Chapter 18. Rectilinear Figures

Ex 18.1

Answer 1.

(i) When n= 7

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

$= (7-2) \times 180°$

$= 5 \times 180° = 900°$

(ii) When n= 12

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

$= (12-2) \times 180°$

$= 10 \times 180° = 1800°$

(iii) When n= 9

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

$= (9-2) \times 180°$

$= 7 \times 180° = 1260°$

Answer 2.

(i) When n = 6

$\therefore$ Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^0}{n}$

$= \dfrac{(6-2) \times 180^0}{6}$

$= 120°$

(ii) When n = 10

$\therefore$ Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^0}{n}$

$= \dfrac{(10-2) \times 180^0}{10}$

$= 144°$

(iii) When n = 15

$\therefore$ Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^0}{n}$

$= \dfrac{(15-2) \times 180^0}{15}$

$= 156°$

Answer 3.

(i) When n = 9

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^\circ}{n} = \frac{360^\circ}{9} = 40^\circ$

(ii) When n = 15

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^\circ}{n} = \frac{360^\circ}{15} = 24^\circ$

(iii) When n = 18

$\therefore$ Each exterior angle of a regular polygon = $\frac{360^\circ}{n} = \frac{360^\circ}{18} = 20^\circ$

Answer 4.

(i) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^\circ}{n}$

$$\Rightarrow \frac{(n-2) \times 180^\circ}{n} = 120^\circ$$
$$\Rightarrow 180^\circ (n-2) = 120^\circ (n)$$
$$\Rightarrow 3(n-2) = 2n$$
$$\Rightarrow n = 6$$

(ii) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^\circ}{n}$

$$\Rightarrow \frac{(n-2) \times 180^\circ}{n} = 140^\circ$$
$$\Rightarrow 180^\circ (n-2) = 140^\circ (n)$$
$$\Rightarrow 9(n-2) = 7n$$
$$\Rightarrow n = \frac{18}{2} = 9$$

(iii) Each interior angle of a regular polygon = $\frac{(n-2) \times 180^\circ}{n}$

$$\Rightarrow \frac{(n-2) \times 180^\circ}{n} = 135^\circ$$
$$\Rightarrow 180^\circ (n-2) = 135^\circ (n)$$
$$\Rightarrow 4(n-2) = 3n$$
$$\Rightarrow n = 8$$

Answer 5.

(i) Each exterior angle = $\frac{360^\circ}{n}$

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

$\Rightarrow \quad n = 18$

(ii) Each exterior angle = $\frac{360^\circ}{n}$

$\Rightarrow \quad \frac{360^\circ}{n} = 60^\circ$

$\Rightarrow \quad n = 6$

(iii) Each exterior angle = $\frac{360^\circ}{n}$

$\Rightarrow \quad \frac{360^\circ}{n} = 72^\circ$

$\Rightarrow \quad n = 5$

Answer 6.

A pentagon has 5 sides

$\therefore$ Sum of interior angles = $(n-2) \times 180^\circ$

$= (5-2) \times 180^\circ$

$= 3 \times 180^\circ = 540^\circ$

Given , the angles are $100^\circ, 96^\circ, 74^\circ, 2x^\circ$ and $3x^\circ$

$\therefore \quad 100^\circ + 96^\circ + 74^\circ + 2x^\circ + 3x^\circ = 540^\circ$

$\Rightarrow \quad 5x^\circ + 270^\circ = 540^\circ$

$\Rightarrow \quad x^\circ = \frac{(540^\circ - 270^\circ)}{5} = 54^\circ$

$\therefore$ The two angles $2x^\circ$ and $3x^\circ$ are 108° and 162° respectively.

Answer 7.

A quadrilateral is a polygon with four sides

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

$= (4-2) \times 180°$

$= 2 \times 180° = 360°$

Given, the three interior angles are $71°, 110°, 95°$

Let the fourth angle be x

$\therefore \quad 71° + 110° + 95° + x = 360°$

$\Rightarrow \quad x + 276° = 360°$

$\Rightarrow \quad x = 360° - 276° = 84°$

$\therefore$ The fourth angle is $84°$.

