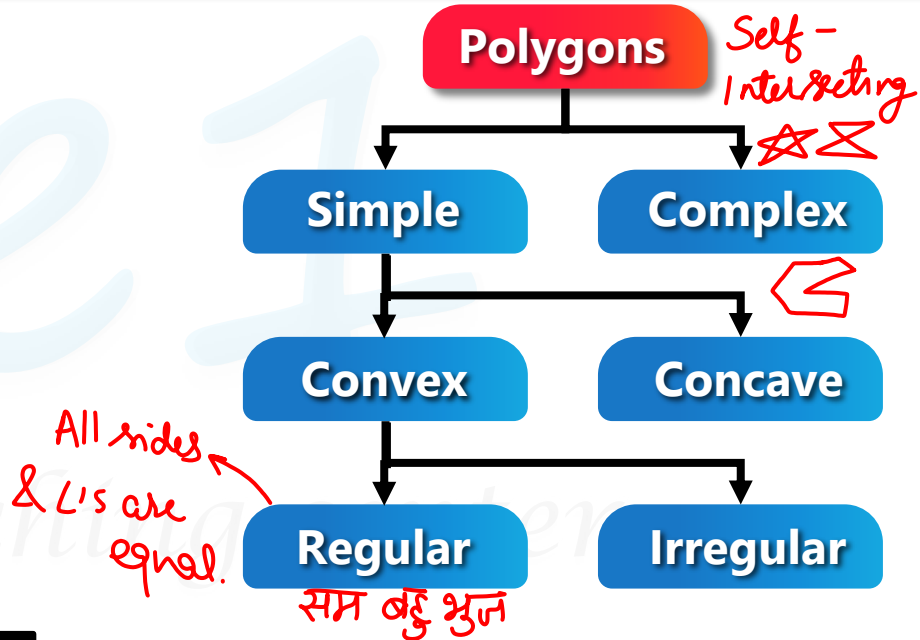


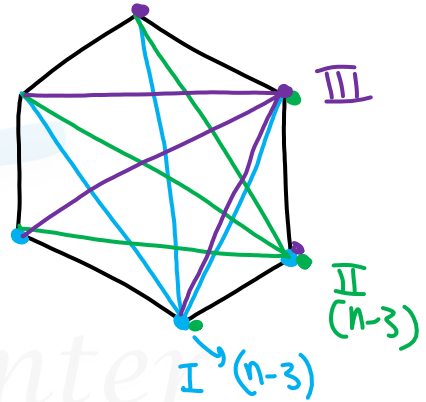
Polygons (बहुभुज):



Properties of Polygons (बहुभुजों के गुण):

1. No. of diagonals is $= \frac{n(n-3)}{2}$, n is number of sides.

Hexagon $\rightarrow \frac{6 \times 3}{2} = 9$



coaching center

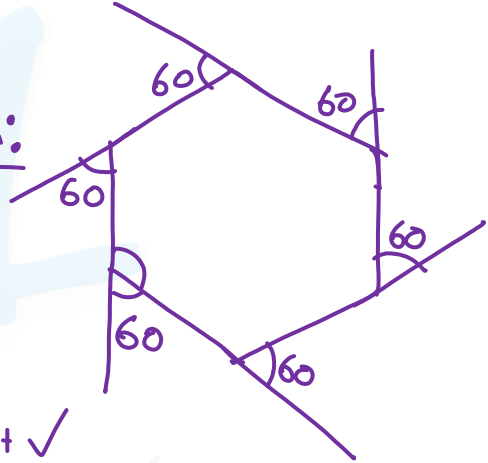
2. Sum of ^{all} exterior angles taken in an order is 360° .

