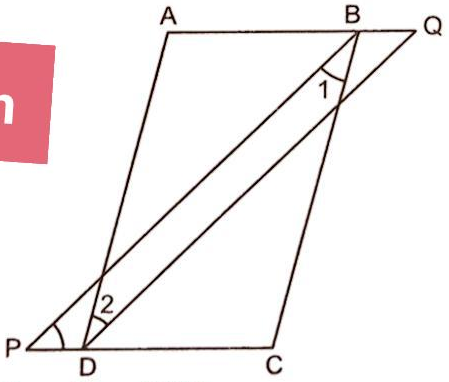
Exercise 12.7

1. Prove that the sum of all the interior angles of a quadrilateral is 360°.
2. Three angles of a quadrilateral are 65°, 110° and 75°. Find the measure of the fourth angle.
3. (*a*) Find each angle of a quadrilateral if its angles are in the ratio of 3 : 4 : 5 : 6.
   (*b*) Find each angle of a pentagon if its angles are in the ratio of 1 : 2 : 3 : 5 : 9.
4. Each interior angle of a regular polygon measures 135°. The polygon is
   (*i*) a parallelogram (*ii*) a hexagon
   (*iii*) an octagon (*iv*) a decagon
5. Sum of the interior angles of a 12-sided polygon is
   (*i*) 180° (*ii*) 360° (*iii*) 1800° (*iv*) 2160°
6. (*a*) The measure of an interior angle of a regular pentagon is
   (*i*) 72° (*ii*) 108° (*iii*) 118° (*iv*) 540°
   (*b*) The interior angle of a regular polygon is 156°. Find the number of sides of the polygon.
   (*c*) Find the number of sides a polygon has if the sum of the measures of the interior angles is
   (*i*) 50 right angles (*ii*) 1800°
7. In the given figure, bisectors of ∠B and ∠D of a quadrilateral ABCD meet CD and AB produced at P and Q respectively, prove that

$$\angle P + \angle Q = \frac{1}{2}(\angle ABC + \angle ADC).$$ [*Most Important*]



[**Hint:** $\angle A + \angle B + \angle C + \angle D = 360°$

$\Rightarrow \quad \angle A + \angle C = 360° - \angle B - \angle D$ ...(1)

In ΔBCP,

$\angle P + \angle C + \angle 1 = 180°$ ...(2)

In ΔADQ,

$\angle Q + \angle A + \angle 2 = 180°$ ...(3)

Adding (2) and (3), we get

$\angle P + \angle Q + \angle C + \angle A + \angle 1 + \angle 2 = 360°$

$$\Rightarrow \quad \angle P + \angle Q = 360° - (\angle A + \angle C) - \angle 1 - \angle 2$$

$$\Rightarrow \quad \angle P + \angle Q = 360° - (360° - \angle B - \angle D) - \frac{1}{2}\angle B - \frac{1}{2}\angle D$$

$$\Rightarrow \quad \angle P + \angle Q = \frac{1}{2}\angle B + \frac{1}{2}\angle D$$

$$\Rightarrow \quad \angle P + \angle Q = \frac{1}{2}(\angle ABC + \angle ADC)]$$

8. Find the measure of each interior angle of a regular polygon with 12 sides.
9. ABCDE is a regular pentagon. Prove that AC = CE.
10. Show that an angle of a regular octagon is $\frac{3}{2}$ times that of a square.
11. The ratio of an interior angle to the exterior angle of a regular polygon is 5 : 1. Find the number of sides.
12. Two angles of a polygon are right angles and each of the others is 150°. How many sides has the polygon?
13. ABCDE is a regular pentagon. Diagonal AD divides ∠CDE into two parts. Find the ratio of $\frac{\angle ADE}{\angle ADC}$.

14. The exterior angle of a regular polygon is $\frac{1}{3}$ of its interior angle. Find the number of sides of the polygon.
15. The angles of a hexagon are $x°$, $(x + 10)°$, $(x + 20)°$, $(x + 30)°$, $(x + 40)°$ and $(x + 50)°$. Find x.

Answers

2. 110°
3. (*a*) 60°, 80°, 100°, 120° (*b*) 27°, 54°, 81°, 135°, 243°
4. (*iii*) an octagon
5. (*iii*) 1800°
6. (*a*) (*ii*) 108° (*b*) 15 (c) (*i*) 27 (*ii*) 12
8. 150°
11. 12
12. 8
13. 1 : 2
14. 8 sides
15. 95