Answer 8.

A pentagon has 5 sides

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

$= (5-2) \times 180°$

$= 3 \times 180° = 540°$

Ratio of the angles = 4:4:6:7:6

$\therefore$ The interior angles are $4x°$, $4x°$, $6x°$, $7x°$ and $6x°$.

$\therefore \quad 4x° + 4x° + 6x° + 7x° + 6x° = 540°$

$\Rightarrow \quad 27x° = 540°$

$\Rightarrow \quad x° = 20°$

$\therefore$ The interior angles of the pentagon are $80°, 80°, 120°, 140°$ and $120°$.

Answer 9.

A quadrilateral is a polygon with four sides

$\therefore$ Sum of interior angles = (n-2) x 180°

= (4-2) x 180°

= 2 x 180° = 360°

Ratio of the angles = 1:4:5:2

$\therefore$ The interior angles are x°, 4x°, 5x° and 2x°.

$$\therefore \quad x^\circ + 4x^\circ + 5x^\circ + 2x^\circ = 360^\circ$$

$$\Rightarrow \quad 12x^\circ = 360^\circ$$

$$\Rightarrow \quad x^\circ = 30^\circ$$

$\therefore$ The interior angles of the quadrilateral are 30°, 120°, 150° and 60°.

Answer 10.

A pentagon has 5 sides

$\therefore$ Sum of interior angles = (n-2) x 180°

= (5-2) x 180°

= 3 x 180° = 540°

Given, the angles are x°, (x-10)°, (x+20)°,(2x-44)° and (2x-70)°

$$\therefore \quad x^\circ + (x-10)^\circ + (x+20)^\circ + (2x-44)^\circ + (2x-70)^\circ = 540^\circ$$

$$\Rightarrow \quad 7x^\circ - 104^\circ = 540^\circ$$

$$\Rightarrow \quad x^\circ = \frac{(540^\circ + 104^\circ)}{7} = 92^\circ$$

$\therefore$ The interior angles of the pentagon are 92°, 82°, 112°, 140° and 114°.

Answer 11.

A hexagon has 6 sides

$\therefore$ Sum of interior angles = (n-2) x 180°

= (6-2) x 180°

= 4 x 180° = 720°

Given, the angles of a hexagon are (2x+5)°, (3x-5)°, (x+40)°, (2x+20)°,(2x+25)° and (2x+35)°

$$\therefore \quad (2x+5)^\circ + (3x-5)^\circ + (x+40)^\circ + (2x+20)^\circ + (2x+25)^\circ + (2x+35)^\circ = 720^\circ$$

$$\Rightarrow \quad 12x + 120^\circ = 720^\circ$$

$$\Rightarrow \quad x = 50^\circ$$

Answer 12.

A hexagon has 6 sides

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

$= (6-2) \times 180°$

$= 4 \times 180° = 720°$

One angle is given to be 140°

Ratio of the remaining five angles = 4:3:4:5:4

$\therefore$ The interior angles are $4x°$, $3x°$, $4x°$, $5x°$ and $4x°$

$\therefore$ $140° + 4x° + 3x° + 4x° + 5x° + 4x° = 720°$

$\Rightarrow$ $20x° + 140° = 720°$

$\Rightarrow$ $x° = 580° / 20 = 29°$

$\therefore$ The smallest angle is $3x° = 3.\ 29° = 87°$

$\therefore$ The largest angle is $5x° = 5.\ 29° = 145°$

Answer 13.

A pentagon has 5 sides

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

$= (5-2) \times 180°$

$= 3 \times 180° = 540°$

One angle is given to be 160°

Ratio of the remaining four angles = 1:1:1:1

$\therefore$ The interior angles are $x°$, $x°$, $x°$ and $x°$

$\therefore$ $160° + x° + x° + x° + x° = 540°$

$\Rightarrow$ $4x° = 540° - 160° = 380°$

$\Rightarrow$ $x° = 95°$

$\therefore$ Each equal angle is 95°.

Answer 14.

A nonagon has 9 sides.

