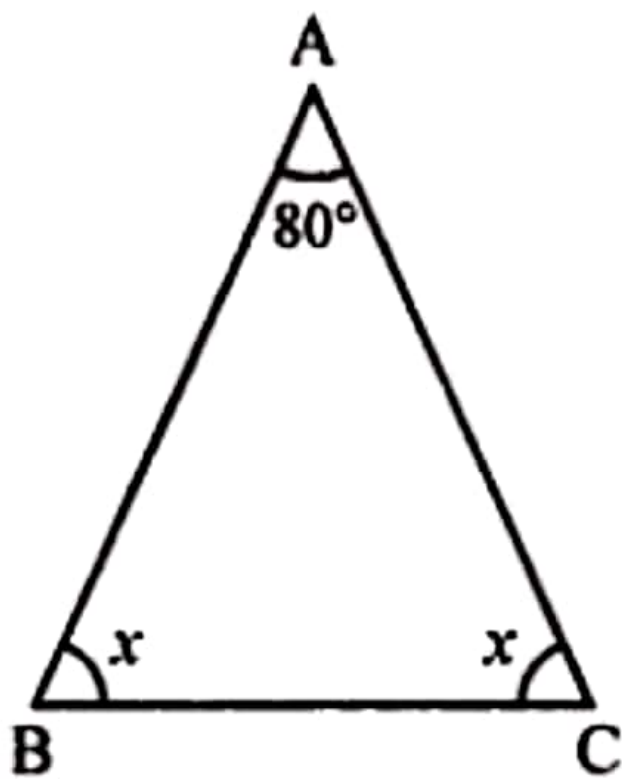
Question 8.

One of the angles of a triangle measures 80° and the other two angles are equal. Find the measure of each of the equal angles.

Solution:

One angle of an $\triangle ABC = 80^\circ$

Let $\angle A = 80^\circ$ and the other two angles are equal



Let $\angle B = \angle C = x$

In $\triangle ABC$,

$\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow 80^\circ + x + x = 180^\circ$$

$$\Rightarrow 2x = 180^\circ - 80^\circ = 100^\circ$$

$$\Rightarrow x = 50^\circ$$

Question 9.

If one angle of a triangle is 60° and the other two angles are in the ratio 2 : 3, find these angles.

Solution:

One angle of a triangle = 60°

Other two angles are in the ratio 2 : 3

Sum of other two angles = $180^\circ - 60^\circ = 120^\circ$

Let one of other two angles = $2x$

Then third angle = $3x$

$$2x + 3x = 120^\circ$$

$$\Rightarrow 5x = 120^\circ$$

$$\Rightarrow x = 24$$

Other two angles are $2x = 2 \times 24 = 48^\circ$

and $3x = 3 \times 24 = 72^\circ$

Other two angles of the triangle are $48^\circ, 72^\circ$

Question 10.

If the angles of a triangle are in the ratio 1 : 2 : 3, find the angles. Classify the triangle in two different ways.

Solution:

Sum of angles of a triangle = 180°

Ratio in the angles of a triangle = 1 : 2 : 3

Let first angle = x

Second angle = $2x$

Third angle = $3x$

$$x + 2x + 3x = 180^\circ$$

$$\Rightarrow 6x = 180^\circ$$

$$\Rightarrow x = 30^\circ$$

\therefore First angle = 30°

Second angle = $30^\circ \times 2 = 60^\circ$

and third angle = $30^\circ \times 3 = 90^\circ$

\therefore One angles is 90°

\therefore It is a right angled triangle

\therefore Sides an different

\therefore It is a scalene triangle.

Question 11.

Can a triangle have three angles whose measures are

(i) $65^\circ, 74^\circ, 39^\circ$?

(ii) $\frac{1}{3}$ right angle, 1 right angle, 60° ?

Solution:

We know that sum of angles of a triangle = 180°

(i) Angles are $65^\circ, 74^\circ, 39^\circ$

Sum of angles = $65^\circ + 74^\circ + 39^\circ = 178^\circ$

$178^\circ \neq 180^\circ$

These three angles can not be of triangle

(ii) $\frac{1}{3}$ right angle = $\frac{1}{3} \times 90^\circ = 30^\circ$

1 right angle = 90°

Third angle = 60°

Sum of angles = $30^\circ + 90^\circ + 60^\circ = 180^\circ$

These angles are of a triangle.