VIII Revision (HW for Thursday – Understanding Quadrilaterals)

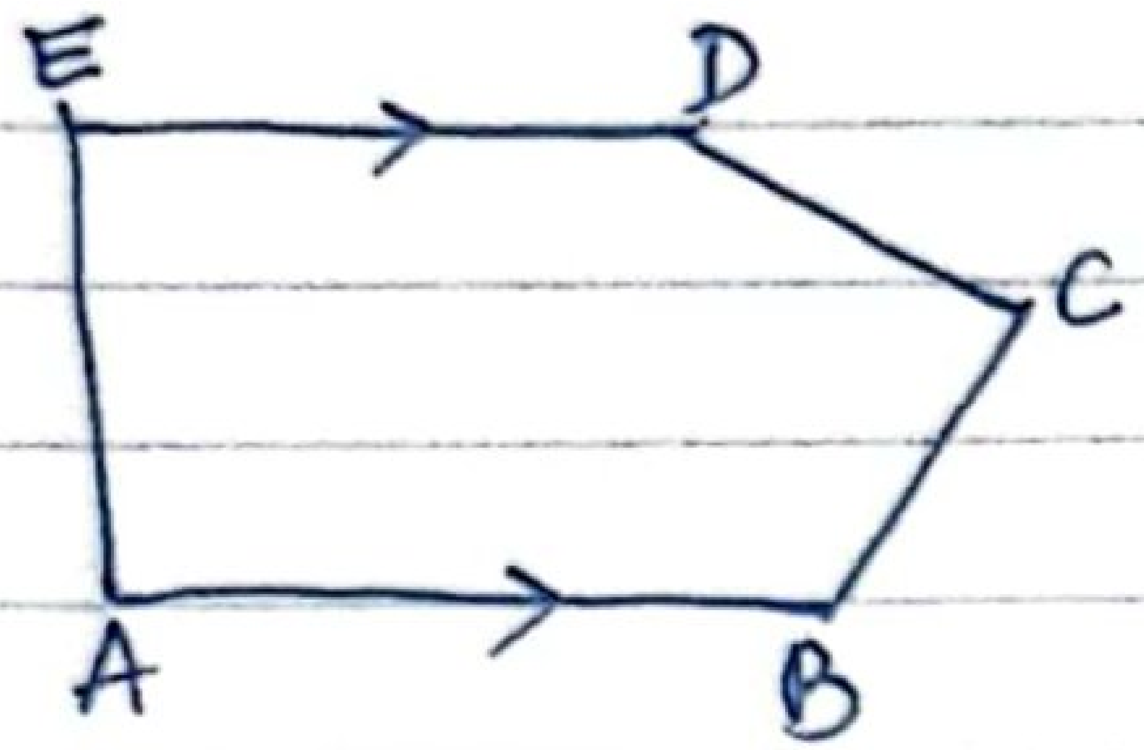
1) Each interior angle of a regular polygon is $144°$. find the interior angle of a polygon, which has double the number of sides as the first polygon.
2) The exterior angle of a regular polygon is one - third of its interior angle. find the no. of sides of the polygon.
3) The difference between the exterior angles of two regular polygons having the sides equal to $(n-1)$ and $(n+1)$ is $9°$. find the value of n.
4) The ratio between the number of sides of two regular polygons is 3:4 and the ratio between the sum of their internal angles is 2:3. find the number of sides in each polygon.

Revision (HW for Friday – Understanding Quadrilaterals)

1) Calculate sum of angles of a polygon with (a) 10 sides (b) 12 sides (c) 20 sides (d) 25 sides
2) Find the number of sides in a polygon if the sum of its interior angles is:
(a) $900°$ (b) $1620°$ (c) 16-right angles (d) 32-right angles
3) Is it possible to have a polygon, whose sum of interior angles is
(a) $870°$ (b) $2340°$ (c) 7 right angles (d) 4500
4) If all the angles of a 14-sided figure are equal, find the measure of each angle.

Revision (HW for Saturday)

1) The sides of a hexagon are produced in order. If the exterior angles so obtained are $(6x-1)°$, $(10x+2)°$, $(8x+2)°$, $(9x-3)°$, $(5x+4)°$ and $(12x+6)°$, find each exterior angle.
2) The interior angles of a pentagon are in the ratio 4:5:6:7:5. find each angle of the pentagon.
3) Two angles of a hexagon are $120°$ and $160°$. If the remaining four angles are equal, find each equal angle.

4) 

In pentagon ABCDE with sides AB and ED parallel to each other and $\angle B : \angle C : \angle D = 5:6:7$

(i) Using formula, find the sum of the interior angles of the pentagon.