$\therefore$ Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^0}{n}$

$= \dfrac{(9-2) \times 180^0}{9}$

$= 140°$

Answer 15.

Here $n = 20$

$\therefore$ Each interior angle of the regular polygon $= \dfrac{(n-2) \times 180^\circ}{n}$

$= \dfrac{(20-2) \times 180^\circ}{20}$

$= 162^\circ$

Answer 16A.

Let the number of sides in the polygon be n.

$\therefore (n-2) \times 180^\circ = 780^\circ$

$\Rightarrow 180^\circ n - 360^\circ = 780^\circ$

$\Rightarrow 180^\circ n = 1140^\circ$

$\Rightarrow n = \dfrac{1140^\circ}{180^\circ} = 6\dfrac{1}{3}$

Since the number of sides of a polygon cannot be in a fraction, therefore the polygon is not possible.

Answer 16B.

Let the number of sides in the polygon be n.

$\therefore (n-2) \times 180^\circ = 7$ Right Angles

$\Rightarrow (n-2) \times 180^\circ = 7 \times 90^\circ$

$\Rightarrow 180^\circ n - 360^\circ = 630^\circ$

$\Rightarrow 180^\circ n = 990^\circ$

$\Rightarrow n = \dfrac{990^\circ}{180^\circ} = \dfrac{11}{2} = 5\dfrac{1}{2}$

Since the number of sides of a polygon cannot be in a fraction, therefore the polygon is not possible.

Answer 17A.

Given each interior angle $= 124^\circ$

So, each exterior angle $= 180^\circ - 124^\circ = 56^\circ$

Thus, the number of sides of the polygon

$= \dfrac{360^\circ}{\text{Each exterior angle}}$

$= \dfrac{360^\circ}{56^\circ}$

$= 6\dfrac{3}{7}$, which is not a natural number

Therefore, no polygon is possible whose each interior angle is 124°.

Answer 17B.

Given each interior angle = 105°

So, each exterior angle = $180^\circ - 105^\circ = 75^\circ$

Thus, the number of sides of the polygon

$= \dfrac{360^\circ}{\text{Each exterior angle}}$

$= \dfrac{360^\circ}{75^\circ}$

$= 4\dfrac{4}{5}$, which is not a natural number

Therefore, no polygon is possible whose each interior angle is 105°.

Answer 18.

The sum of the interior angles of heptagon

$= (n-2) \times 180^\circ$

$= (7-2) \times 180^\circ$

$= 5 \times 180^\circ$

$= 900^\circ$

Since, three angles are equal to 120°,

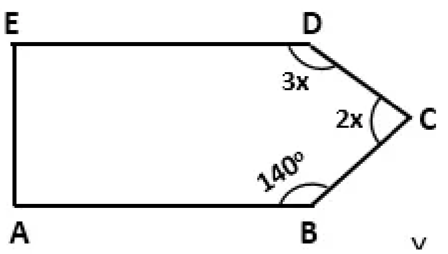
$\therefore$ The sum of remaining four angles $= 900^\circ - 3 \times 120^\circ = 900^\circ - 360^\circ = 540^\circ$

Since, these angles are equal,

$\therefore$ The measure of each equal angle $= \dfrac{540^\circ}{4} = 135^\circ$

Thus, the angles of heptagon are 120°, 120°, 120°, 135°, 135°, 135°, 135°.

Answer 19.



Since, AB || ED, we have

$\angle A + \angle E = 180^\circ$

Now, $\angle A + \angle B + \angle C + \angle D + \angle E = (5-2) \times 180^\circ$

$\Rightarrow (\angle A + \angle E) + 140^\circ + 2x + 3x = 3 \times 180^\circ$

$\Rightarrow 180^\circ + 140^\circ + 5x = 540^\circ$

$\Rightarrow 320^\circ + 5x = 540^\circ$

$\Rightarrow 5x = 220^\circ$

$\Rightarrow x = 44^\circ$

Hence,

$\angle C = 2x = 2 \times 44^\circ = 88^\circ$

$\angle D = 3x = 3 \times 44^\circ = 132^\circ$

Answer 20.