Regular Hexagon:

- All sides equal

- All \angle 's equal

✓ Int Ext ✓



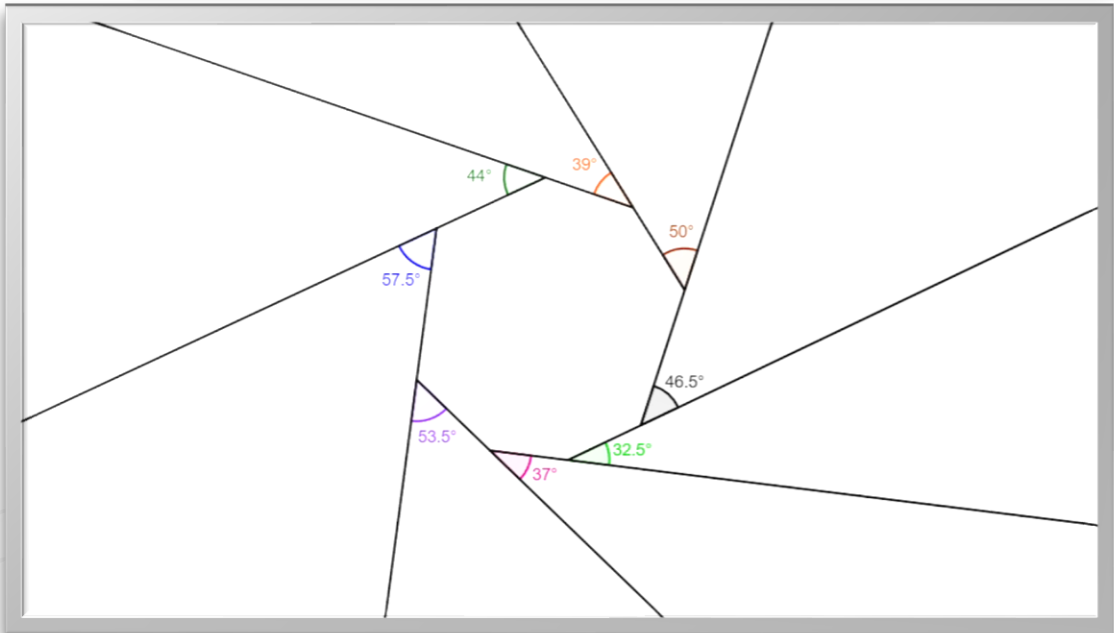
$$60^\circ = \frac{360}{6}$$



$$\frac{360}{30} = 12 \text{ angles}$$

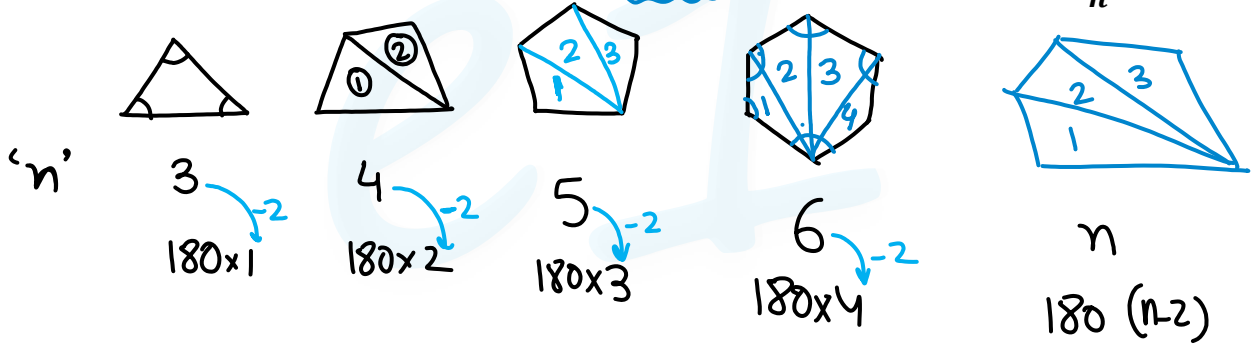


Sum of exterior angles:



