RS Aggarwal Solutions Class 8 Mathematics
Polygons Ex 14A

Q1.

Answer :

Exterior angle of an n-sided polygon = $\left(\frac{360}{n}\right)^{o}$

(i) For a pentagon: $n = 5$

$$\therefore \left(\frac{360}{n}\right) = \left(\frac{360}{5}\right) = 72^{o}$$

(ii) For a hexagon: $n = 6$

$$\therefore \left(\frac{360}{n}\right) = \left(\frac{360}{6}\right) = 60^{o}$$

(iii) For a heptagon: $n = 7$

$$\therefore \left(\frac{360}{n}\right) = \left(\frac{360}{7}\right) = 51.43^{o}$$

(iv) For a decagon: $n = 10$

$$\therefore \left(\frac{360}{n}\right) = \left(\frac{360}{10}\right) = 36^{o}$$

(v) For a polygon of 15 sides: $n = 15$

$$\therefore \left(\frac{360}{n}\right) = \left(\frac{360}{15}\right) = 24^{o}$$

Q2.

Answer :

Each exterior angle of an n-sided polygon = $\left(\frac{360}{n}\right)^{o}$

If the exterior angle is 50°, then:

$\frac{360}{n} = 50$

$\Rightarrow n = 7.2$

Since n is not an integer, we cannot have a polygon with each exterior angle equal to 50°.

Q3.

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Answer :

For a regular polygon with n sides:

Each interior angle $= 180 - \{$Each exterior angle$\} = 180 - \left(\frac{360}{n}\right)$

(i) For a polygon with 10 sides:

Each exterior angle $= \frac{360}{10} = 36^o$

$\Rightarrow$ Each interior angle $= 180 - 36 = 144^o$

(ii) For a polygon with 15 sides:

Each exterior angle $= \frac{360}{15} = 24^o$

$\Rightarrow$ Each interior angle $= 180 - 24 = 156^o$

Q4.

Answer :

Each interior angle of a regular polygon having n sides $= 180 - \left(\frac{360}{n}\right) = \frac{180n - 360}{n}$

If each interior angle of the polygon is 100°, then:

$100 = \frac{180n - 360}{n}$

$\Rightarrow 100n = 180n - 360$

$\Rightarrow 180n - 100n = 360$

$\Rightarrow 80n = 360$

$\Rightarrow n = \frac{360}{80} = 4.5$

Since *n* is not an integer, it is not possible to have a regular polygon with each interior angle equal to 100°.

Q5.

Answer :

Sum of the interior angles of an n-sided polygon $= (n - 2) \times 180^\circ$

(i) For a pentagon:

$n = 5$

$\therefore (n - 2) \times 180^\circ = (5 - 2) \times 180^\circ = 3 \times 180^\circ = 540^\circ$

(ii) For a hexagon:

$n = 6$

$\therefore (n - 2) \times 180^\circ = (6 - 2) \times 180^\circ = 4 \times 180^\circ = 720^\circ$

(iii) For a nonagon:

$n = 9$

$\therefore (n - 2) \times 180^\circ = (9 - 2) \times 180^\circ = 7 \times 180^\circ = 1260^\circ$

(iv) For a polygon of 12 sides:

$n = 12$

$\therefore (n - 2) \times 180^\circ = (12 - 2) \times 180^\circ = 10 \times 180^\circ = 1800^\circ$

Q6.

Answer :

Number of diagonal in an n-sided polygon $= \frac{n(n-3)}{2}$

(i) For a heptagon:

$n = 7 \Rightarrow \frac{n(n-3)}{2} = \frac{7(7-3)}{2} = \frac{28}{2} = 14$

(ii) For an octagon:

$n = 8 \Rightarrow \frac{n(n-3)}{2} = \frac{8(8-3)}{2} = \frac{40}{2} = 20$

(iii) For a 12-sided polygon:

$n = 12 \Rightarrow \frac{n(n-3)}{2} = \frac{12(12-3)}{2} = \frac{108}{2} = 54$

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Q7.

Answer:

Sum of all the exterior angles of a regular polygon is 360°.

(i)
Each exterior angle $= 40^o$

Number of sides of the regular polygon $= \frac{360}{40} = 9$

(ii)
Each exterior angle $= 36^o$

Number of sides of the regular polygon $= \frac{360}{36} = 10$

(iii)
Each exterior angle $= 72^o$

Number of sides of the regular polygon $= \frac{360}{72} = 5$

(iv)
Each exterior angle $= 30^o$

Number of sides of the regular polygon $= \frac{360}{30} = 12$

Q8.

