

# Properties of Triangles

## Exercise 15B

Q1

**Answer :**

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

$$\begin{aligned}\angle ACD &= \angle CAB + \angle CBA \\ \angle ACD &= 75^\circ + 45^\circ = 120^\circ\end{aligned}$$

Q2

**Answer :**

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

$$\begin{aligned}\therefore \angle BAC + \angle ABC &= \angle ACD \\ x + 68 &= 130 \\ x &= 62\end{aligned}$$

Sum of the angles in any triangle is  $180^\circ$ .

$$\begin{aligned}\therefore \angle BAC + \angle ABC + \angle ACB &= 180^\circ \\ 62 + 68 + y &= 180 \\ y &= 50\end{aligned}$$

Q3

**Answer :**

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

$$\begin{aligned}\therefore \angle BAC + \angle CBA &= \angle ACD \\ 32 + x &= 65 \\ x &= 33\end{aligned}$$

Also, sum of the angles in any triangle is  $180^\circ$ .

$$\begin{aligned}\therefore \angle BAC + \angle CBA + \angle ACB &= 180^\circ \\ 32 + 33 + y &= 180 \\ y &= 115\end{aligned}$$

$$\begin{aligned}\therefore x &= 33 \\ y &= 115\end{aligned}$$

Q4

**Answer :**

Suppose the interior opposite angles are  $(2x)^\circ$  and  $(3x)^\circ$ .

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

$$\begin{aligned}\therefore 3x + 2x &= 110 \\ x &= 22\end{aligned}$$

The interior opposite angles are  $(2 \times 22)^\circ$  and  $(3 \times 22)^\circ$ , i.e.  $44^\circ$  and  $66^\circ$ .

Suppose the third angle of the triangle is  $y^\circ$ .

Now, sum of the angles in any triangle is  $180^\circ$ .

$$\begin{aligned}\therefore 44 + 66 + y &= 180 \\ y &= 70\end{aligned}$$

Hence, the angles of the triangle are  $44^\circ$ ,  $66^\circ$  and  $70^\circ$ .

Q5

**Answer :**

Suppose the interior opposite angles of an exterior angle  $100^\circ$  are  $x^\circ$  and  $x^\circ$ .  
We know that the exterior angle of a triangle is equal to the sum of the interior opposite angles.

$$\therefore x + x = 100$$

$$2x = 100$$

$$x = 50$$

Also, sum of the angles of any triangle is  $180^\circ$ .

Let the measure of the third angle be  $y^\circ$ .

$$\therefore x + x + y = 180$$

$$50 + 50 + y = 180$$

$$y = 80$$

Hence, the angles are of the measures  $50^\circ$ ,  $50^\circ$  and  $80^\circ$ .

Q6

**Answer :**

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

In  $\triangle ABC$ :

$$\angle ACD = \angle BAC + \angle ABC = 25^\circ + 45^\circ$$

$$\angle ACD = 70^\circ$$

(ii) In  $\triangle ECD$ :

$$\angle AED = \angle ECD + \angle EDC = 70^\circ + 40^\circ$$

$$\Rightarrow \angle AED = 110^\circ$$

Q7

**Answer :**

Sum of the angles of a triangle is  $180^\circ$ .

In  $\triangle ABC$ :

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

$$\angle BAC = 180^\circ - (40^\circ + 100^\circ)$$

$$\Rightarrow \angle BAC = 40^\circ$$

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

$$\angle ACD = \angle BAC + \angle CBA = 40^\circ + 40^\circ = 80^\circ$$

$$(i) \angle ACD = 80^\circ$$

(ii) In  $\triangle ACD$ :

$$\angle CAD + \angle ACD + \angle ADC = 180^\circ$$

$$\Rightarrow \angle ADC = 180^\circ - (50^\circ + 80^\circ)$$

$$\Rightarrow \angle ADC = 50^\circ$$

$$\therefore \angle ADC = 50^\circ$$

$$(iii) \angle DAB + \angle DAE = 180^\circ \quad (\text{since } BE \text{ is a straight line})$$

$$\angle DAE = 180^\circ - (\angle DAC + \angle CAB)$$

$$\angle DAE = 180^\circ - (50^\circ + 40^\circ)$$

$$\angle DAE = 90^\circ$$

Q8

**Answer :**

$$\frac{x}{y} = \frac{2}{3}$$

$$\Rightarrow 3x = 2y$$

$$\Rightarrow x = \frac{2}{3}y$$

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

$$\therefore \angle A + \angle B = \angle ACD$$

$$x^\circ + y^\circ = 130^\circ$$

$$\Rightarrow \frac{2y}{3} + y = 130$$

$$\Rightarrow 5y = 130 \times 3$$

$$\Rightarrow 5y = 390$$

$$\Rightarrow y = 78$$

$$\Rightarrow x = \frac{2}{3} \times 78$$

$$\Rightarrow x = 52$$

Also, sum of the angles in any triangle is  $180^\circ$

$$\therefore x + y + z = 180$$

$$z = 180 - 78 - 52$$

$$z = 50$$

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