Key

A#27 p. 104-105 WE #1-6, 8-11, 16-17, 21-26

1. Quadrilateral: $n = 4$ $I_{sum} = (4-2)180^\circ$ $\boxed{E_{sum} = 360^\circ}$ [True for all Polygons]

*Use $I_{sum} = (n-2)180^\circ$ for #1-6. $\boxed{I_{sum} = 360^\circ}$

2. Pentagon: $n = 5$ $I_{sum} = (5-2)180^\circ \rightarrow \boxed{I_{sum} = 540^\circ}$ $\boxed{E_{sum} = 360^\circ}$

3. Hexagon: $n = 6$ $I_{sum} = (6-2)180^\circ \rightarrow \boxed{I_{sum} = 720^\circ}$ $\boxed{E_{sum} = 360^\circ}$

4. Octagon: $n = 8$ $I_{sum} = (8-2)180^\circ \rightarrow \boxed{I_{sum} = 1080^\circ}$ $\boxed{E_{sum} = 360^\circ}$

5. Decagon: $n = 10$ $I_{sum} = (10-2)180^\circ \rightarrow \boxed{I_{sum} = 1440^\circ}$ $\boxed{E_{sum} = 360^\circ}$

6. n-gon: n $\boxed{I_{sum} = (n-2)180^\circ}$ $\boxed{E_{sum} = 360^\circ}$

8. No Table! *Use $I_1 = \frac{(n-2)180}{n}$ or $E_1 = \frac{360}{n}$ or $I_1 + E_1 = 180^\circ$ [∠ Add Post]

a. $n = 9$
① $E_1 = \frac{360}{9}$
$\boxed{E_1 = 40^\circ}$
② $\boxed{I_1 = 140^\circ}$ [∠ Add Post]

b. $n = 15$
① $E_1 = \frac{360}{15}$
$\boxed{E_1 = 24^\circ}$
② $\boxed{I_1 = 156^\circ}$ [∠ Add. Post]

c. $n = 30$
① $E_1 = \frac{360}{30}$
$\boxed{E_1 = 12^\circ}$
② $\boxed{I_1 = 168^\circ}$ [∠ Add Post]

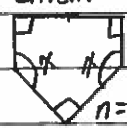
d. $E_1 = 6^\circ \rightarrow$ ② $\boxed{I_1 = 174^\circ}$ [∠ Add Post]
① $6 = \frac{360}{n}$
$6n = 360$
$\boxed{n = 60}$

e. $E_1 = 8^\circ \rightarrow$ ② $\boxed{I_1 = 172^\circ}$ [∠ Add Post]
① $8 = \frac{360}{n}$
$8n = 360$
$\boxed{n = 45}$

f. $I_1 = 165^\circ$
① $\boxed{E_1 = 15^\circ}$ [∠ Add Post]
② $15 = \frac{360}{n}$
$15n = 360$
$\boxed{n = 24}$

g. $I_1 = 178^\circ$
① $E_1 = 2^\circ$ [∠ Add Post]
② $2 = \frac{360}{n}$
$2n = 360$
$\boxed{n = 180}$

9. Given: ① $I_{sum} = (n-2)180^\circ$ ② $I_{sum} = 2x + 3(90)$



$n = 5$
$I_{sum} = (5-2)180^\circ$
$I_{sum} = 540^\circ$

$540 = 2x + 270$
$2x = 270 \rightarrow \boxed{x = 135^\circ}$

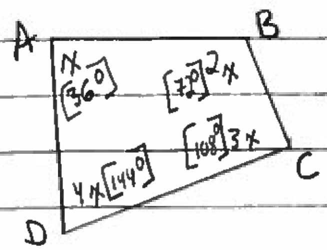
10. ① From above, $I_{sum} = 540^\circ$. ② $x + 40 + 80 + 115 + 165 = 540$
$x + 400 = 540 \rightarrow \boxed{x = 140^\circ}$

11. Regular Hexagon: $n = 6$ $I_1 = \frac{(n-2)180}{n}$
$I_1 = \frac{(6-2)180}{6} = \frac{720}{6} \rightarrow \boxed{I_1 = 120^\circ}$

16. $I_{sum} = 5\,E_{sum}$ [Given]
$(n-2)180 = 5(360)$
$n - 2 = 10$ [÷ both sides by 180]
$\boxed{n = 12}$

17. ① $I_1 = 11\,E_1$ [Given]
② $I_1 + E_1 = 180^\circ$ [∠ Add Post]
$11E_1 + E_1 = 180$
$12E_1 = 180 \rightarrow E_1 = 15^\circ$
③ $E_1 = \frac{360}{n}$
$15 = \frac{360}{n}$
$15n = 360$
$\boxed{n = 24}$