Let the number of sides of the polygon be n

Number of right angles = 3

$\therefore$ Number of angles of 165° each = $n - 3$

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

$\Rightarrow 3 \times 90^\circ + (n-3)165^\circ = 180^\circ n - 360^\circ$

$\Rightarrow 270^\circ + 165^\circ n - 495^\circ = 180^\circ n - 360^\circ$

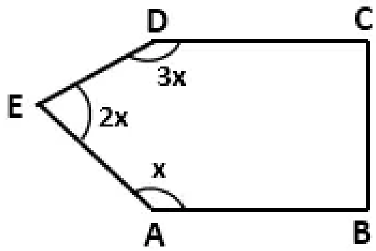
$\Rightarrow 180^\circ n - 165^\circ k = 270^\circ - 495^\circ + 360^\circ$

$\Rightarrow 15^\circ n = 135^\circ$

$\Rightarrow n = 9$

Thus, the number of sides in the polygon is 9.

Answer 21.



Given AB || DC

$\Rightarrow \angle B + \angle C = 180^\circ$

Also, $\angle A : \angle E : \angle D = 1 : 2 : 3$

$\Rightarrow \angle A = x$, $\angle E = 2x$ and $\angle D = 3x$

Since, $\angle A + \angle B + \angle C + \angle D + \angle E = (5-2) \times 180^\circ$

$\Rightarrow \angle A + (\angle B + \angle C) + \angle D + \angle E = 3 \times 180^\circ$

$\Rightarrow x + 180^\circ + 3x + 2x = 540^\circ$

$\Rightarrow 6x + 180^\circ = 540^\circ$

$\Rightarrow 6x = 360^\circ$

$\Rightarrow x = 60^\circ$

Hence, $\angle A = 60^\circ$

Answer 22.

Each exterior angle of a regular polygon of n sides = $\frac{360^\circ}{n}$

$\therefore$ Each exterior angle of a regular polygon of (n + 1) sides = $\frac{360^\circ}{n+1}$

Difference between the two exterior angles = 4°

$\Rightarrow \frac{360^\circ}{n} - \frac{360^\circ}{n+1} = 4^\circ$

$\Rightarrow \frac{90}{n} - \frac{90}{n+1} = 1$

$\Rightarrow \frac{90n + 90 - 90n}{n(n+1)} = 1$

$\Rightarrow 90 = n^2 + n$

$\Rightarrow n^2 + n - 90 = 0$

$\Rightarrow n^2 + 10n - 9n - 90 = 0$

$\Rightarrow n(n+10) - 9(n+10) = 0$

$\Rightarrow (n+10)(n-9) = 0$

$\Rightarrow n + 10 = 0 \text{ or } n - 9 = 0$

$\Rightarrow n = -10 \text{ or } n = 9$

Since the number of sides cannot be negative, we have n = 9.

Answer 23.

Ratio of the sides = 2 : 3.

$\therefore$ Number of sides in each polygon is 2x and 3x.

Interior angle of a regular polygon of n sides = $\frac{(n-2) \times 180^\circ}{n}$

$\therefore$ Interior angle of a regular polygon of 2x sides = $\frac{(2x-2) \times 180^\circ}{2x}$

And, interior angle of a regular polygon of 3x sides = $\frac{(3x-2) \times 180^\circ}{3x}$

Ratio of the interior angles = 9 : 10

$\Rightarrow \frac{(2x-2) \times 180^\circ}{2x} : \frac{(3x-2) \times 180^\circ}{3x} = 9 : 10$

$\Rightarrow \frac{(2x-2) \times 180^\circ}{2x} \times \frac{3x}{(3x-2) \times 180^\circ} = \frac{9}{10}$

$\Rightarrow \frac{(x-1) \times 180^\circ}{x} \times \frac{3x}{(3x-2) \times 180^\circ} = \frac{9}{10}$

$\Rightarrow \frac{3(x-1)}{(3x-2)} = \frac{9}{10}$

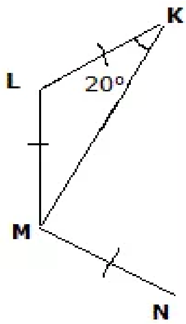
$\Rightarrow \frac{x-1}{3x-2} = \frac{3}{10}$

$\Rightarrow 10x - 10 = 9x - 6$

$\Rightarrow x = 4$

$\therefore$ Number of sides in each polygon = 2(4) = 8 and 3(4) = 12.