3. Sum of all interior angles is $= (n - 2) \times 180^\circ$, where n is number of sides.

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



coaching center

5. Interior + exterior = 180°

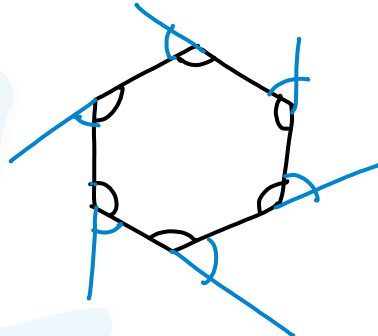


coaching center

$$\text{Sum Int} = (n-2)180$$

$$\text{Sum Int} + \text{Sum Ext} = n \times 180$$

↓
 2×180



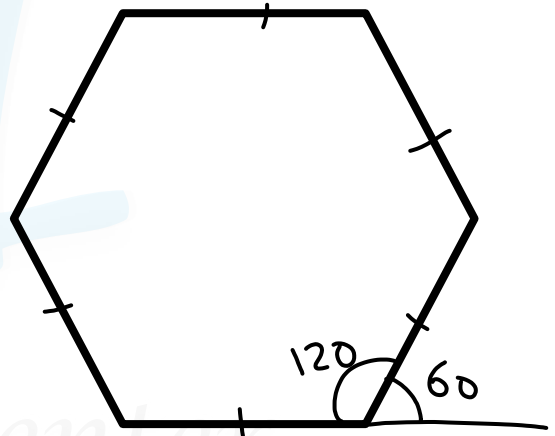
coaching center

Hexagon (षट्भुज):

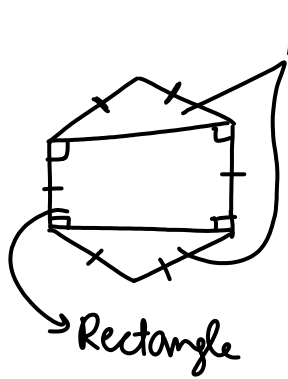
Regular

$$\text{Ext angle} = \frac{360}{6} = 60^\circ$$

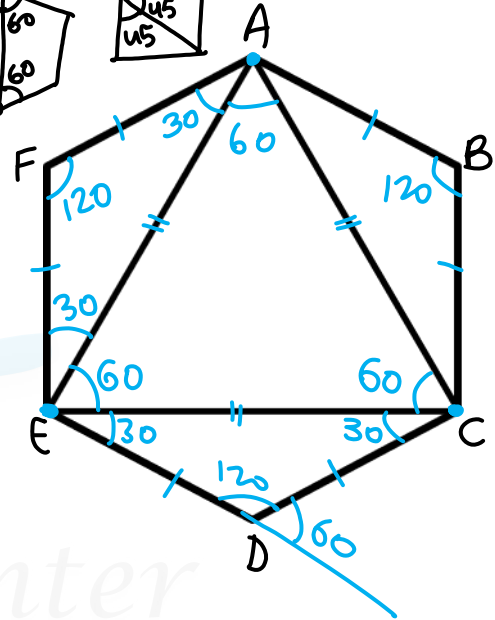
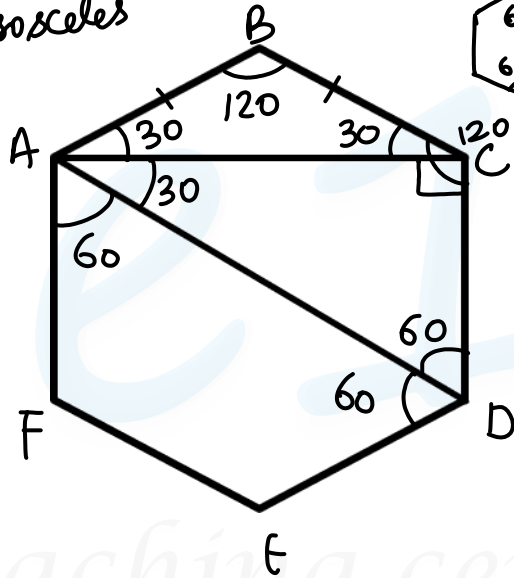
$$\text{Int angle} = 180 - 60 = 120^\circ$$



