EXERCISE 28(B)

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) …………	36^0	…………..
(iv) …………	20^0	…………..
(v) …………	……………	135^0
(vi) ………..	…………...	165^0

Solution:

Number of sides	Each exterior angle	Each interior angle
(i) 6	60^0	120^0
(ii) 8	45^0	135^0
(iii) 10	36^0	144^0
(iv) 18	20^0	160^0
(v) 8	45^0	135^0
(vi) 24	15^0	165^0

(i) Each exterior angle = $360^0 / 6$
= 60^0
Each interior angle = $180^0 - 60^0$
= 120^0
(ii) Each exterior angle = $360^0 / 8$
= 45^0
Each interior angle = $180^0 - 45^0$
= 135^0
(iii) Given that, each exterior angle = 36^0
So, number of sides = $360^0 / 36^0$
= 10 sides
Each interior angle = $180^0 – 36^0$
= 144^0
(iv) Given that, each exterior angle = 20^0
Hence, number of sides = $360^0 / 20^0$
= 18 sides
Each interior angle = $180^0 - 20^0$
= 160^0
(v) Given that, each interior angle = 135^0
Hence, exterior angle = $180^0 - 135^0$

$= 45^0$
Therefore, number of sides $= 360^0 / 45^0$
= 8 sides
(vi) Given that, each interior angle $= 165^0$
Hence, exterior angle $= 180^0 - 165^0$
$= 15^0$
Therefore, the number of sides $= 360^0 / 15^0$
= 24 sides

2. Find the number of sides in a regular polygon, if its each interior angle is:
(i) 160^0
(ii) 150^0
Solution:
(i) 160^0
Let the number of sides of a regular polygon = n
Each interior angle $= 60^0$
The sum of interior angle of polygon can be calculated as,
$(2n – 4) \times 90^0 = 160^0 \times n$
$180^0n – 360^0 = 160^0n$
$180^0n – 160^0n = 360^0$
$20^0n = 360^0$
$n = 360^0 / 20^0$
We get,
n = 18
Hence, the number of sides = 18
(ii) 150^0
Let us consider the number of sides of regular polygon be n
The sum of the interior angle of polygon $= (2n – 4) \times 90^0$
Each interior angle $= 150^0$
The sum of the interior angle of polygon can be calculated as,
$(2n – 4) \times 90^0 = 150^0 \times n$
$180^0n – 360^0 = 150^0n$
$180^0n – 150^0n = 360^0$
$30^0n = 360^0$
$n = 360^0 / 30^0$
We get,
n = 12
Hence, the number of sides = 12

3. Find number of sides in a regular polygon, if its each exterior angle is:
(i) 30^0
(ii) 36^0
Solution:
(i) 30^0
Let us assume the number of sides be n
Each exterior angle = 30^0
Each exterior angle of polygon = 360^0 / n
Now, we have
360^0 / n = 30^0
n = 360^0 / 30^0
We get,
n = 12
Hence, the number of sides = 12
(ii) 36^0
Let us assume the number of sides be n
Each exterior angle = 36^0
Each exterior angle of polygon = 360^0 / n
Now, we have
360^0 / n = 36^0
n = 360^0 / 36^0
We get,
n = 10
Hence, the number of sides = 10

4. Is it possible to have a regular polygon whose each interior angle is:
(i) 135^0
(ii) 155^0
Solution:
(i) 135^0
Let the number of sides of regular polygon be n
The sum of the interior angle of polygon = $(2n - 4) \times 90^0$
Each interior angle = 135^0
The sum of interior angle of polygon can be calculated as,
$(2n - 4) \times 90^0 = 135^0 \times n$
$180^0n - 360^0 = 135^0n$
$180^0n - 135^0n = 360^0$
$45^0n = 360^0$
$n = 360^0 / 45^0$

We get,

$n = 8$

Since, it is a whole number

Therefore, it is possible to have a regular polygon whose interior angle is 135^0

(ii) 155^0

Let the number of sides of a regular polygon is n

The sum of the interior angle of polygon is $(2n - 4) \times 90^0$

Each interior angle = 155^0

The sum of the interior angle of polygon can be calculated as,

$(2n - 4) \times 90^0 = 155^0 \times n$

$180^0n - 360^0 = 155^0n$

$180^0n - 155^0n = 360^0$

$25^0n = 360^0$

$n = 360^0 / 25^0$

We get,

$n = 72 / 5$

Since, it is not a whole number

Therefore, it is not possible to form a regular polygon whose interior angle is 155^0

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

(i) 100^0

(ii) 36^0

Solution:

(i) 100^0

Let the number of sides be n

Each exterior angle = 100^0

Each exterior angle of a polygon is calculated as,

$360^0 / n$

So,

$360^0 / n = 100^0$

$n = 360^0 / 100^0$

We get,

$n = 18 / 5$

Since, it is not a whole number

Therefore, it is not possible to form a regular polygon

(ii) 36^0

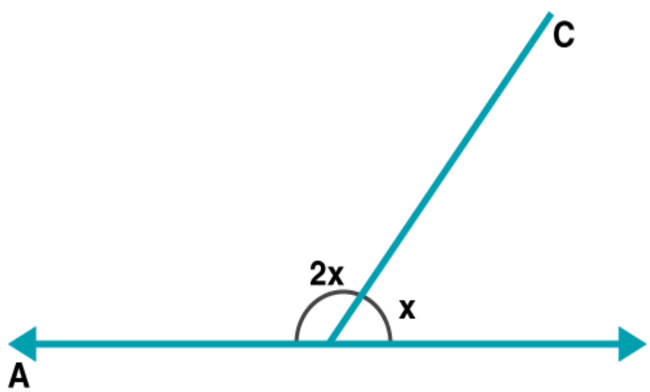
Let us consider the number of sides be n

Each exterior angle = 36^0

Each exterior angle of polygon = $360^0 / n$

So,
$360^0 / n = 36^0$
$n = 360^0 / 36^0$
We get,
$n = 10$
Since, it is a whole number
Therefore, it is possible to form a regular polygon

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) Given
Interior angle: exterior angle = 2: 1
Let us assume the interior angle = $2x^0$ and the exterior angle = x^0



The sum of the interior angle and exterior angle is 180^0
Hence,
$2x^0 + x^0 = 180^0$
$3x = 180^0$
$x = 180^0 / 3$
We get,
$x = 60^0$
Therefore, each exterior angle = 60^0
(ii) Let us assume the number of sides be n
Each exterior angle = 60^0
Each exterior angle of polygon = $360^0 / n$
So,
$360 / n = 60^0$

$n = 360^0 / 60^0$

We get,

$n = 6$

Hence, the number of sides = 6