Answer 24.



In ΔLMK, LM = LK [Sides of a regular polygon]

$\therefore$ $\angle LMK = \angle LKM = 20°$ [Angles opp to equal sides are equal]

$\therefore$ $\angle LKM + \angle LMK + \angle KLM = 180°$

$\Rightarrow$ $20° + 20° + \angle KLM = 180°$

$\Rightarrow$ $\angle KLM = 140°$

$\therefore$ Each interior angle of the polygon is 140°.

Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^o}{n}$

$\Rightarrow$ $\dfrac{(n-2) \times 180^o}{n} = 140°$

$\Rightarrow$ $180°(n-2) = 140°n$

$\Rightarrow$ $40°n = 360°$

$\therefore$ $n = 9$

$\therefore$ Number of sides of the polygon = 9

Answer 25.

Ratio of the sides is 3:4

$\therefore$ Number of sides in each polygon is 3x and 4x.

Each interior angle of a regular polygon = $\dfrac{(n-2) \times 180^o}{n}$

$\therefore$ Interior angle of a regular polygon of 3x sides = $\dfrac{(3x-2) \times 180^o}{3x}$

And Interior angle of a regular polygon of 4x sides = $\dfrac{(4x-2) \times 180^o}{4x}$

Ratio of the interior angles is 2:3

$$\Rightarrow \left\{\frac{(3x-2) \times 180^o}{3x}\right\} : \left\{\frac{(4x-2) \times 180^o}{4x}\right\} = 2:3$$

$$\Rightarrow \left\{\frac{(3x-2) \times 180^o}{3x}\right\} \times \left\{\frac{4x}{(4x-2) \times 180^o}\right\} = \frac{2}{3}$$

$\Rightarrow \quad \frac{(3x-2)}{(4x-2)} \times \frac{4}{3} = \frac{2}{3}$

$\Rightarrow \quad 2(3x-2) = (4x-2)$

$\Rightarrow \quad 2x = 2$

$\therefore \quad x = 1$

So, the number of sides of each of the polygons are 3 and 4.

Answer 26.

A heptagon has 7 sides.

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

$= (7-2) \times 180°$

$= 5 \times 180° = 900°$

Given, four of its angles are equal

Let the equal angles be x° each.

$\therefore \quad 132°+132°+132°+x+x+x+x=900°$

$\Rightarrow \quad 4x + 396° = 900°$

$\Rightarrow \quad 4x = 504°$

$\Rightarrow \quad x = 126°$

$\therefore$ Measure of each equal angle is 126°.

Answer 27.

An octagon has 8 sides.

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

$= (8-2) \times 180°$

$= 6 \times 180° = 1080°$

Given, six of its angles are equal.

Let the equal angles be x° each.

$\therefore \quad 148° + 152° + x + x + x + x + x + x = 1080°$

$\Rightarrow \quad 6x + 300° = 1080°$

$\Rightarrow \quad 6x = 780°$

$\Rightarrow \quad x = 130°$

Each of the equal angles are equal to 130°.

Answer 28.

An octagon has 8 sides, hence eight angles.

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

$= (8-2) \times 180°$

$= 6 \times 180° = 1080°$

Given, four of its angles are equal.
Let each of the equal angles be $x°$

$\therefore$ Other four angles are = $(x + 20)°$

$\therefore$ $x° + x° + x° + x° + (x+20)° + (x+20)° + (x+20)° + (x+20)° = 1080°$

$\Rightarrow$ $8x° + 80° = 1080°$

$\Rightarrow$ $8x° = 1000°$

$\therefore$ $x° = 125°$

$\therefore$ The four equal angles are $125°$
The other four angles are = $125° + 20° = 145°$.

Answer 29.