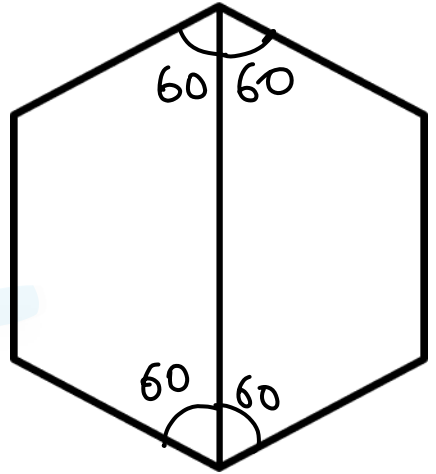
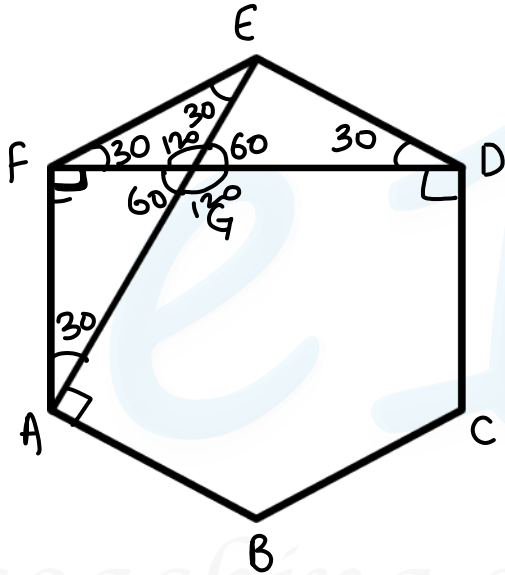
coaching center



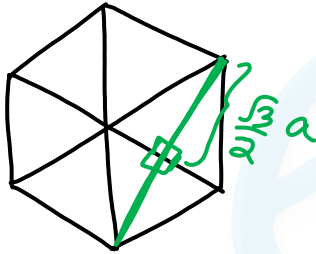
Isosceles



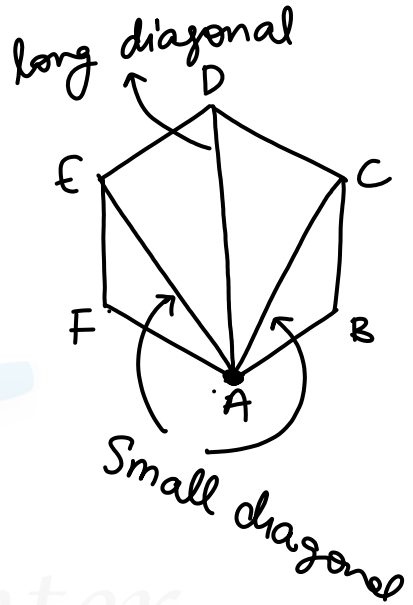
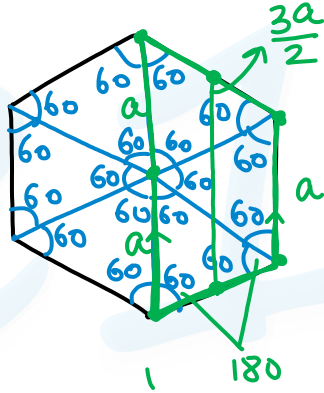
coaching center



coaching center



$$\frac{\sqrt{3}a}{2}$$



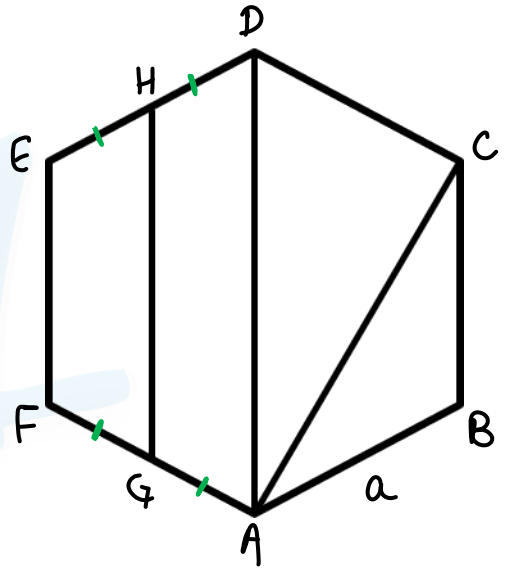
coaching center

Lengths:

$$AC \text{ (Smallest dia)} = \sqrt{3}a$$

$$AD \text{ (longest dia)} = 2a$$

$$GH = 1.5a$$

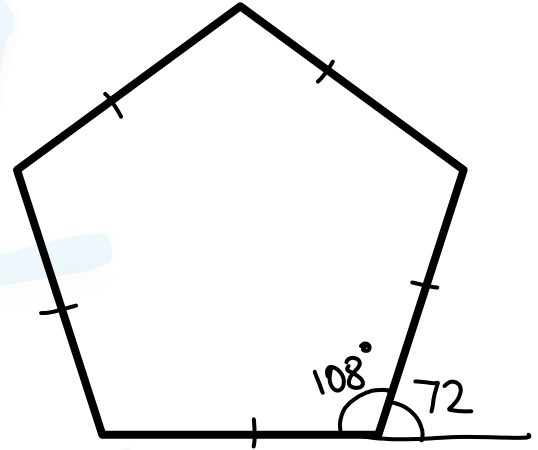


coaching center

Pentagon (पंचभुज):

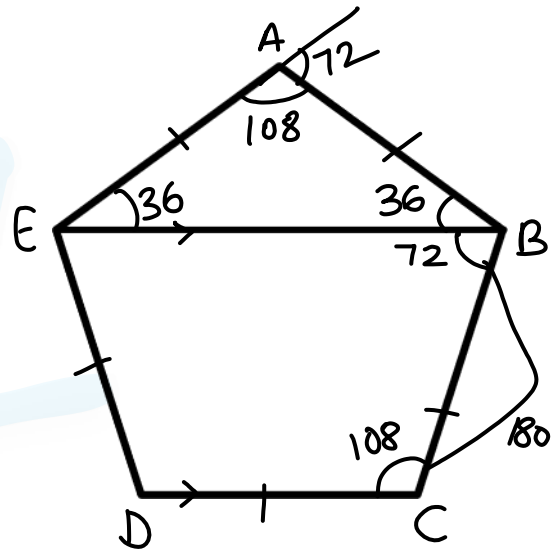
Regular

$$\text{Ext Angle} = \frac{360}{5} = 72^\circ$$



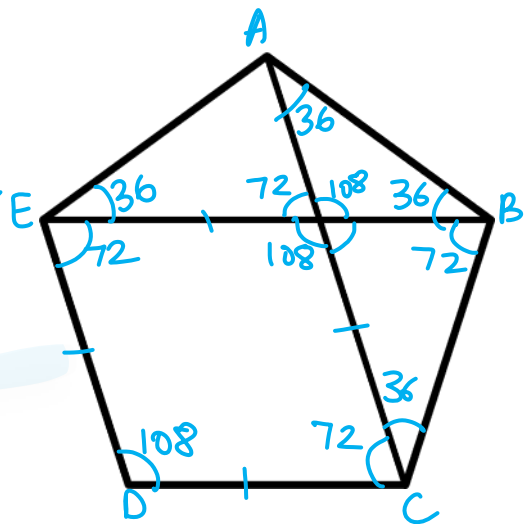
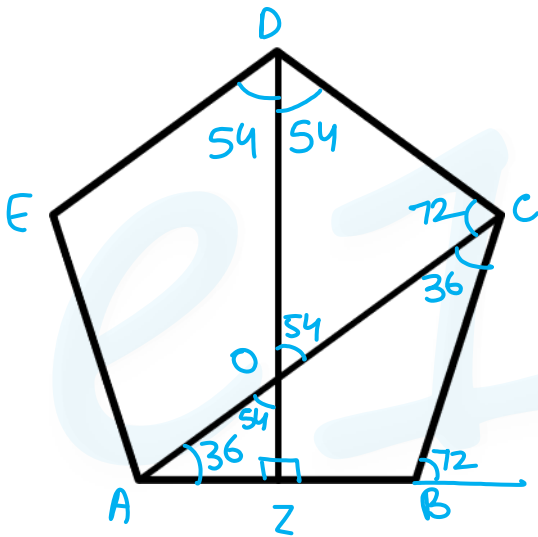
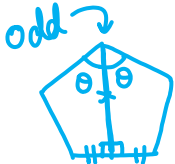
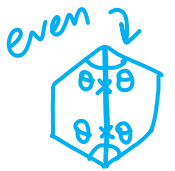
coaching center

