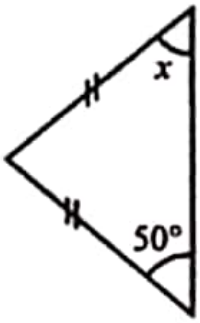
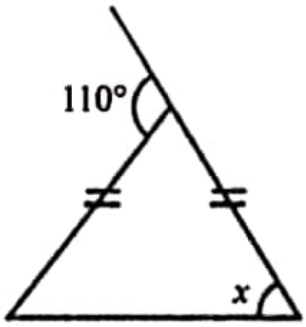
Question 1.

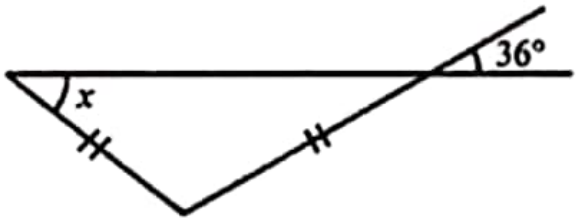
Find the value of x in each of the following figures:



(i)



(ii)



(iii)

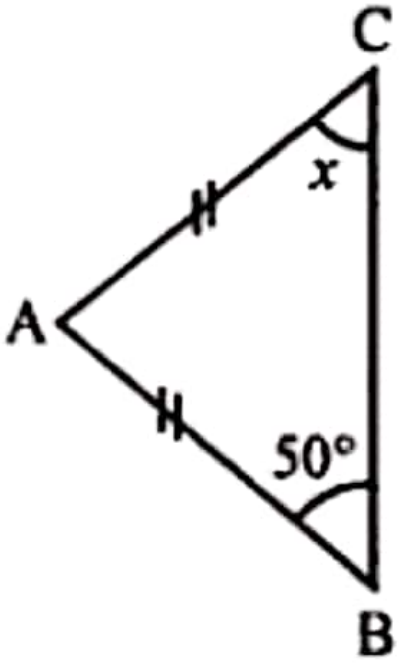
Solution:

(i) In ΔABC,

AB = AC

∠B = ∠C (Angles opposite to equal sides)

x = 50°



(ii) In ΔABC,

AB = AC

(ii) In ΔABC,

$AB = AC$

$\angle B = \angle C$ (Angles opposite to equal sides)

