Chapter : 14. POLYGONS

Exercise : 14A

Question: 1

Find the measure

Solution:

(i) In Regular Pentagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of pentagon is

(n – 2) × 180° [n is number of sides of polygon)]

(5 – 2) × 180°= 540°·

Each interior angle = 540/5 = 108^0

As, we know that Sum of Interior Angle and Exterior Angle is 180°

Exterior Angle + Interior Angle = 180°

Exterior Angle +108° =180°

So, Exterior Angle = 180°- 108°

=72°

(ii) In Regular Hexagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of hexagon is

(n – 2) × 180° [n is number of sides of polygon)]

(6 – 2) × 180°= 720°

Each interior angle = 720/6 = 120°

As, we know that Sum of Interior Angle and Exterior Angle is 180°

Exterior Angle + Interior Angle = 180°

Exterior Angle +120° = 180°

So, Exterior Angle = 180°- 120°

= 60°

(iii) In Regular Heptagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of heptagon is

(n – 2) × 180° [n is number of sides of polygon)]

(7 – 2) X 180°= 900°·

Each interior angle = 900/7 = 128.57^0

As, we know that Sum of Interior Angle and Exterior Angle is 180°

Exterior Angle + Interior Angle = 180°

Exterior Angle +128.57° =180°

So, Exterior Angle = 180°– 128.57°

=51.43°

(iv) In Regular Decagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of decagon is (n – 2) × 180° [n is number of sides of polygon)]

(10 – 2) X 180°= 1440°·

Each interior angle = 1440/10 = 144^0

As, we know that Sum of Interior Angle and Exterior Angle is 180°

Exterior Angle + Interior Angle = 180°

Exterior Angle +144° =180°

So, Exterior Angle = 180°- 144°

=36°

(v) In Regular Polygon of 15 sides, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of polygon of 15 sides is

(n – 2) × 180° [n is number of sides of polygon)]

(15 – 2) X 180°= 2340°·

Each interior angle = 2340/15 = 156^0

As, we know that Sum of Interior Angle and Exterior Angle is 180°

Exterior Angle + Interior Angle = 180°

Exterior Angle +156° =180°

So, Exterior Angle = 180°- 156°

=24°

Question: 2

Is it possible to

Solution:

No, since $\frac{360}{50}$ is not a whole number

Sum of exterior angles of regular polygon is 360°

When we divide the exterior angle by 360°, we get the numbers of exterior angle. Since, it is a regular polygon number of exterior angles will be equal to number to sides.

N = 360/50 = 7.2 [Number of sides of polygon]

7.2 is not an integer. So, it is not possible to have a regular polygon whose each exterior angle is 50°.

Question: 3

Find the measure

Solution:

(i) In Regular Polygon of 10 sides, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of polygon of 10 sides is

(n – 2) × 180° [n is number of sides of polygon)]

(10 – 2) X 180°= 1440°·

Each interior angle = 1440/10

= 144^0

(ii) In Regular Polygon of 15 sides, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of polygon of 10 sides is

(n – 2) × 180° [n is number of sides of polygon)]

(15 – 2) X 180°= 2340°·

Each interior angle = 2340/15

= 156°

Question: 4

Is it possible to

Solution:

No, since $\frac{360}{80}$ is not a whole number

Sum of Interior Angle and Exterior Angle = 180°

Interior Angle = 100°

So, Exterior Angle = 180° - 100°

= 80°

No. of Sides = 360° / Exterior Angle

= 360/80

= 4.5

4.5 is not an integer. So, it is not possible to have a regular polygon whose interior angle is 100°.

Question: 5

What is the sum o

Solution:

(i) In Regular Pentagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of regular pentagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (5 – 2) X 180°

= 540°·

(ii) In Regular Hexagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of regular hexagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (6 – 2) X 180°

= 720°·

(iii) In Regular Nonagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of regular nonagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (9 – 2) X 180°

= 1260°·

(iv) In Regular Polygon of 12 sides, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of regular polygon of 12 sides is

= (n – 2) × 180° [n is number of sides of polygon)]

= (12 – 2) X 180°

= 1800°.

Question: 6

What is the numbe

Solution:

(i) Number of diagonals in Heptagon is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 7 \times \frac{7-3}{2}$

$= 7 \times \frac{4}{2}$

= 14

So, Number of diagonals in heptagon is 14.

(ii) Number of diagonals in Octagon is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 8 \times \frac{8-3}{2}$

$= 8 \times \frac{5}{2}$

= 20

So, Number of diagonals in octagon is 20.

(iii) Number of diagonals in polygon of 12 sides is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 12 \times \frac{12-3}{2}$

$= 12 \times \frac{9}{2}$

= 54

So, Number of diagonals in polygon of 12 sides is 54.

Question: 7

Find the number o

Solution:

(i) No. of Sides = 360°/Exterior Angle

= 360/40

= 9

Number of sides is 9 of regular polygon whose exterior angle is 40°.

(ii) No. of Sides = 360° / Exterior Angle

= 360/36

= 10

Number of sides is 10 of regular polygon whose exterior angle is 36°.

