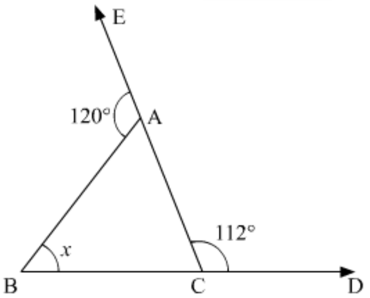
Triangles and Its Angles Ex 9.2 Q4

Answer :

In the given problem, we need to find the value of x

(i) In the given ΔABC, $\angle ACD = 112^\circ$ and $\angle BAE = 120^\circ$



Now, BCD is a straight line. So, using the property, "the angles forming a linear pair are supplementary", we get,

$$\angle ACB + \angle ACD = 180^\circ$$
$$\angle ACB + 112^\circ = 180^\circ$$
$$\angle ACB = 180^\circ - 112^\circ$$
$$\angle ACB = 68^\circ$$

Similarly, EAC is a straight line. So, we get,

$$\angle BAE + \angle BAC = 180^\circ$$
$$120^\circ + \angle BAC = 180^\circ$$
$$\angle BAC = 180^\circ - 120^\circ$$
$$\angle BAC = 60^\circ$$

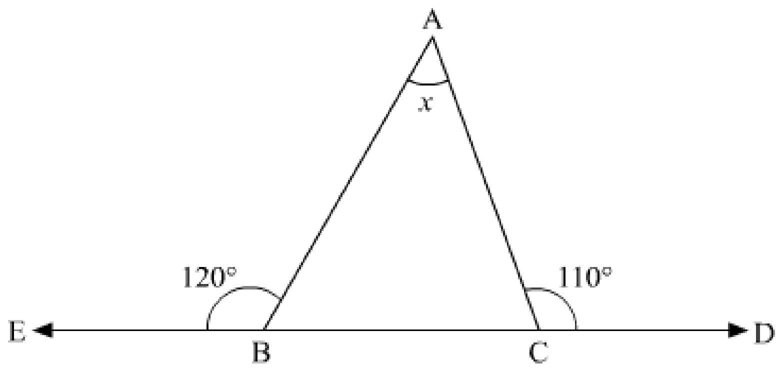
Further, using the angle sum property of a triangle,

In ΔABC

$$\angle ACB + \angle BAC + \angle ABC = 180^\circ$$
$$68^\circ + 60^\circ + \angle ABC = 180^\circ$$
$$128^\circ + \angle ABC = 180^\circ$$
$$\angle ABC = 180^\circ - 128^\circ$$
$$\angle ABC = 52^\circ$$

Therefore, $\boxed{x = 52^\circ}$

(ii) In the given ΔABC, $\angle ACD = 110^\circ$ and $\angle EBA = 120^\circ$



Here, BCD is a straight line. So, using the property, "the angles forming a linear pair are supplementary" we get,

$$\angle ACB + \angle ACD = 180^\circ$$
$$\angle ACB + 110^\circ = 180^\circ$$
$$\angle ACB = 180^\circ - 110^\circ$$
$$\angle ACB = 70^\circ$$

Similarly, EBC is a straight line. So, we get

$$\angle EBA + \angle ABC = 180^\circ$$
$$120^\circ + \angle ABC = 180^\circ$$
$$\angle ABC = 180^\circ - 120^\circ$$
$$\angle ABC = 60^\circ$$

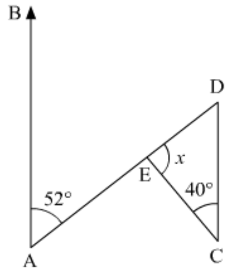
Further, using the angle sum property of a triangle,

In ΔABC

$$\angle ACB + \angle BAC + \angle ABC = 180^\circ$$
$$70^\circ + 60^\circ + \angle BAC = 180^\circ$$
$$130^\circ + \angle BAC = 180^\circ$$
$$\angle BAC = 180^\circ - 130^\circ$$
$$\angle BAC = 50^\circ$$

Therefore, $\boxed{x = 50^\circ}$

(iii) In the given figure, $\angle BAD = 52^\circ$ and $\angle DCE = 40^\circ$



Here, $AB \parallel CD$ and AD is the transversal, so $\angle EDC$ and $\angle BAD$ form a pair of alternate interior angles. Therefore, using the property, "alternate interior angles are equal", we get,

$$\angle EDC = \angle BAD$$
$$\angle EDC = 52^\circ$$

Further, applying angle sum property of the triangle

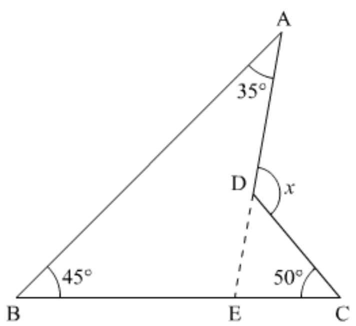
In ΔDEC

$$\angle DEC + \angle DCE + \angle EDC = 180^\circ$$
$$\angle DEC + 40^\circ + 52^\circ = 180^\circ$$
$$x + 92^\circ = 180^\circ$$
$$x = 180^\circ - 92^\circ$$
$$x = 88^\circ$$

Therefore, $\boxed{x = 88^\circ}$

(iv) In the given figure, $\angle DCB = 45^\circ$, $\angle CBA = 45^\circ$ and $\angle BAD = 35^\circ$

Here, we will produce AD to meet BC at E



Now, using angle sum property of the triangle

In ΔAEB

$$\angle BAE + \angle AEB + \angle EBA = 180^\circ$$
$$\angle AEB + 35^\circ + 45^\circ = 180^\circ$$
$$\angle AEB + 80^\circ = 180^\circ$$
$$\angle AEB = 180^\circ - 80^\circ$$
$$\angle AEB = 100^\circ$$

Further, BEC is a straight line. So, using the property, "the angles forming a linear pair are supplementary", we get,

$$\begin{aligned}
\angle AEB + \angle AEC &= 180^\circ \\
100^\circ + \angle AEC &= 180^\circ \\
\angle AEC &= 180^\circ - 100^\circ \\
\angle AEC &= 80^\circ
\end{aligned}$$

Also, using the property, "an exterior angle of a triangle is equal to the sum of its two opposite interior angles"

In ΔDEC, x is its exterior angle

Thus,

$$\begin{aligned}
\angle x &= \angle DCE + \angle DEC \\
&= 50^\circ + 80^\circ \\
&= 130^\circ
\end{aligned}$$

Therefore, $\boxed{x = 130^\circ}$.

*********** END **********