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G.D.GOENKA PUBLIC SCHOOL

Subject: Mathematics (8th)

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Chapter 13 (Understanding Quadrilaterals)

Exercise 13.1

(5) Find the number of sides of a regular polygon if each interior angle is:

(i) 144°

Sum of all interior angles = $(n-2)\times 180° = n\times 144°$

$\therefore (180°)n - 360° = (144°)n$

$(180°)n - (144°)n = 360°$

$(36°)n = 360°$

$\therefore n = \frac{360°}{36°} = 10$

(ii) 108°

Sum of all interior angles = $(n-2)\times 180° = n\times 108°$

$\therefore (180°)n - 360° = (108°)n$

$(180°)n - (108°)n = 360°$

$(72°)n = 360°$

$\therefore n = \frac{360°}{72°} = 5$

(iii) 165°

Sum of all interior angles = $(n-2)\times 180° = n\times 165°$

$\therefore (180°)n - 360° = (165°)n$

$(180°)n - (165°)n = 360°$

$(15°)n = 360°$

$\therefore n = \frac{360°}{15°} = 24$

(iv) 156°

Sum of all interior angles = $(n-2)\times 180° = n\times 156°$

$\therefore (180°)n - 360° = (156°)n$

$(180°)n - (156°)n = 360°$

$(24°)n = 360°$

$\therefore n = \frac{360°}{24°} = 15$

(6) Find each angle of a quadrilateral, if all of them are equal.

Let each equal angle be x.

By, angle sum property of a quadrilateral

$x + x + x + x = 360°$

$\Rightarrow 4x = 360°$

$\Rightarrow x = \frac{360°}{4} = 90°$

$\therefore$ Angles are 90° each.

(7) PQRS is a quadrilateral in which PQ||RS, $\angle PQR$ is 130° and $\angle QPS = 75°$. Find $\angle PSR$ and $\angle QRS$.

Sides PQ and RS are parallel.

Hence the other sides PS and QR can be considered as transversals.

Hence $\angle P$ and $\angle S$ must be supplementary as they are co-interior angles on the same side of the transversal.

$\therefore \angle P + \angle S = 180°$

$\angle S = 180° - \angle P$

$\angle S = 180° - 75° = 105°$

Similarly, $\angle Q$ and $\angle R$ must be supplementary as they are co-interior angles

$\therefore \angle Q + \angle R = 180°$

$\angle R = 180° - \angle S$

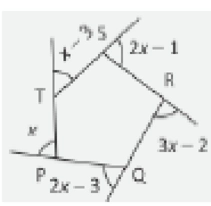
$\angle R = 180° - 130° = 50°$

Thus $\angle PSR = 105°$ and $\angle QRS = 180° - 130° = 50°$

[Note: The naming of the angles depend on the way the vertices are named and can vary.

Hence whether $\angle 105°$ is called $\angle PSR$ and $\angle 50°$ is called $\angle QRS$ or the other way round can vary.]

(8) In the pentagon PQRST, find the measure of each of its exterior angles.



Sum of the five exterior angles = 360°. [True for any polygon]

$\therefore (2x-1)+(3x-2)+(2x-3)+x+(x-3) = 360°$

$\therefore 9x - 9 = 360°$

$\therefore x - 1 = \frac{360°}{9} = 40° \Rightarrow x = 41°$

$\therefore (2x-1) = 2\times(41°) - 1 = 81°$

$\therefore (3x-2) = 3\times(41°) - 2 = 121°$

$\therefore (2x-3) = 2\times(41°) - 3 = 79°$

$\therefore x = 41°$

$\therefore (x-3) = (41°) - 3 = 38°$

$\Rightarrow$ Angles are $\angle S = 81°$, $\angle R = 121°$, $\angle Q = 79°$, $\angle P = 41°$, $\angle T = 38°$

Write Q5 to Q8 in your mathematics notebook.