e1



coaching center





coaching center

e 1

$$\frac{10 \times 7}{2}$$

coaching center

1. Find the no. of diagonals in a 10 sided polygon?

10 भुजी बहुभुज के विकरणों की संख्या ज्ञात करें।

a) 65

b) 21

c) 12

~~d) 35~~

(I) Check options

$$a) \frac{8 \times 5}{2} = 20 \quad \times$$

$$b) \frac{11 \times 8}{2} = 44 \quad \checkmark$$

(II) $\frac{n(n-3)}{2} = 44$

$$\Rightarrow n(n-3) = 88$$

(Note: Blue arrows point from 88 to 11 and 8, indicating the factors used to solve the equation.)

2. A polygon has 44 diagonals. The no. of sides it has is

किसी बहुभुज में 44 विकर्ण हैं। भुजाओं की संख्या:

a) 8

~~b) 11~~

c) 4

d) 12

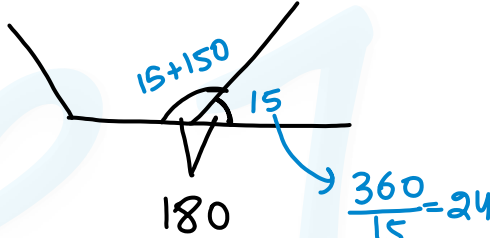
$$i + e = 180$$

$$i - e = 150$$

↙

15

$$\frac{360}{15} = 24$$



3. The difference between the exterior and interior angles at a vertex of regular polygon is 150° . The no. of sides of a polygon is

किसी सम बहुभुज के एक शीर्ष पर इसके बाहरी कोण व आंतरिक कोण का अंतर 150° है। बहुभुज की भुजाओं की संख्या:

a) 10

b) 15

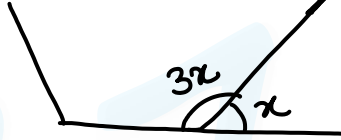
~~c) 24~~

d) 30



$$180 \rightarrow 6 \text{ बार } x$$

$$360 \rightarrow 12 \text{ बार } x$$



$$4x = 180$$

$$x = 45$$

$$\frac{360}{45} = 8$$

4. Each interior angle of a regular polygon is three times its exterior angle, then the no. of sides of the regular polygon is

किसी सम बहुभुज का प्रत्येक आंतरिक कोण इसके बाहरी कोण का तिगुना है, तो इस बहुभुज की भुजाओं की संख्या ज्ञात करें।

a) 9

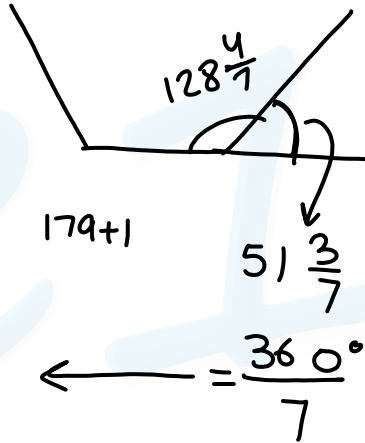
b) 8

c) 10

d) 7

coaching center

$$d_n = \frac{7 \times 4}{2} = 14$$



5. If each interior angle of a regular polygon is $(128\frac{4}{7})^\circ$, then what is the sum of the number of its diagonals and the number of its sides?