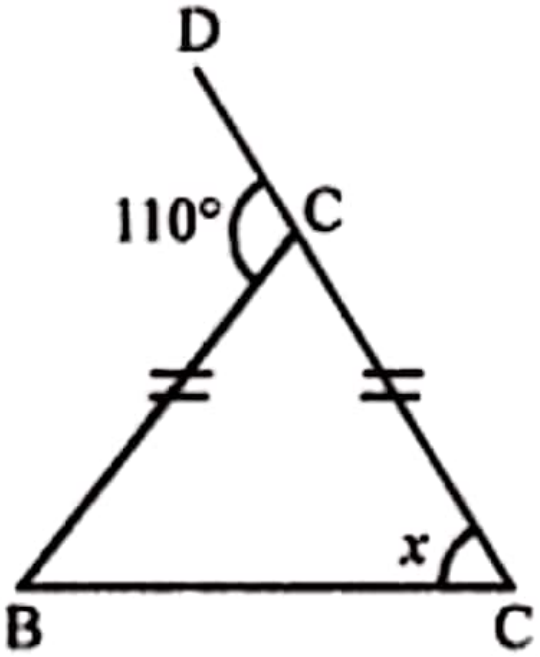
$\angle B = \angle C = x$

and Ext. $\angle BAD = \angle B + \angle C = x + x$

$110° = \angle B + \angle C$

$110° = x + x = 2x$

$x = 55°$



(iii) In the given figure,

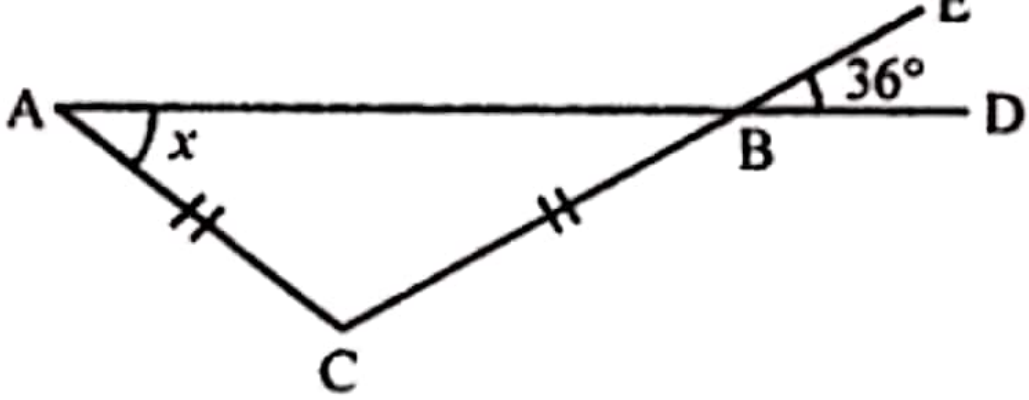
$CA = CB$

$\angle A = \angle ABC = x$

$\angle EBD = 36°$

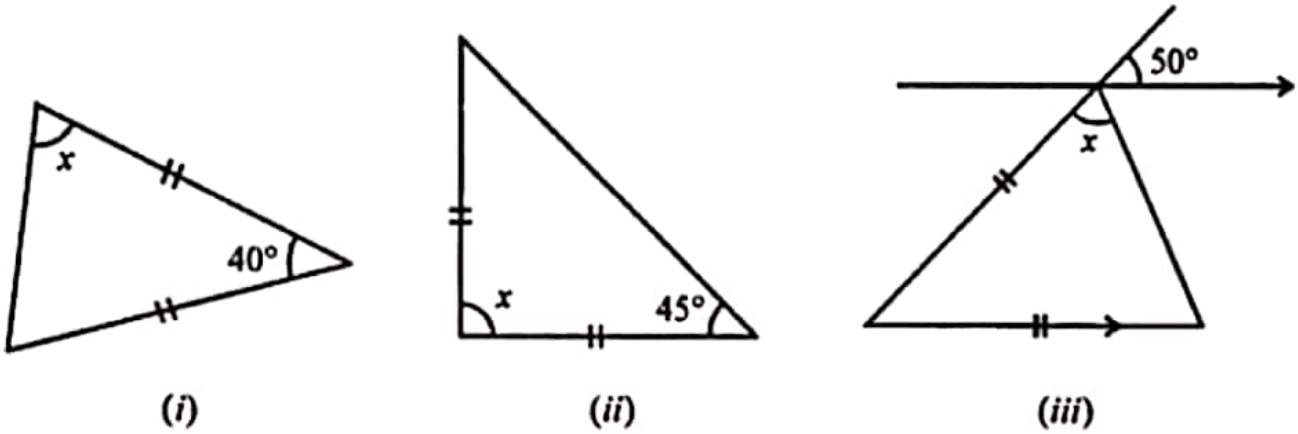
$\angle ABC = \angle EBD = 36°$ (Vertically opposite angles)

$x = 36°$



Question 2.

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



(i) (ii) (iii)

Solution:

(i) In ΔABC,

AC = BC, ∠C = 40°

∠A = ∠B (Angles opposite to equal sides)

