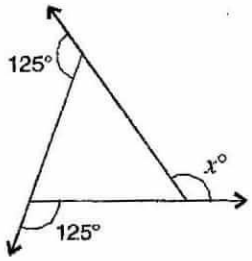
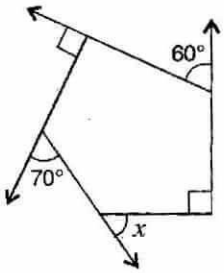
Exercise 3.2

Question 1:

Find x in the following figures:

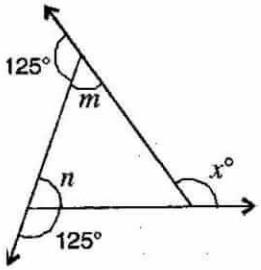


(a)



(b)

Answer 1:



(a) Here, $125° + m = 180°$ [Linear pair]

$\Rightarrow \quad m = 180° - 125° = 55°$

and $125° + n = 180°$ [Linear pair]

$\Rightarrow \quad n = 180° - 125° = 55°$

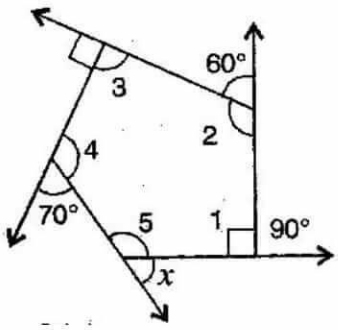
$\because$ Exterior angle $x°$ = Sum of opposite interior angles

$\therefore \quad x° = 55° + 55° = 110°$

(b) Sum of angles of a pentagon $= (n-2)\times 180°$

$= (5-2)\times 180°$

$= 3\times 180° = 540°$



By linear pairs of angles,

$\angle 1 + 90° = 180°$ .....(i)

$\angle 2 + 60° = 180°$ .....(ii)

$\angle 3 + 90° = 180°$ .....(iii)

$\angle 4 + 70° = 180°$ .....(iv)

$\angle 5 + x = 180°$ .....(v)

Adding eq. (i), (ii), (iii), (iv) and (v),

$x + (\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5) + 310° = 900$

$\Rightarrow \quad x + 540° + 310° = 900° \quad \Rightarrow x + 850° = 900° \quad \Rightarrow x = 900° - 850° = 50°$

Question 2:

Find the measure of each exterior angle of a regular polygon of:

(a) 9 sides (b) 15 sides

Answer 2:

(i) Sum of angles of a regular polygon = $(n-2)\times 180°$

$= (9-2)\times 180° = 7\times 180° = 1260°$

Each interior angle = $\dfrac{\text{Sum of interior angles}}{\text{Number of sides}} = \dfrac{1260°}{9} = 140°$

Each exterior angle = $180° - 140° = 40°$

(ii) Sum of exterior angles of a regular polygon = $360°$

Each interior angle = $\dfrac{\text{Sum of interior angles}}{\text{Number of sides}} = \dfrac{360°}{15} = 24°$

Question 3:

How many sides does a regular polygon have, if the measure of an exterior angle is $24°$?

Answer 3:

Let number of sides be n.

Sum of exterior angles of a regular polygon = $360°$

$$\text{Number of sides} = \frac{\text{Sum of exterior angles}}{\text{Each interior angle}} = \frac{360°}{24°} = 15$$

Hence, the regular polygon has 15 sides.

Question 4:

How many sides does a regular polygon have if each of its interior angles is $165°$?

Answer 4:

Let number of sides be n.

Exterior angle = $180° - 165° = 15°$

Sum of exterior angles of a regular polygon = $360°$

$$\text{Number of sides} = \frac{\text{Sum of exterior angles}}{\text{Each interior angle}} = \frac{360°}{15°} = 24$$

Hence, the regular polygon has 24 sides.

Question 5:

(a) Is it possible to have a regular polygon with of each exterior angle as $22°$?

(b) Can it be an interior angle of a regular polygon? Why?

Answer 5:

(a) No. (Since 22 is not a divisor of $360°$)

(b) No, (Because each exterior angle is $180° - 22° = 158°$, which is not a divisor of $360°$)

Question 6:

(a) What is the minimum interior angle possible for a regular polygon? Why?

(b) What is the maximum exterior angle possible for a regular polygon?

Answer 6:

(a) The equilateral triangle being a regular polygon of 3 sides has the least measure of an interior angle of 60°.

$\because$ Sum of all the angles of a triangle = $180°$

$\therefore \quad x + x + x = 180°$

$\Rightarrow \quad 3x = 180°$

$\Rightarrow \quad x = 60^\circ$

(b) By (a), we can observe that the greatest exterior angle is $180° - 60° = 120°$.