21. Diagram not drawn to scale! $n = 4$



① $I_{sum} = (n-2)180^\circ$
$I_{sum} = (4-2)180^\circ$
$I_{sum} = 360^\circ$

② $x + 2x + 3x + 4x = 360^\circ$
$10x = 360$
$\boxed{x = 36^\circ}$
[Substitute on diagram]

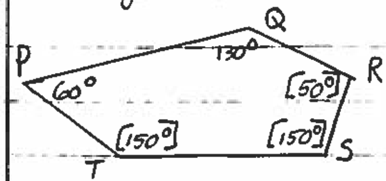
③ By the S.S. Int. ∠s Converse:
$\boxed{\overline{AB} \parallel \overline{DC}}$

A#27 continued

p. 105 WE #22-26

$\boxed{\text{Key}}$

22. Diagram not drawn to scale! ① Pentagon: $n=5$ $I_{sum}=540°$ [See #2]



② $m\angle S = m\angle T = 3m\angle R$, $m\angle P = 60°$, $m\angle Q = 130°$ [Given]

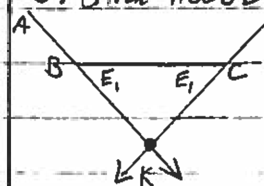
③ $I_{sum} = m\angle P + m\angle Q + m\angle R + m\angle S + m\angle T$

$540 = 60 + 130 + m\angle R + 3m\angle R + 3m\angle R$

$7m\angle R = 350 \rightarrow \boxed{m\angle R = 50°} \rightarrow \boxed{m\angle S = m\angle T = 150°}$

④ $\boxed{\overline{PQ} \parallel \overline{RS}}$ [S.S.Int. ∠s Converse] marked on diagram.

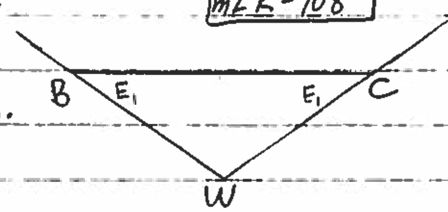
23. Given: ABCDEFGHIJ is a regular decagon. [Only draw part of the polygon!]



① $n=10$ ② $E_1 = \frac{360}{n}$ ③ $E_1 + E_1 + m\angle K = 180°$ [Δ sum thrm]

$E_1 = \frac{360}{10}$ $m\angle K + 72 = 180$

$E_1 = 36°$ $\boxed{m\angle K = 108°}$



24. See diagram above for the relationship.

① n-gon $\rightarrow$ n sides, $E_1 = \frac{360}{n}$

② $E_1 + E_1 + m\angle W = 180$

$\frac{360}{n} + \frac{360}{n} + m\angle W = 180$

$\frac{720}{n} + m\angle W = 180$

$m\angle W = 180 - \frac{720}{n}$ or $\rightarrow$ $m\angle W = \frac{180n}{n} - \frac{720}{n}$

$m\angle W = \frac{180n - 720}{n}$

$\boxed{m\angle W = \frac{180(n-4)}{n}}$

25. $2100 < I_{sum} < 2200$ [Given] Find n. Use $I_{sum} = (n-2)180°$.

From #5, if $n=10$, $I_{sum} = 1440°$. Therefore $n > 10$.

Check $n=12$. $I_{sum} = (12-2)180° \rightarrow I_{sum} = 1800°$. Too small.

Check $n=15$. $I_{sum} = (15-2)180° \rightarrow I_{sum} = 2340°$. Too large.

Check $n=14$. $I_{sum} = (14-2)180° \rightarrow I_{sum} = 2160°$. Just right! $\boxed{n=14}$

26. ① $S = I_{sum}$ [Given] Therefore $S = (n-2)180°$ when the number of sides is n.

part a ② Adding another side to the polygon always adds 180° to the interior sum. Therefore if there are $n+1$ sides, the new $\boxed{I_{sum} = S + 180}$.

Part b ③ If there are $2n$ sides, it is the same as $n+n$ sides. We have added n sides to the original polygon so we need to add 180° n times.

New $I_{sum} = S + 180n$. [Problem: This has an n in it! Solve ① for n and substitute.]

④ $S = (n-2)180$

$n - 2 = \frac{S}{180}$

$n = \frac{S}{180} + 2$

⑤ If $2n$ sides, $I_{sum} = S + 180n$.

$I_{sum} = S + 180\left(\frac{S}{180} + 2\right)$

$I_{sum} = S + S + 360$

Final Answer: $\boxed{I_{sum} = 2S + 360}$