8TH CBSE MATHS UNDERSTANDING QUADRILATERALS

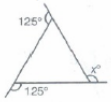
151) How many diagonals does each of the following have?
(a) A convex quadrilateral
(b) A regular hexagon
(c) A triangle

Answer : We know that, a diagonal is a line segment connecting two non-consecutive vertices of a polygon.
(a) A convex quadrilateral has two diagonals.
(b) A regular hexagon has nine diagonals.
(c) A triangle has no diagonals.

153) What is a regular polygon? State the name of a regular polygon of
(i) 3 sides
(ii) 4 sides
(iii) 6 sides

Answer : A polygon is called a regular polygon, if it is both equiangular and equilateral i.e. its all interior angles are equal and its all sides are equal.
(i) The name of a regular polygon of 3 sides is an equilateral triangle.
(ii) The name of a regular polygon of 4 sides is a square.
(iii) The name of a regular polygon of 6 sides is a hexagon.

154) Find x in the following figures.



Answer : (a) We know that, the sum of the exterior angles of any polygon is 360°.
$\therefore x+125°+125°=360°$
$\Rightarrow x + 250° = 360°$
$\Rightarrow x = 360° - 250° = 110°$
Hence, the measure of angle x is 110°.

155) Find the measure of each exterior angle of a regular polygon of 9 sides

Answer : Given, number of sides of a polygon = 9
i.e. number of exterior angles = 9
and sum of all exterior angle = 360°
$\therefore$ Measure of each exterior angle = $\frac{360^0}{9} = 40^0$.

156) Find the measure of each exterior angle of a regular polygon of 15 sides

Answer : Given, number of sides of polygon = 15
i.e, number of exterior angles = 15
and sum of all exterior angles = 360°
$\therefore$ Measure of each exterior angle = $\frac{360^0}{15} = 24^0$.

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

Answer : Weknow that, the sum of the measures of exterior angles of any polygon is 360°.
Given, measure of each exterior angle = 24°

$\therefore$ Number of exterior angles = $\frac{360^0}{Measure\ of\ each\ exterior\ angle} = \frac{360^0}{24^0} = 15$

Hence, the number of sides of a regular polygon is 15.

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

Answer : Firstly,find the measure of exterior angle by subtracting measureof interior angle from 180°.

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

Answer : Given, measure of each exterior angle =22°
We know that, the sum of the measures of all exterior angles of a regular polygon is 360°.
$\therefore$ Number of sides of a polygon

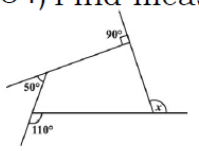
$= \frac{360^0}{Measure\ of\ each\ exterior\ angle} = \frac{360^0}{22^2} = \frac{180}{11}$

which is not a whole number.
Hence, 22° cannot be an exterior angle of a regular polygon.

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

Answer : No, it cannot be an interior angle of a regular polygon, because if interior angle is 22°, then each exterior angle is (180° - 22°) = 158°, which is not a divisor of 360°.

184) Find measure x in Fig



Answer : x + 90° + 50° + 110° = 360°
x + 250° = 360°
x = 110°

185) Find the number of sides of a regular polygon whose each exterior angle has a measure of 45°.

Answer : Total measure of all exterior angles = 360°
Measure of each exterior angle = 45°
Therefore, the number of exterior angles = $\frac{360}{45} = 8$
The polygon has 8 sides.

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186) Find the number of diagonals possible in regular hexagon.

Answer : ∵ Number of sides in hexagon (n) =6

∴ Number of diagonals $=\frac{n(n-3)}{2}=\frac{6(6-3)}{2}=\frac{18}{2}=9$

187) Four angles of a quadrilateral are in the ratio 4 : 3 : 5 : 3. Find the angles.

Answer : Let the angles be 4x, 3x, 5x and 3x, respectively.
From the angle sum property, ∠A + ∠B + ∠C + ∠D = 180°
Here, ∠A=4x, ∠B=3x, ∠C=5xand ∠D=3x

∴ 4x+3x+5x+3x=360° ⇒ 15x=360° ⇒ $x=360^0 \times \frac{1}{15}=24^0$

So, the angles are 24° x 4° ,24° x 3° ,24° x 5° ,24° x 3°, i.e. 96°, 72°, 120°, 72°.

188) Find the measure of each interior angle of a regular polygon with 12 sides.

Answer : We have, n=12

Each interior angle = $\frac{180^0\times(n-2)}{n}=\frac{180^0\times(12-2)}{12}=\frac{1800^0}{12}=150^0$

189) Find the measure of each interior angle of a regular polygon with 18 sides.

Answer : We have, n=18

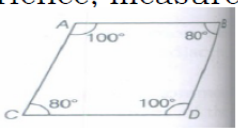
Each interior angle = $\frac{180^0\times(18-2)}{18}=\frac{180^0\times16}{18}=160^0$.

211) The measure of two adjacent angles of a parallelogram are in the ratio 5:4. Find the measure of each of the angles of parallelogram.

Answer : Let the adjacent angles be 5x and 4x, respectively.
We know that, the adjacent angle in a parallelogram is supplementary.

So, 5x + 4x =180° ⇒ 9x=180° ⇒ $x=180^0 \times \frac{1}{9}=20^0$

So, the adjacent angles are 20° X 5 i.e. 100° and 20° X 4 i.e. 80°.
Also, in a parallelogram, opposite angles are equal.
Hence, measure of each of the angles are 100°, 80°, 100° and 80°.



234) Find the measure of each interior angle of a regular nonagon.

Answer : Exterior angle of a regular nonagon= $\frac{360^0}{9}$

[in nonagon, sides are 9]
∴ Interior angle of a regular nonagon
=180° - 40° = 140°

235) Find the number of diagonals in a octagon.

Answer : We know that, number of diagonals in a polygon of n sides = $\frac{n(n-3)}{2}$

∴ Number of diagonals of 8 sides
$=\frac{8(8-3)}{2}=\frac{8\times5}{2}=20$

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