∠A = ∠B = x

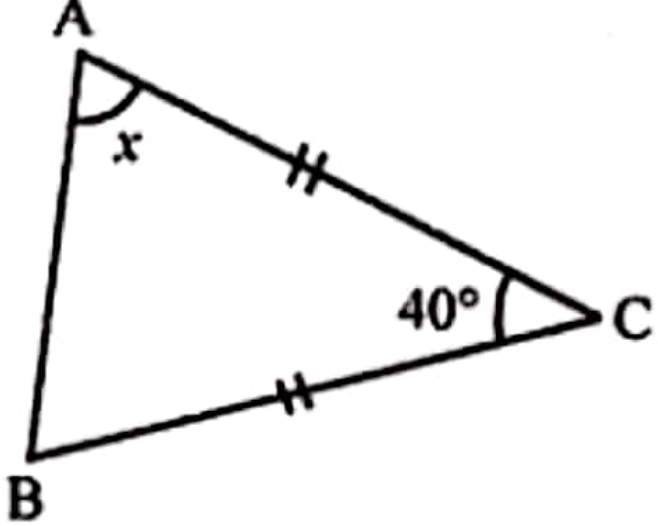
But A + B + C = 180° (Angles of a triangle)

⇒ x + x + 40° = 180°

⇒ 2x = 180° − 40° = 140°

⇒ x = 70°

x = 70°



(ii) In ΔABC,

$\angle B = 45°$

$AC = BC$

$\angle A = \angle B = 45°$

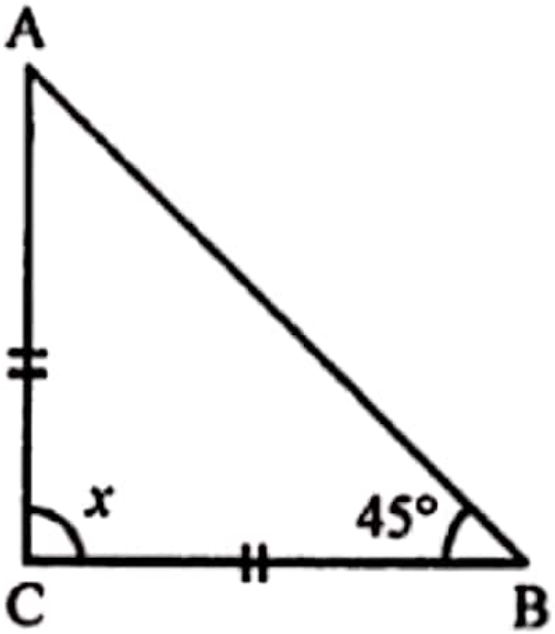
But $\angle A + \angle B + \angle C = 180°$

$\Rightarrow 45° + 45° + x° = 180°$

$\Rightarrow x + 90° = 180°$

$\Rightarrow x = 180° - 90° = 90°$

$x = 90°$



(iii) In the given figure, EF || BC

In ΔABC, Ext. $\angle DAF = 50°$

$AB = BC$

$\angle A = \angle C = x$

EF || BC

$\angle DAF = \angle ABC = 50°$

Now in ΔABC

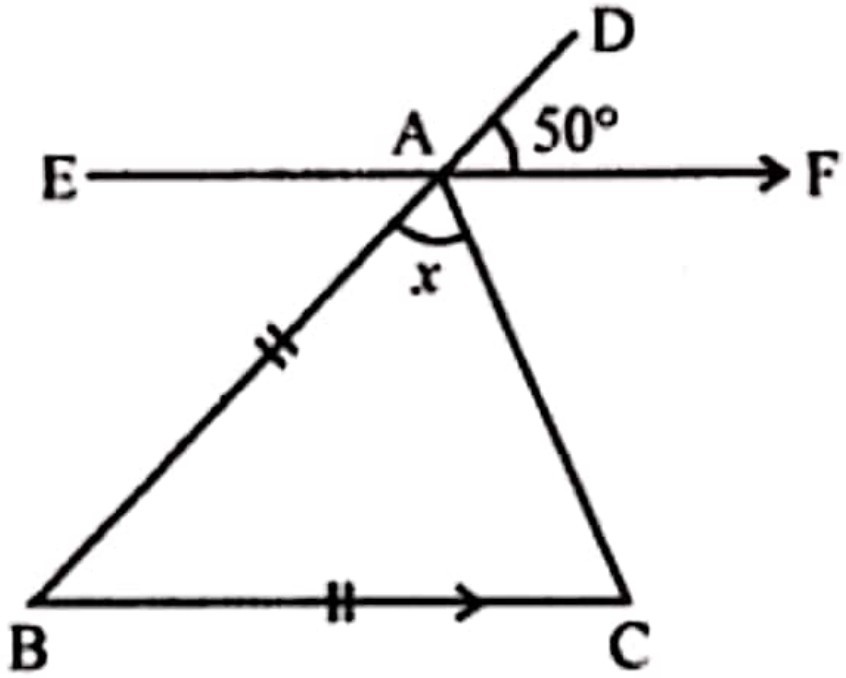
$\angle BAC + \angle ABC + \angle BCA = 180°$