Answer:

Sum of all the interior angles of an n-sided polygon $= (n-2) \times 180^{\circ}$

$m\angle ADC = 180 - 50 = 130^o$
$m\angle DAB = 180 - 115 = 65^o$
$m\angle BCD = 180 - 90 = 90^o$
$m\angle ADC + m\angle DAB + m\angle BCD + m\angle ABC = (n-2) \times 180^{\circ} = (4-2) \times 180^{\circ} = 2$
$\times 180^{\circ} = 360^{\circ}$
$\Rightarrow m\angle ADC + m\angle DAB + m\angle BCD + m\angle ABC = 360^{\circ}$
$\Rightarrow 130^o + 65^o + 90^o + m\angle ABC = 360^{\circ}$
$\Rightarrow 285^o + m\angle ABC = 360^o$
$\Rightarrow m\angle ABC = 75^o$
$\Rightarrow m\angle CBF = 180 - 75 = 105^o$
$\therefore$ x = 105

Q9.

Answer:

For a regular n-sided polygon:
Each interior angle $= 180 - \left(\frac{360}{n}\right)$

In the given figure:
$n = 5$
$x^{\circ} = 180 - \frac{360}{5}$
$= 180 - 72$
$= 108^o$
$\therefore$ x = 108

Polygons Ex 14B

Q1.
Answer:

(a) 5

For a pentagon:
$n = 5$

$$\text{Number of diagonals} = \frac{n(n-3)}{2} = \frac{5(5-3)}{2} = 5$$

Q2.
Answer:

(c) 9

Number of diagonals in an n-sided polygon = $\frac{n(n-3)}{2}$

For a hexagon:

$n = 6$

$$\therefore \frac{n(n-3)}{2} = \frac{6(6-3)}{2}$$
$$= \frac{18}{2} = 9$$

Q3.
Answer:

(d) 20

For a regular n-sided polygon:
Number of diagonals =: $\frac{n(n-3)}{2}$
For an octagon:

$n = 8$
$$\frac{8(8-3)}{2} = \frac{40}{2} = 20$$

Q4.

Answer :

(d) 54

For an n-sided polygon:

Number of diagonals = $\frac{n(n-3)}{2}$

$\therefore n = 12$

$\Rightarrow \frac{12(12-3)}{2} = 54$

Q5.

Answer :

(c) 9

$\frac{n(n-3)}{2} = 27$

$\Rightarrow n(n-3) = 54$

$\Rightarrow n^2 - 3n - 54 = 0$

$\Rightarrow n^2 - 9n + 6n - 54 = 0$

$\Rightarrow n(n-9) + 6(n-9) = 0$

$\Rightarrow n = -6 \ or \ n = 9$

Number of sides cannot be negative.

$\therefore n = 9$

Q6.

Answer :

(b) 68°

Sum of all the interior angles of a polygon with n sides = $(n-2) \times 180°$

$\therefore (5-3) \times 180^o = x + x + 20 + x + 40 + x + 60 + x + 80$

$\Rightarrow 540 = 5x + 200$

$\Rightarrow 5x = 340$

$\Rightarrow x = 68^o$

Q7.

Answer :

(b) 9

Each exterior angle of a regular $n-$sided polygon $= \frac{360}{n} = 40$

$\Rightarrow n = \frac{360}{40} = 9$

Q8.

Answer :

(c) 5

Each interior angle for a regular n-sided polygon = $180 - \left(\frac{360}{n}\right)$

$180 - \left(\frac{360}{n}\right) = 108$

$\Rightarrow \left(\frac{360}{n}\right) = 72$

$\Rightarrow n = \frac{360}{72} = 5$

Q9.

Answer :

(a) 8

Each interior angle of a regular polygon with n sides $= 180 - \left(\frac{360}{n}\right)$

$\Rightarrow 180 - \left(\frac{360}{n}\right) = 135$

$\Rightarrow \frac{360}{n} = 45$

$\Rightarrow n = 8$

Q10.

Answer :

(b) 8

For a regular polygon with n sides:

Each exterior angle = $\frac{360}{n}$

Each interior angle = $180 - \frac{360}{n}$

$\therefore 180 - \frac{360}{n} = 3\left(\frac{360}{n}\right)$

$\Rightarrow 180 = 4\left(\frac{360}{n}\right)$

$\Rightarrow n = \frac{4 \times 360}{180} = 8$

Q11.

Answer :

(c) 144°

Each interior angle of a regular decagon = $180 - \frac{360}{10} = 180 - 36 = 144^o$

Q12.

Answer :

(b) 8 *right* $\angle s$

Sum of all the interior angles of a hexagon is $(2n - 4)$ right angles.

For a hexagon:

$n = 6$

$\Rightarrow (2n - 4) \text{ right } \angle s = (12 - 4) \text{ right } \angle s = 8 \text{ right } \angle s$

Q13.

Answer :

(a) 135°

$(2n - 4) \times 90 = 1080$

$(2n - 4) = 12$

$2n = 16$

or $n = 8$

Each interior angle $= 180 - \frac{360}{n} = 180 - \frac{360}{8} = 180 - 45 = 135^o$