(ii) Write the value of $\angle A + \angle E$

(iii) Find angles $\angle B, \angle C, \angle D$.

5) The sum of all the interior angles of a regular polygon is twice the sum of its exterior angles. Find the number of sides of the polygon.

6) Is it possible to have a regular polygon whose interior angles measure 130°?

7) Two angles of a polygon are right angles and each of the other angles is 120°. Find the number of sides of the polygon.

VIII. Understanding Quadrilaterals (HW)

1) Exterior angle of the given polygon $= 180^\circ - 144^\circ$ (linear pair)
$= 36^\circ$

no. of sides $= \frac{360^\circ}{\text{each exterior angle}} = \frac{360^\circ}{36^\circ} = 10$

$\therefore$ No. of sides of new polygon $= 2 \times 10 = 20$ sides.

Then, each exterior angle $= \frac{360^\circ}{\text{no. of sides}} = \frac{360^\circ}{20^\circ}$
$= 18^\circ$

$\therefore$ Each interior angle $= 180^\circ - 18^\circ = \underline{\underline{162^\circ}}$

2) Let the interior angle be x and exterior angle be $\frac{x}{3}$

Then, $x + \frac{x}{3} = 180^\circ$ (linear pair)

$\frac{4x}{3} = 180^\circ \Rightarrow x = \frac{\cancel{180}^{45} \times 3}{\cancel{4}_1} = 135^\circ$

$\therefore$ Each exterior angle $= \frac{x}{3} = \frac{135}{3} = 45^\circ$

Then, no. of sides $= \frac{360^\circ}{\text{each exterior angle}} = \frac{360^\circ}{45^\circ} = \underline{\underline{8 \text{ sides}}}$

3) Each exterior angle $= \frac{360^\circ}{\text{no. of sides}}$

Then, $\frac{360^\circ}{n-1} - \frac{360^\circ}{n+1} = 9$

$360^\circ \left[\frac{1}{n-1} - \frac{1}{n+1} \right] = 9$

$360^\circ \left[\frac{\cancel{n}+1-\cancel{n}+1}{n^2-1} \right] = 9$

$360^\circ \times 2 = 9(n^2-1)$

$n^2 - 1 = \frac{\cancel{360}^{40} \times 2}{\cancel{9}_1} = 80$

$n^2 = 81$

$\underline{\underline{n = 9}}$

4) Let the no. of sides be $3x$ and $4x$.

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

Then, $\dfrac{(n_1-2)\times \cancel{180^\circ}}{(n_2-2)\times \cancel{180^\circ}} = \dfrac{2}{3}$

$\Rightarrow \dfrac{3x-2}{4x-2} = \dfrac{2}{3}$

$\Rightarrow 9x-6 = 8x-4$

$\Rightarrow 9x-8x = -4+6$

$\therefore x = 2$

$\therefore$ No. of sides of each polygon $=$ 6 sides and 8 sides.

Understanding Quadrilaterals (HW)

1) (a) $n = 10$ sides

Sum of angles $= (n-2)\times 180^\circ = (10-2)\times 180^\circ$
$= 8\times 180^\circ = 1440^\circ$

(b) $n = 12$ sides.

Sum of angles $= (n-2)\times 180^\circ = (12-2)\times 180^\circ$
$= 10\times 180^\circ = 1800^\circ$

(c) $n = 20$ sides

Sum of angles $= (n-2)\times 180^\circ = (20-2)\times 180^\circ$
$= 18\times 180^\circ = 3240^\circ$

(d) $n = 25$ sides

Sum of angles $= (n-2)\times 180^\circ = (25-2)\times 180^\circ$
$= 23\times 180^\circ = 4140^\circ$

2) (a) Sum of interior angles $= (n-2)\times 180^\circ = 900$

$\Rightarrow n-2 = \dfrac{900}{180} = 5$

$\therefore n = 5+2 = 7$ sides

(b) Sum of interior angles $= (n-2)\times 180^\circ = 1620^\circ$

$\Rightarrow n-2 = 9$

$\therefore n = 9+2 = 11$ sides

(c) Sum of interior angles $= (n-2)\times 180^\circ = 16\times 90^\circ$

$\Rightarrow n-2 = \dfrac{16\times 90^\circ}{180^\circ} = 8$

$\therefore n = 8+2 = 10$ sides

(d) sum of interior angles = $(n-2)\times180° = 32\times90°$

$\Rightarrow n-2 = \frac{32\times90°}{180°} = 16$

$\therefore n = 16+2 =$ 18 sides

3) Sum of interior angles $= (n-2)\times180°$.