$\Rightarrow x + 50° + x = 180°$

$\Rightarrow 2x = 180° - 50° = 130°$

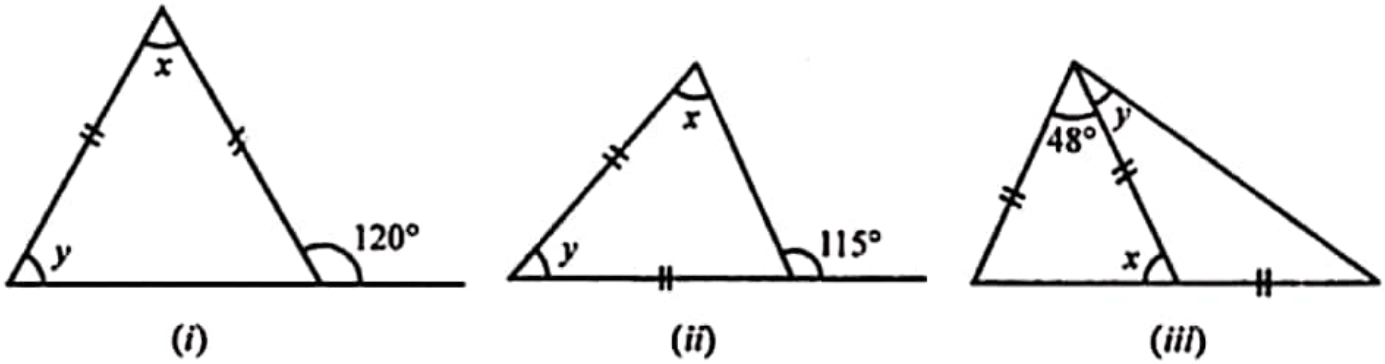
$\Rightarrow x = 65°$

$x = 65°$



Question 3.

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



(i) (ii) (iii)

Solution:

(i) In the given figure of ΔABC

AB = AC

∠ABC = ∠ACB = y

But, Ext. ∠ACD + ∠ACB = 120° (Linear pair)

∠ACB = 180° − 120° = 60°

y = 60°

Now in ΔABC,

∠A + ∠B + ∠ACB = 180° (Angles of a triangle)