Let the interior angle be x

Then, the exterior angle is $\frac{x}{3}$

$\therefore$ $x + \frac{x}{3} = 180°$

[Interior angle and exterior angle form a linear pair]

$\Rightarrow$ $\frac{4x}{3} = 180°$

$\Rightarrow$ $x = \frac{3}{4} \times 180° = 135°$

$\therefore$ Exterior angle = $\frac{135°}{3} = 45°$

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

$\Rightarrow$ $\frac{360°}{n} = 45°$

$\Rightarrow$ $n = 8$

$\therefore$ The regular polygon has 8 sides.

Answer 30.

Let the exterior angle be x

Then, the interior angle is 2x

$\therefore \quad x + 2x = 180°$

[Interior angle and exterior angle form a linear pair]

$\Rightarrow \quad 3x = 180°$

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

$\therefore$ Exterior angle = 60°

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

$\Rightarrow \quad \frac{360°}{n} = 60°$

$\Rightarrow \quad n = 6$

$\therefore$ The regular polygon has 6 sides.

Answer 31.

Sum of the interior angles of a polygon = (n-2) x 180°

Sum of the exterior angles of a polygon = 360°

Given, Sum of the interior angles of a polygon = 6.5(Sum of the exterior angles of a polygon)

$\therefore \quad (n-2) \times 180° = 6.5 \times 360°$

$\Rightarrow \quad n - 2 = 13$

$\Rightarrow \quad n = 15$

$\therefore$ The polygon has 15 sides.

Answer 32.

Each exterior angle of a regular polygon of n sides = $\frac{360^\circ}{n}$

$\therefore$ Each exterior angle of a regular polygon of (n-1) sides = $\frac{360^\circ}{n-1}$

$\therefore$ Each exterior angle of a regular polygon of (n+2) sides = $\frac{360^\circ}{n+2}$

Difference between the two exterior angles = 6°

$$\therefore \quad \frac{360^\circ}{n-1} - \frac{360^\circ}{n+2} = 6^\circ$$

$$\Rightarrow \quad 360^\circ\left[\frac{n+2-n+1}{(n-1)(n+2)}\right] = 6^\circ$$

$$\Rightarrow \quad 60 \times 3 = (n-1)(n+2)$$

$$\Rightarrow \quad 180 = n^2 + n - 2$$

$$\Rightarrow \quad n^2 + n - 182 = 0$$

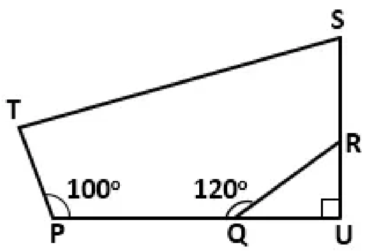
$$\Rightarrow \quad n^2 + 14n - 13n - 182 = 0$$

$$\Rightarrow \quad (n+14)(n-13) = 0$$

$\therefore$ n = -14 (rejected as number of sides can't be negative) or n = 13

$\therefore$ The value of n is 13.

Answer 33.



In the figure, PQ and SR produced meet at point P,

$\therefore \angle U = 90^\circ$

$\angle Q = 120^\circ$

$\Rightarrow \angle UQR = 180^\circ - 120^\circ = 60^\circ$

$\therefore \angle URQ = 90^\circ - \angle UQR = 90^\circ - 60^\circ = 30^\circ$

$\therefore QRS = 180^\circ - \angle URQ = 180^\circ - 30^\circ = 150^\circ$

Let $\angle S = \angle T = x$

Since, $\angle P + \angle Q + \angle QRS + \angle S + \angle T = (5-2) \times 180^\circ$

$\Rightarrow 100^\circ + 120^\circ + 150^\circ + x + x = 3 \times 180^\circ$

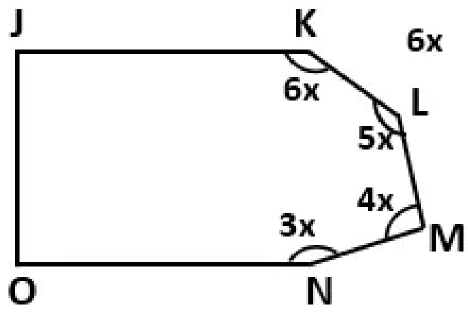
$\Rightarrow 370^\circ + 2x = 540^\circ$

$\Rightarrow 2x = 170^\circ$

$\Rightarrow x = 85^\circ$

Hence, $\angle PTS = 85^\circ$

Answer 34.



