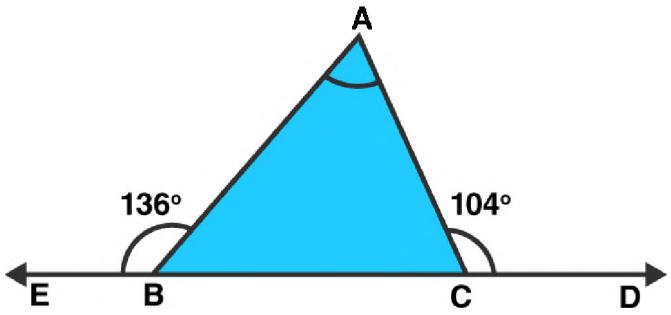
Solutions for Class 9 Maths Chapter 9 Triangle and its Angles

Question 1: The exterior angles, obtained on producing the base of a triangle both ways are 104^0 and 136^0. Find all the angles of the triangle.

Solution:



∠ACD = ∠ABC + ∠BAC [Exterior angle property]

Find ∠ABC:

∠ABC + ∠ABE = 180^0 [Linear pair]

∠ABC + 136^0 = 180^0

∠ABC = 44^0

Find ∠ACB:

∠ACB + ∠ACD = 180^0 [Linear pair]

∠ACB + 104^0 = 180^0

∠ACB = 76^0

Now,
Sum of all angles of a triangle = 180^0

∠A + 44^0 + 76^0 = 180^0
∠A = 180^0 – 44^0 –76^0
∠ A = 60^0

Answer: Angles of a triangle are $\angle A = 60^0$, $\angle B = 44^0$ and $\angle C = 76^0$

Question 2: In a $\triangle ABC$, the internal bisectors of $\angle B$ and $\angle C$ meet at P and the external bisectors of $\angle B$ and $\angle C$ meet at Q. Prove that $\angle BPC + \angle BQC = 180^0$.

Solution:

In triangle ABC,

BP and CP are internal bisector of $\angle B$ and $\angle C$ respectively
=> External $\angle B = 180^o - \angle B$

BQ and CQ are external bisector of $\angle B$ and $\angle C$ respectively.
=> External $\angle C = 180^o - \angle C$

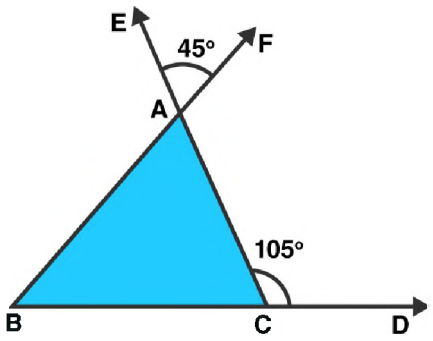
In triangle BPC,
$\angle BPC + 1/2\angle B + 1/2\angle C = 180o$

$\angle BPC = 180^o - (\angle B + \angle C)$ .... (1)

In triangle BQC,
$\angle BQC + 1/2(180^o - \angle B) + 1/2(180^o - \angle C) = 180^o$
$\angle BQC + 180^o - (\angle B + \angle C) = 180^o$
$\angle BPC + \angle BQC = 180^o$ [Using (1)]

Hence Proved.

Question 3: In figure, the sides BC, CA and AB of a $\triangle ABC$ have been produced to D, E and F respectively. If $\angle ACD = 105^0$ and $\angle EAF = 45^0$, find all the angles of the $\triangle ABC$.



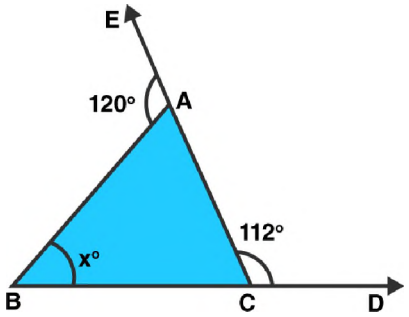
Solution:

$\angle BAC = \angle EAF = 45^0$ [Vertically opposite angles]

$\angle ACD = 180^0 - 105^0 = 75^0$ [Linear pair]

$\angle ABC = 105^0 - 45^0 = 60^0$ [Exterior angle property]

Question 4: Compute the value of x in each of the following figures:
(i)



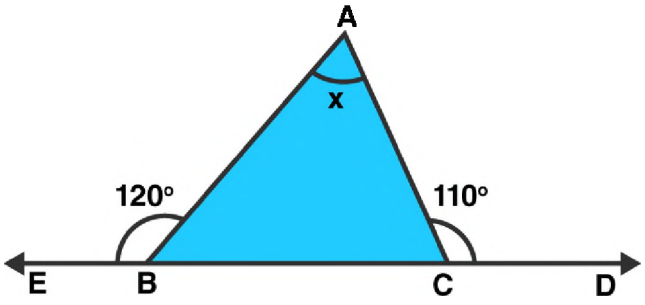
Solution:

$\angle BAC = 180^0 - 120^0 = 60^0$ [Linear pair]
$\angle ACB = 180^0 - 112^0 = 68^0$ [Linear pair]

Sum of all angles of a triangle = 180^0

$x = 180^0 - \angle BAC - \angle ACB$
$= 180^0 - 60^0 - 68^0 = 52^0$
Answer: $x = 52^0$

(ii)



Solution:

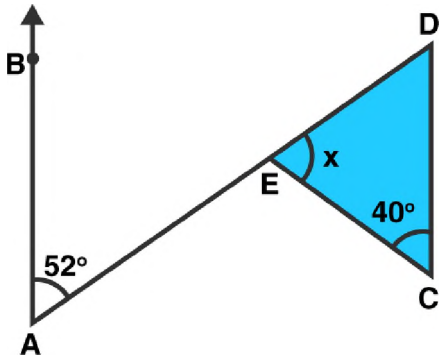
$\angle ABC = 180^0 - 120^0 = 60^0$ [Linear pair]
$\angle ACB = 180^0 - 110^0 = 70^0$ [Linear pair]

Sum of all angles of a triangle = 180^0

$x = \angle BAC = 180^0 - \angle ABC - \angle ACB$
$= 1800 - 60^0 - 70^0 = 50^0$

Answer: $x = 50^0$

(iii)



Solution:

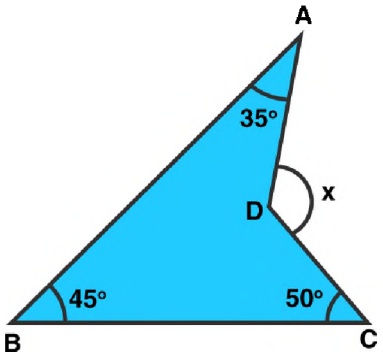
$\angle BAE = \angle EDC = 52^0$ [Alternate angles]

Sum of all angles of a triangle = 180^0

$x = 180^0 - 40^0 - 52^0 = 180^0 - 92^0 = 88^0$

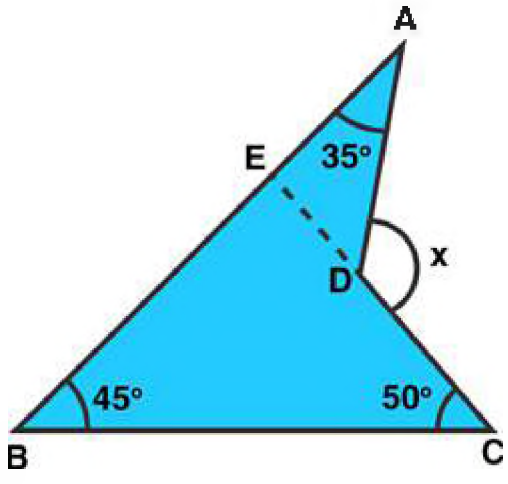
Answer: $x = 88^0$

(iv)



Solution:

CD is produced to meet AB at E.



$\angle BEC = 180^0 - 45^0 - 50^0 = 85^0$ [Sum of all angles of a triangle = 180^0]

$\angle AEC = 180^0 - 85^0 = 95^0$ [Linear Pair]

Now, $x = 95^0 + 35^0 = 130^0$ [Exterior angle Property]

Answer: $x = 130^0$

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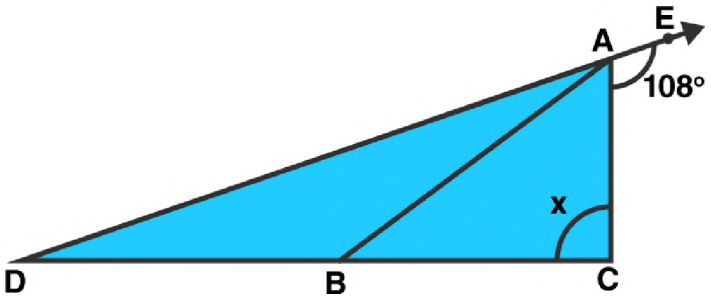
Question 5: In figure, AB divides ∠DAC in the ratio 1 : 3 and AB = DB. Determine the value of x.



Solution:

Let ∠BAD = y, ∠BAC = 3y

∠BDA = ∠BAD = y (As AB=DB)

Now,
∠BAD + ∠BAC + 108^0 = 180^0 [Linear Pair]

y + 3y + 108^0 = 180^0

4y = 72^0

or y = 18^0

Now, In ΔADC

∠ADC + ∠ACD = 108^0 [Exterior Angle Property]

x + 18^0 = 180^0
x = 90^0

Answer: x = 90^0