(a) $(n-2)\times180° = 870°$

$\Rightarrow n-2 = \frac{870°}{180°}$

$\therefore n = \frac{\cancel{870°}^{29}}{\cancel{180°}_{6}} + 2 = 4.83+2 = 6.83$, which is not a natural number.

Hence, a polygon cannot be formed with the given sum of interior angles.

(b) $(n-2)\times180° = 2340°$

$\Rightarrow n-2 = \frac{2340°}{180°} = 13$

$\therefore n = 13+2 = 15$ sides.

Hence a polygon can be formed with the given sum of interior angles.

(c) $(n-2)\times180° = 7\times90°$

$\Rightarrow n-2 = \frac{7\times90°}{180°} = 3.5$

$\therefore n = 3.5+2 = 5.5$, which is not a natural number.

Hence, a polygon cannot be formed with the given sum of interior angles.

(d) $(n-2)\times180° = 4500$

$\Rightarrow n-2 = \frac{4500}{180°} = 25$

$\therefore n = 25+2 = 27$ sides.

Hence, a polygon can be formed with the given sum of interior angles.

4) $n = 14$

each interior angle of a regular polygon $= \frac{(n-2)\times180°}{n}$

$= \frac{(14-2)\times180°}{14} = \frac{12\times180°}{14} = 154.28°$

Understanding Quadrilaterals (HW)

1) Sum of exterior angles = 360°

$6x-1+10x+2+8x+2+9x-3+5x+4+12x+6=360^\circ$

$\Rightarrow 50x+10=360^\circ$

$\Rightarrow 50x=350$

$\Rightarrow x=7$

$\therefore$ Each exterior angle $= 6x-1 = 42-1 = 41^\circ$

$10x+2 = 70+2 = 72^\circ$

$8x+2 = 56+2 = 58^\circ$

$9x-3 = 63-3 = 60^\circ$

$5x+4 = 35+4 = 39^\circ$

$12x+6 = 84+6 = 90^\circ$

2) $n=5$

Sum of interior angles $= (n-2)\times 180^\circ = (5-2)\times 180^\circ$

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

Then, $4x+5x+6x+7x+5x = 540^\circ$

$27x = 540^\circ$

$x = \frac{540^\circ}{27} = 20$

$\therefore$ Each angle of the pentagon $= 4x = 80^\circ$

$5x = 100^\circ$

$6x = 120^\circ$

$7x = 140^\circ$

$5x = 100^\circ$

3) $n=6$

Sum of interior angles $= (n-2)\times 180^\circ = (6-2)\times 180^\circ$

$= 4\times 180^\circ = 720^\circ$

Then, $120^\circ + 160^\circ + 4x = 720^\circ$

$4x = 720^\circ - 280^\circ = 440^\circ$

$x = 110^\circ$

$\therefore$ Each equal angle $= 110^\circ$.

4) Since $ED \parallel AB$, $\angle E + \angle A = 180^\circ$ (co-interior angles)

Thus

(i) Sum of interior angles $= (n-2)\times180^\circ = (5-2)\times180^\circ$
$= 3\times180^\circ = 540^\circ$

(ii) $\angle A+\angle E = 180^\circ$

(iii) $\angle A+\angle B+\angle C+\angle D+\angle E = 540^\circ$

$\Rightarrow 5x+6x+7x+180^\circ = 540^\circ$

$\Rightarrow 18x = 360^\circ$

$x = 20$

Thus, $\angle B = 5x = 100^\circ$

$\angle C = 6x = 120^\circ$

$\angle D = 7x = 140^\circ$

5) Given, Sum of all interior angles $= 2\times$ Sum of exterior angles.

$$(n-2)\times180^\circ = 2\times360^\circ$$

$$n-2 = \frac{2\times360^\circ}{180^\circ} = 4$$

$\therefore$ no. of sides, $n = 4+2 = 6$ sides

6) Each exterior angle $= 180^\circ -$ each interior angle (linear pair)
$= 180^\circ - 130^\circ = 50^\circ$

no. of sides $= \dfrac{360^\circ}{\text{each exterior angle}} = \dfrac{360^\circ}{50^\circ} = 7.2,$
which is not a natural number.

Hence a regular polygon cannot be formed.

7) Sum of interior angles $= 90^\circ+90^\circ+(n-2)\times120^\circ = (n-2)\times180^\circ$

$\Rightarrow 180^\circ+120n-240 = 180n-360^\circ$

$\Rightarrow -60^\circ+120n = 180n-360^\circ$

$\Rightarrow 300 = 60n$

$n = \dfrac{300}{60} = 5$ sides