Given JK || ON

$\Rightarrow \angle J + \angle O = 180°$

Also, $\angle K : \angle L : \angle M : \angle N = 6 : 5 : 4 : 3$

$\Rightarrow \angle K = 6x,\ \angle L = 5x,\ \angle M = 4x$ and $\angle N = 3x$

Since, $\angle J + \angle K + \angle L + \angle M + \angle N + \angle O = (6 - 2) \times 180°$

$\Rightarrow (\angle J + \angle O) + \angle K + \angle L + \angle M + \angle N = 4 \times 180°$

$\Rightarrow 180° + 6x + 5x + 4x + 3x = 720°$

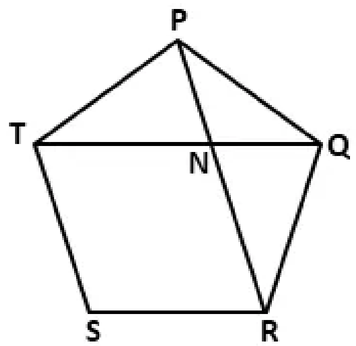
$\Rightarrow 18x + 180° = 720°$

$\Rightarrow 18x = 540°$

$\Rightarrow x = 30°$

Hence, $\angle K = 6x = 6 \times 30° = 180°$ and $\angle M = 4x = 4 \times 30° = 120°$

Answer 35.



Each interior angle of a regular pentagon $= \dfrac{(5-2) \times 180°}{5} = 3 \times 36° = 108°$

Now, in ΔPQT,

PT = PQ ....(sides of a regular pentagon)

$\Rightarrow \angle PQT = \angle PTQ = x(\text{say})$

Now, $\angle PQT + \angle PTQ + \angle QPT = 180°$

$\Rightarrow x + x + 108° = 180°$

$\Rightarrow 2x = 72°$

$\Rightarrow x = 36°$

$\Rightarrow \angle PQT = \angle PTQ = 36°$

Similarly, we can rove that in ΔPQR,

$\angle QPR = \angle QRP = 36°$

Now, $\angle RQT = \angle RQP - \angle PQT$

$= 108° - 36°$

$= 72°$

In ΔQNP,

$\angle PQN + \angle QPN + \angle QNP = 180^\circ$

$\Rightarrow 36^\circ + 36^\circ + \angle QNP = 180^\circ$

$\Rightarrow \angle QNP = 180^\circ - 72^\circ$

$\Rightarrow \angle QNP = 108^\circ$

Answer 36.

Each interior angle of a regular polygon of n sides $= \dfrac{(n-2) \times 180^\circ}{n}$

Each exterior angle of a regular polygon of n sides $= \dfrac{360^\circ}{n}$

Now,

$$\frac{360^\circ}{n} = \frac{1}{p} \times \frac{(n-2) \times 180^\circ}{n}$$

$$\Rightarrow 360^\circ = \frac{1}{p} \times (n-2) \times 180^\circ$$

$$\Rightarrow n - 2 = p \times \frac{360^\circ}{180^\circ}$$

$\Rightarrow n - 2 = 2p$

$\Rightarrow n = 2p + 2$

$\Rightarrow n = 2(p + 1)$

Thus, the number of sides of a given regular polygon is $2(p + 1)$.

Answer 37.

For the given polygon:

Each interior angle $= 162^\circ$

$\Rightarrow$ Each exterior angle $= 180^\circ - 162^\circ = 18^\circ$

$\therefore$ Number of sides in it $= \dfrac{360^\circ}{18^\circ} = 20$

For the other polygon:

Number of sides $= 2 \times 20 = 40$

$\therefore$ Each exterior angle $= \dfrac{360^\circ}{40} = 9^\circ$

And, each interior angle $= 180^\circ - 9^\circ = 171^\circ$