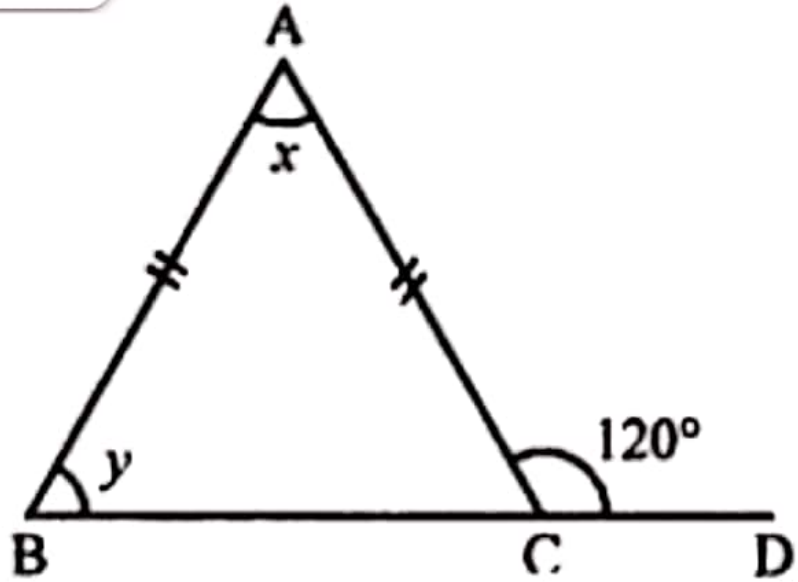
⇒ x + y + y = 180°

⇒ x + 60° + 60° = 180°

⇒ x + 120° = 180°

⇒ x = 180° − 120° = 60°

Here, x = 60°, y = 60°



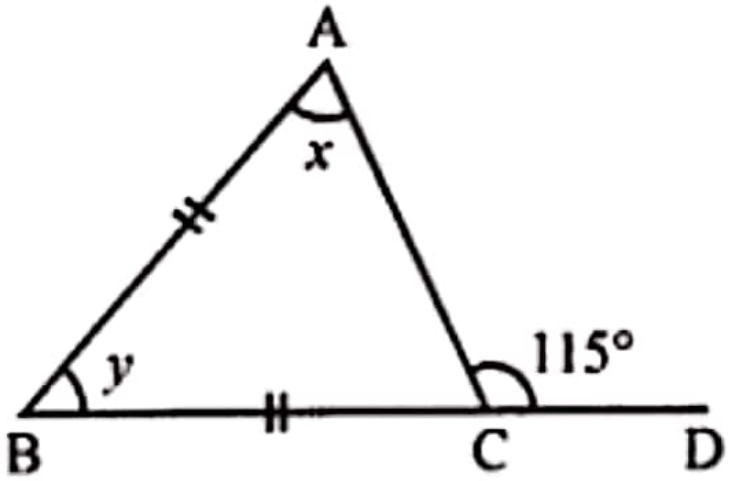
(ii) Here, $\angle A = \angle ACB$

$\angle ACB = x$ ($\because$ angles opposite to equal sides)

$\Rightarrow x + 115° = 180°$

$\Rightarrow x = 180° - 115° = 65$

$\angle ACB = \angle A = 65°$



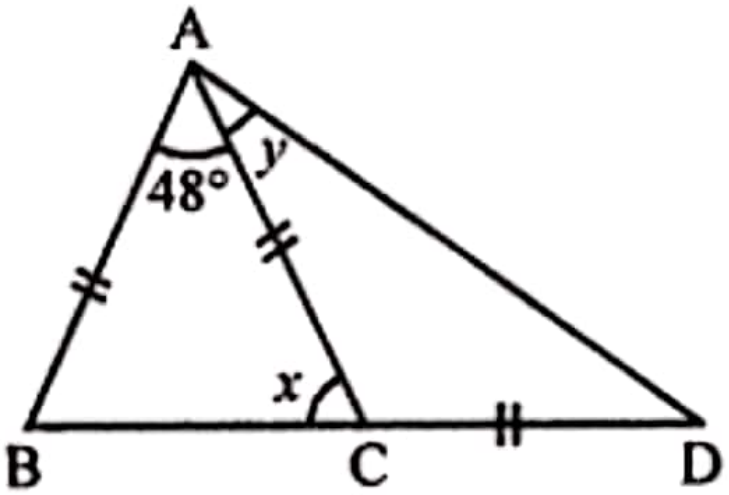
Now, $\angle A + \angle B + \angle ACB = 180°$ (Sum of $\angle$s of a Δ)

$65° + 65° + \angle y = 180°$

$130° + \angle y = 180°$

$\angle y = 180° - 130° = 50°$

(iii) In ΔABC,



$\angle ABC = \angle ACB$ ($\angle$s opposite to equal sides)

$\angle ABC = x = \angle ACB$

Now, In ΔABC

$48° + x + x = 180°$ (Sum of $\angle$s of a Δ)

$\Rightarrow 2x = 180° - 48°$

$\Rightarrow 2x = 132°$

$\Rightarrow x = 66°$

In ΔACD,

$\angle CAD = \angle CDA$ ($\angle$s opposite to equal sides)