यदि किसी समबहुभुज का प्रत्येक आंतरिक कोण $(128\frac{4}{7})^\circ$ है, तो उसके विकर्णों की संख्या और उसकी भुजाओं की संख्या का योग क्या है?

a) 15

b) 19

c) 17

~~d) 21~~

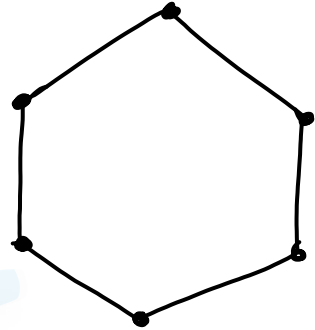
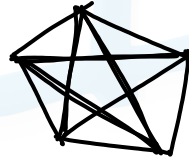
coaching center

n Polygon with 'n' sides:

Sides + diagonals

Total no of lines through 'n' points = nC_2

No of dia = $nC_2 - n$



coaching center

$$(n-2) \times 180 = 1080$$

$$n = 8$$

Sum int \angle 's =

1440

10

1260

9

900

7

6. If the sum of all interior angles of a regular polygon is 1080° , the no. of sides of polygon is:

किसी सम बहुभुज के सभी आंतरिक कोणों का जोड़ 1080° है। भुजाओं की संख्या पता करें।

a) 6

~~b) 8~~

c) 10

d) 12

coaching center

$$\text{Sum ext} = 360^\circ$$

$$(n-2)180 = 720$$

$$n = 6$$



7. The sum of all interior angles of a regular polygon is twice the sum of all exterior angles. The no. of sides of polygons is किसी सम बहुभुज के सभी आंतरिक कोणों का जोड़ सभी बाहरी कोणों के जोड़ का दोगुना है। बहुभुज की भुजाओं की संख्या:

a) 10

b) 8

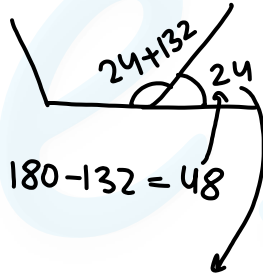
c) 12

~~d) 6~~

coaching center

$$(n-2)180 = 1080$$

$$A_1 \rightarrow n = 8$$



$$n = \frac{360}{24} = 15 \quad A_2$$

8. A_1 and A_2 are two regular polygons. The sum of all the interior angles of A_1 is 1080° . Each interior angle of A_2 exceeds its exterior by 132° . The sum of the number of sides A_1 and A_2 is:

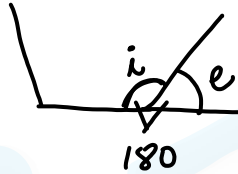
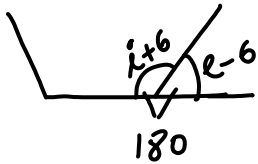
A_1 और A_2 दो सम बहुभुज हैं। A_1 के सभी आंतरिक कोणों का योग 1080° है। A_2 का प्रत्येक आंतरिक कोण, इसके बाह्य कोण से 132° अधिक है। A_1 और A_2 की भुजाओं की संख्या का योग कितना होगा?

a) 21

b) 22

c) 23

d) 24



$$\frac{360}{4x} - \frac{360}{5x} = 6$$

$$90 - 72 = 6x$$

$$18 = 6x$$

$$3 = x$$

Check options

a) $\frac{24}{15}, \frac{30}{12}$ ✓

9. The no. of sides of two regular polygons is in the ratio 5:4 and the difference between each interior angle of the polygon is 6. Then the no. of sides is

दो सम बहुभुजों की भुजाओं का अनुपात 5:4 है तथा दोनों के आंतरिक कोणों का अंतर 6 है। इन दोनों की भुजाओं की संख्या:

~~a) 15,12~~

b) 5,4

c) 10,6

d) 20,16

I) Checking option:

a)
$$\begin{array}{r} 36 \\ \overline{360} \\ 10 \end{array} \quad \begin{array}{r} 18 \\ \overline{360} \\ 20 \end{array} \quad \begin{array}{l} 180-18 \\ \downarrow \\ 162 \end{array} \quad \times$$

Handwritten note: $180-36$ with an arrow pointing to the 10 in the first division.