(iii) No. of Sides = 360° / Exterior Angle

= 360/72

= 5

Number of sides is 5 of regular polygon whose exterior angle is 72°.

(iv) No. of Sides = 360° / Exterior Angle

= 360/30

= 12

Number of sides is 12 of regular polygon whose exterior angle is 30°.

Question: 8

In the given figu

Solution:

Sum of all the exterior angles = 360°

90° + 50°+ 115°+ x=360°

X = 360° - 90° - 50°- 115°

X = 105°

Question: 9

Find the angle me

Solution:

This is a regular pentagon, as all sides are of equal length.

AB = BC = CD = DE = EA

The sum of interior angles of poligon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (5 – 2) X 180° [for pentagon n=5]

= 540°

Since, it is a regular pentagon. It’s all interior angle will be equal.

Size of Interior Angle x = 540/5

= 108°

Exercise : 14B

Question: 1

How many diagonal

Solution:

Number of diagonals in Pentagon is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 5 \times \frac{5-3}{2}$

$= 5 \times \frac{2}{2}$

= 5

So, Number of diagonals in pentagon is 5.

Question: 2

How many diagonal

Solution:

Number of diagonals in Hexagon is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 6 \times \frac{6-3}{2}$

$= 6 \times \frac{3}{2}$

= 9

So, Number of diagonals in hexagon is 9.

Question: 3

How many diagonal

Solution:

Number of diagonals in Octagon is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 8 \times \frac{(8-3)}{2}$

$= 8 \times \frac{5}{2}$

= 20

So, Number of diagonals in octagon is 20.

Question: 4

How many diagonal

Solution:

Number of diagonals in Polygon having12 sides is

$= n \times \frac{n-3}{2}$ [n represents number of sides]

$= 12 \times \frac{12-3}{2}$

$= 12 \times \frac{9}{2}$

= 54

So, Number of diagonals in polygon having 12 sides is 54.

Question: 5

A polygon has 27

Solution:

Let x be sides of polygon.

No. of Diagonals = 27

According to formula,

No. of Diagonals $= n \times \frac{n-3}{2}$

$27 = n \times \frac{n-3}{2}$

$n (n - 3) = 54$

$n^2 – 3n – 54 = 0$

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

$n = -6$ or 9

Since, no of sides can’t be negative.

So, No. of sides of polygon will be 9.

Question: 6

The angles of a p

Solution:

The sum of interior angles of pentagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (5 – 2) X 180°

= 540°

$x + (x + 20) + (x + 40) + (x + 60) + (x + 80) = 540$

$5x + 200 = 540$

$5x = 340$

$X = 340 / 5$

= 68°

So, smallest angle of pentagon is 68°

Question: 7

The measure of ea

Solution:

Exterior Angle = 40°

No. of Sides = 360 / Exterior Angle

= 360 / 40

= 9

Question: 8

Each interior ang

Solution:

Interior Angle = 108°

Interior Angle + Exterior Angle = 180°

Exterior Angle = 180° - 108°

= 72°

No. of Sides = 360 / Exterior Angle

= 360 / 72

= 5

Question: 9

Each interior ang

Solution:

Interior Angle = 135°

Interior Angle + Exterior Angle = 180°

Exterior Angle = 180° - 135°

= 45°

No. of Sides = 360 / Exterior Angle

= 360 / 45

= 8

Question: 10

In a regular poly

Solution:

Let x be the exterior angle

Interior Angle = 3x

Interior Angle + Exterior Angle = 180°

4x = 180°

X= 180/4

= 45°

So, Exterior Angle = 45°

No. of Sides = 360 / Exterior Angle

= 360 / 45

= 8

Question: 11

Each interior ang

Solution:

In Regular Decagon, all sides are of same size and measure of all interior angles are same.

The sum of interior angles of decagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (10 – 2) X 180°

= 1440°.

Each interior angle = 1440/10

= 144°

Question: 12

The sum of all in

Solution:

The sum of interior angles of hexagon is

= (n – 2) × 180° [n is number of sides of polygon)]

= (6 – 2) X 180°

= 720°.

1 right ∠s = 90°

So, 720°= 8 right ∠s

Question: 13

The sum of all in

Solution:

The sum of interior angles of regular polygon is

$1080° = (n – 2) \times 180°$ [n is number of sides of polygon)]

$n - 2 = 1080° / 180°$

$n = 6 + 2$

$= 8$

No. of Sides = 360 / Exterior Angle

8 = 360 / Exterior Angle

So, Exterior Angle = 360 / 8

$= 45°$

Exterior Angle + Interior Angle = 180°

Interior Angle = 180°- 45°

$= 135°$

Question: 14

The interior angl

Solution:

Let x be the exterior angle

Interior Angle = x + 108°

Interior Angle + Exterior Angle = 180°

$X + (x + 108°) = 180°$

$2x= 180° - 108°$

$2x =72°$

$= 36°$

So, Exterior Angle = 36°

No. of Sides = 360 / Exterior Angle

= 360 / 36

= 10