$\angle CAD = y = \angle CDA$

Now, $x + \angle ACD = 180°$ (Linear pair $\angle$s)

$66° + \angle ACD = 180°$

$\angle ACD = 180° - 66° = 114°$

Now, in ΔACD

$y + y + 114° = 180°$ (Sum of $\angle$s of a Δ)

$\Rightarrow 2y + 114° = 180°$

$\Rightarrow 2y = 180° - 114°$

$\Rightarrow 2y = 66°$

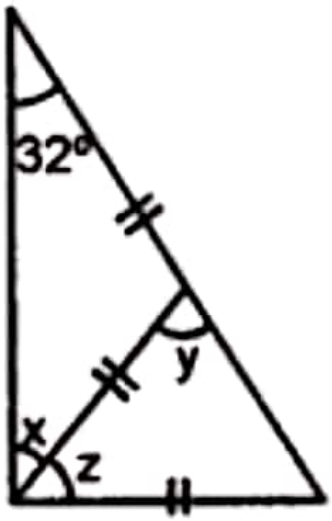
$\Rightarrow y = 33°$

Hence, $x = 66°$ and $y = 33°$

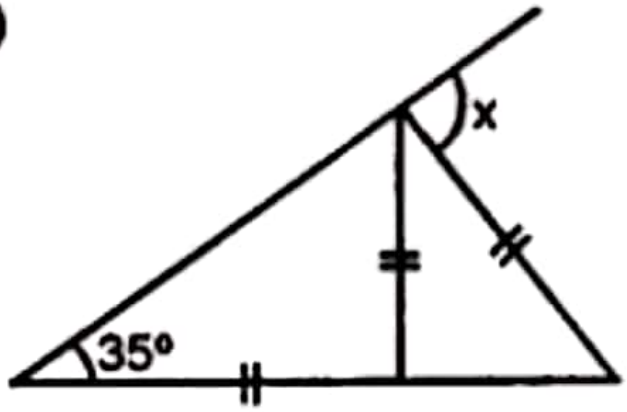
Question 4.

Calculate the size of each lettered angle in the following figures:

(i)



(ii)



Solution:

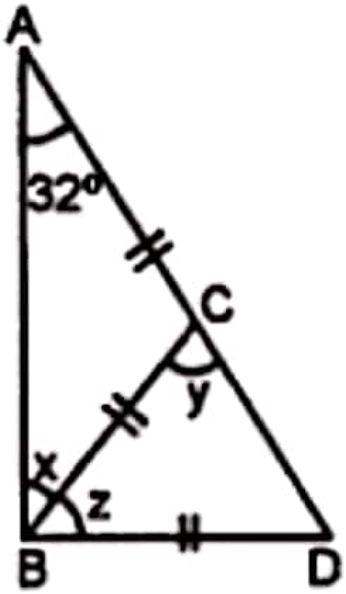
(i) In ΔABC,

AC = BC (Given)

∠ABC = ∠BAC (∠s opposite to equal sides)

∠ABC = 32°

⇒ x = 32°



Now, y = 32° + 32° = 64°

(∵ Exterior angle = Sum of two opposite interior ∠s)

In ΔBCD,

BC = BD

∠BDC = ∠BCD (∠s opposite to equal sides)

∠BDC = y = ∠BCD

∠BDC = 64° = ∠BCD

Now, z + 64° + 64° = 180° (Sum of ∠s of a Δ)

