EXERCISE 28 (B)

Question 1.

Fill in the blanks :

In case of regular polygon, with

Number of sides	Each exterior angle	Each interior angle
(i) 6	....	....
(ii) 8	....	....
(iii)	36°	....
(iv)	20°	....
(v)	....	135°
(vi)	....	165°

Solution:

Number of sides	Each exterior angle	Each interior angle
(i) 6	**60°**	**120°**
(ii) 8	**45°**	**135°**
(iii) **10**	36°	**144°**
(iv) **18**	20°	**160°**
(v) **8**	**45°**	135°
(vi) **24**	**15°**	165°

(i) Each exterior angle = $\frac{360°}{6} = 60°$

Each interior angle = $180° - 60° = 120°$

(ii) Each exterior angle = $\frac{360°}{8} = 45°$

Each interior angle = $180° - 45° = 135°$

(iii) Since each exterior angles = $36°$

$\therefore$ Number of sides = $\frac{360°}{36°} = 10$

Also, interior angle = $180° - 20° = 160°$

(iv) Since each exterior angles = $20°$

$\therefore$ Number of sides = $\frac{360°}{20°} = 18$

Also, interior angle $180° - 20° = 160°$

(v) Since interior angle = $135°$

$\therefore$ Exterior angle = $180° - 135°$

$\therefore$ Number of sides = $\frac{360°}{45°} = 8$

(vi) Since interior angle = $165°$

$\therefore$ Exterior angle = $180° - 165° = 15°$

$\therefore$ Number of sides = $\frac{360°}{15°} = 24$

Question 2.

Find the number of sides in a regular polygon, if its each interior angle is :

(i) 160°

(ii) 150°

Solution:

(i) 160°

Let no. of sides of regular polygon be n

Each interior angle = 160°

$$\therefore \quad \frac{(2n-4)\times 90^\circ}{n} = 160^\circ$$

$180n - 360^\circ = 160n$

$180n - 160n = 360^\circ$

$$n = \frac{360^\circ}{20}$$

$n = 18$

(ii) 150°

Let no. of sides of regular polygon be n

Each interior angle = 150°

$$\therefore \quad \frac{(2n-4)\times 90^\circ}{n} = 150^\circ$$

$180n - 360^\circ = 150n$

$180n - 150n = 360^\circ$

$30n = 360^\circ$

$$n = \frac{360^\circ}{30}$$

$n = 12$.

Question 3.

Find number of sides in a regular polygon, if its each exterior angle is :

(i) 30°

(ii) 36°

Solution:

(i) 30°

Let number of sides = n

$$\therefore \quad \frac{360°}{n} = 30°$$

$$n = \frac{360°}{30°}$$

$$n = 12$$

(ii) 36°

Let number of sides = n

$$\therefore \quad \frac{360°}{n} = 36°$$

$$n = \frac{360°}{36°}$$

$$n = 10$$

Question 4.

Is it possible to have a regular polygon whose each interior angle is :

(i) 135°

(ii) 155°

Solution:

(i) 135°

No. of sides = n

Each interior angle = 135°

$$\therefore \frac{(2n-4)\times 90°}{n} = 135°$$

$180n - 360° = 135n$

$180n - 135n = 360°$

$$n = \frac{360°}{45°}$$

$n = 8$

Which is a whole number.

Hence, it is possible to have a regular polygon whose interior angle is 135°.

(ii) 155°

No. of sides = n

Each interior angle = 155°

$$\therefore \frac{(2n-4)\times 90°}{n} = 155°$$

$180n - 360° = 155n$

$180n - 155n = 360°$

$25n = 360°$

$$n = \frac{360°}{25°}$$

$$n = \frac{72°}{5}$$

Which is not a whole number.

Hence, it is not possible to have a regular polygon having interior angle is of 138°.

Question 5.

Is it possible to have a regular polygon whose each exterior angle is :

(i) 100°

(ii) 36°

Solution:

(i) 100°

Let no. of sides = n

Each exterior angle = 100°

$$= \frac{360°}{n} = 100°$$

$$\therefore\ n = \frac{360°}{100°}$$

$$n = \frac{18}{5}$$

Which is not a whole number.

Hence, it is not possible to have a regular polygon whose each exterior angle is 100°.

(ii) 36°

Let number of sides = n

Each exterior angle = 36°

$$= \frac{360°}{n} = 36°$$

$$\therefore\ n = \frac{360°}{36°}$$

$n = 10$

Which is a whole number.

Hence, it is possible to have a regular polygon whose each exterior angle is of 36°.

Question 6.

The ratio between the interior angle and the exterior angle of a regular polygon is 2 : 1. Find :

(i) each exterior angle of this polygon.

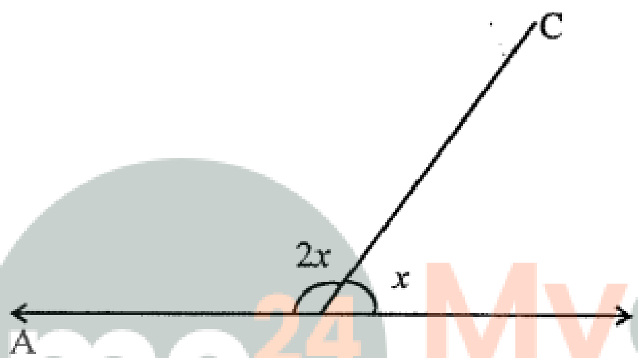
(ii) number of sides in the polygon.

Solution:

(i) Interior angle : exterior angle = 2 : 1

$\therefore$ Let interior angle = $2x°$

and exterior angle = $x°$



$\therefore$ $2x° + x° = 180°$

$$3x° = 180° = x = \frac{180°}{3} = 60°$$

(ii) $x = 60$

$\therefore$ Each exterior angle = $60°$

$$\therefore \frac{360°}{n} = 60°$$

$$n = \frac{360°}{60°} = 6 \text{ sides}$$