144

b)
$$\begin{array}{r} 90 \\ \overline{360} \\ 4 \end{array} \quad \begin{array}{r} 45 \\ \overline{360} \\ 8 \end{array} \quad \begin{array}{l} 180-45 \\ \downarrow \\ 135 \end{array} \quad \times$$

90

c)
$$\begin{array}{l} 120, \\ \downarrow \\ 60 \end{array} \quad \begin{array}{l} 60 \\ \downarrow \\ 120 \end{array} \quad \times$$

10. Two regular polygons are such that the ratio between their number of sides is 1 : 2 and the ratio of measures of their interior angles is 3 : 4. Then the number of sides of each polygon are

दो सम बहुभुज ऐसे हैं कि उनकी भुजाओं की संख्या का अनुपात 1 : 2 है और उनके अन्तः कोणों के माप का अनुपात 3 : 4 है। प्रत्येक बहुभुज की भुजाओं की संख्या बताइए ?

a) 10, 20

b) 4, 8

c) 3, 6

d) 5, 10

$$\frac{\cancel{(n-2)180}}{\cancel{n}} \times \frac{\cancel{2n}}{\cancel{(2n-2)180}} = \frac{3}{4}$$

(n-1)

$$1 \left(\frac{\overset{\textcircled{5}}{\uparrow} n-2}{n-1} = \frac{3}{4} \right) 1$$

\textcircled{5}

Sides $\textcircled{1n}: 2n$
 Int \angle s 3 4

$$\frac{\frac{(n-2)180}{n}}{\frac{(2n-2)180}{2n}} = \frac{3}{4}$$

① options

$$\begin{array}{r} 18 \rightarrow 162 \\ \cancel{360} \\ \hline \cancel{20} \end{array} \quad \begin{array}{r} 15 \rightarrow 165 \\ \cancel{360} \\ \hline \cancel{24} \end{array} \quad \times$$

$$\begin{array}{r} 20 \rightarrow 160 \leftarrow \text{not a multiple of } 24 \\ \cancel{360} \\ \hline \cancel{15} \end{array}$$

$$\begin{array}{r} 36 \rightarrow 144 \\ \cancel{360} \\ \hline \cancel{10} \end{array} \quad \begin{array}{r} 30 \rightarrow 150 \\ \cancel{360} \\ \hline \cancel{12} \end{array}$$

11. Ratio of no. of sides of two regular polygons is 5:6 and the ratio of their each interior angle is 24:25. Then the no. of sides of these two polygons are

दो सम बहुभुजों की भुजाओं का अनुपात 5:6 है तथा दोनों के आंतरिक कोणों का अनुपात 24:25 है। इन दोनों बहुभुजों की भुजाओं की संख्या ज्ञात करें।

a) 20,24

b) 15,18

~~c) 10,12~~

d) 5,6

$$\frac{\frac{(5n-2)180}{5n}}{\frac{(6n-2)180}{6n}} = \frac{24}{25}$$

$$\Rightarrow \frac{\cancel{5n} \cdot \cancel{180} \cdot \cancel{6n}}{\cancel{5n} \cdot \cancel{180} \cdot \cancel{25} \cdot 5} = \frac{\cancel{24} \cdot 4}{\cancel{25} \cdot 5}$$

$$\Rightarrow 25n - 10 = 24n - 8$$

$$\Rightarrow n = 2$$

	$5n$	$6n$
	↑	↑
Sides	5	6
Int \angle s	24	25

① Check options:

a) $\frac{360}{13}, 16 \times$ → fraction

x b) $\frac{360}{11}$ → fraction

c)
$$\begin{array}{r} 30 \\ \cancel{360} \\ \hline 12 \end{array} \quad \begin{array}{r} 24 \\ \cancel{360} \\ \hline 15 \end{array}$$

12. There are two regular polygons with number of sides equal to $(n-1)$ and $(n+2)$. Their exterior angles differ by 6. The value of n is

दो सम बहुभुजों में भुजाओं की संख्या $(n-1)$ और $(n+2)$ है। इनके बाहरी कोणों का अंतर 6 है। n का मान:

- a) 14 b) 12
~~c) 13~~ d) 11

coaching center