⇒ z + 128°= 180°

⇒ z = 180° − 128° = 52°

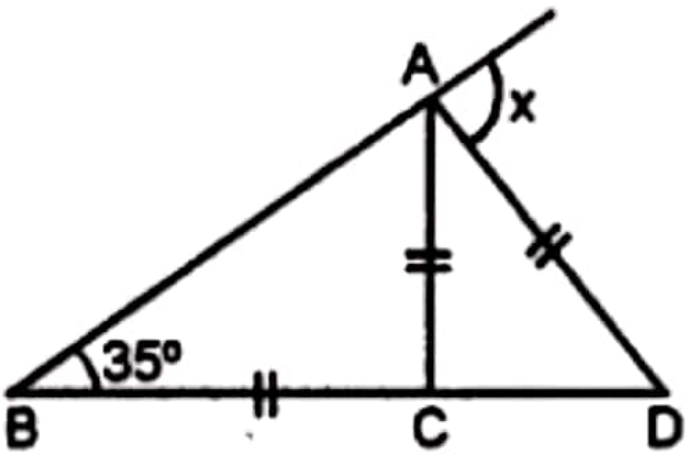
Hence, x = 32°, y = 64°, z = 52°

(iii) In ΔABC,

AC = BC (Given)

∠ABC = ∠BAC (∠s opposite to equal sides)

∠ABC = 35° = ∠BAC



Now, ∠ACD = ∠ABC + ∠BAC (Exterior angle =

Sum)

$= 35° + 35° = 70°.$

In ΔACD,

$AC = AD$ (Given)

$\angle ADC = \angle ACD$ ($\angle$s opposite to equal sides)

$\angle ADC = 70°$

Now, $\angle x = \angle ABD + \angle ADB$

(Exterior angle = Sum of two opposite interior $\angle$s)

$= 35° + 70° = 105°$

Hence, $\angle x = 105°$

Question 5.

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

Solution:

Ratio in the angles of a triangle are 1 : 2 : 1

Sum of angles of a triangle = 180°

Let first angle = x

Then second = 2x

and third angle x

$x + 2x + x = 180°$

$\Rightarrow 4x = 180°$

$\Rightarrow x = 45°$

Angles are 45°, $45° \times 2 = 90°$ and 45°

Two angles are equal

Their opposite sides are also equal

It is an isosceles triangle

It's one angle is 90°

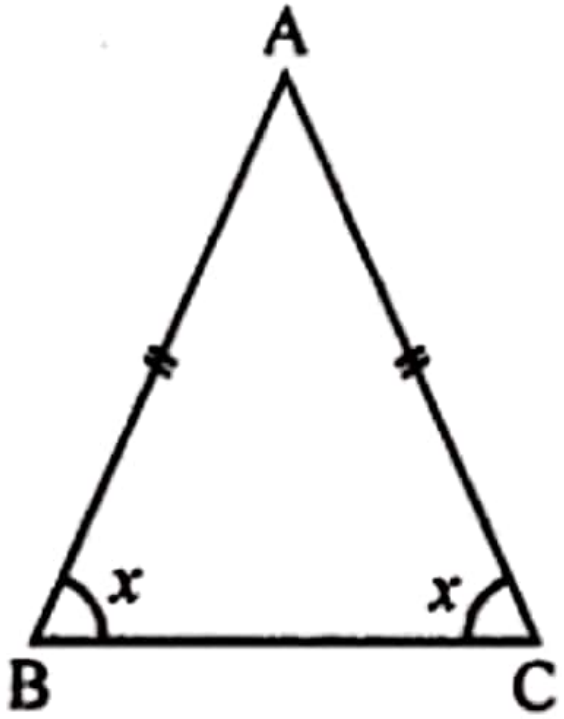
It is a right-angled triangle.

Question 6.

In an isosceles triangle, a base angle is four times its vertical angle. Find all the angles of the triangle.

Solution:

In an isosceles triangle ABC, AB = AC



Base angles are equal

Let ∠B = ∠C = x

$$\angle A = \frac{x}{4}$$

$$\therefore\ x + x + \frac{x}{4} = 180^\circ \Rightarrow \frac{4x + 4x + x}{4} = 180^\circ$$

$$\Rightarrow \frac{9x}{4} = 180° \Rightarrow x = 180° \times \frac{4}{9} = 80°$$

$$\text{Vertical angle} = \frac{x}{4} = \frac{80°}{4} = 20°$$

Angles of the triangle will be 80°, 80°, 20°