Polygons

Name: _____	Date: _____	Score: _____ / 24

Quick Review and Helpful Hints

A polygon is a closed figure made of straight sides. The interior angles of a polygon with n sides add up to $(n-2)\times 180^\circ$. In a *regular* polygon all sides and angles are equal, so each interior angle is $\dfrac{(n-2)\times 180^\circ}{n}$. The perimeter is the sum of all the side lengths.

▷ **Example:** Find the sum of the interior angles of a hexagon (6 sides). **Work:** Use $(n-2)\times 180^\circ$ with $n=6$: $(6-2)\times 180 = 4\times 180$.

★ **Answer:** 720°

Hexagon ($n=6$): angle sum $=720^\circ$.

Practice Problems

Use the polygon shown to find the requested angle measure or perimeter.

1. Triangle: find the sum of the interior angles.

$n=3$

_____

2. Quadrilateral: find the sum of the interior angles.

$n=4$

_____

3. Pentagon: find the sum of the interior angles.

$n=5$

_____

4. Octagon: find the sum of the interior angles.

$n=8$

_____

5. Regular pentagon: find each interior angle.

regular

_____

6. Regular hexagon: find each interior angle.

regular

_____

7. Square: find each interior angle.

regular

_____

8. Decagon: find the sum of the interior angles.

$n=10$

_____

9. Equilateral triangle: find each interior angle.

regular

_____

10. Regular pentagon with side 7: find the perimeter.

$s=7$

_____

11. Regular hexagon with side 5: find the perimeter.

$s=5$

_____

12. Regular octagon: find each interior angle.

regular

_____

13. Heptagon: find the sum of the interior angles.

$n=7$

_____

14. Regular octagon with side 4: find the perimeter.

$s=4$

_____

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Word Problems

15. A stop sign is a regular octagon with each side measuring 12 inches. What is its perimeter?

16. A regular hexagonal floor tile has each interior angle equal to how many degrees?

17. A picture frame is shaped like a regular pentagon with a side length of 9 cm. Find its perimeter.

18. What is the sum of the interior angles of a regular nonagon (9 sides)?

19. A regular hexagonal garden has side length 8 feet. Find the perimeter.

20. A regular decagonal table has 10 equal sides. What is the measure of each interior angle?

21. A regular heptagonal flower bed has each side measuring 6 meters. Find its perimeter.

22. An art mural is shaped like a regular dodecagon (12 sides). What is the sum of its interior angles?

23. A regular nonagon tile has all angles equal. What is the measure of each interior angle?

24. A regular pentagonal sign has perimeter 65 cm. What is the length of each side?

Answer Keys

1. $180°$	**7.** $90°$	**13.** $900°$	**19.** 48 ft
2. $360°$	**8.** $1440°$	**14.** 32	**20.** $144°$
3. $540°$	**9.** $60°$	**15.** 96 in	**21.** 42 m
4. $1080°$	**10.** 35	**16.** $120°$	**22.** $1800°$
5. $108°$	**11.** 30	**17.** 45 cm	**23.** $140°$
6. $120°$	**12.** $135°$	**18.** $1260°$	**24.** 13 cm

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The diagram is a triangle, so $n = 3$. The angle sum is $(3 - 2) \times 180 = 180°$. So the final answer is $180°$.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The diagram has 4 sides. Use $(n-2)\times180$: $(4-2)\times180 = 360°$. So the final answer is $360°$.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The diagram is a pentagon, so $(5 - 2) \times 180 = 540°$. So the final answer is $540°$.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The octagon has 8 sides: $(8 - 2) \times 180 = 1080°$. So the final answer is $1080°$.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A regular pentagon has equal angles. Its total is $540°$, so each angle is $540 \div 5 = 108°$. So the final answer is $108°$.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A regular hexagon has total angle measure $720°$; divide by 6 to get $120°$ each. So the final answer is $120°$.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A square has 4 equal angles. The total is $360°$, so each angle is $360 \div 4 = 90°$. So the final answer is $90°$.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The diagram is a decagon, so $(10 - 2) \times 180 = 1440°$. So the final answer is $1440°$.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is An equilateral triangle has 3 equal angles. Since the total is $180°$, each angle is $180 \div 3 = 60°$. So the final answer is $60°$.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Perimeter is number of sides times side length: $5 \times 7 = 35$. So the final answer is 35.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The regular hexagon has 6 equal sides: $6 \times 5 = 30$. So the final answer is 30.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A regular octagon has total angle measure $1080°$, and $1080 \div 8 = 135°$. So the final answer is $135°$.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The heptagon has 7 sides: $(7 - 2) \times 180 = 900°$. So the final answer is $900°$.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The regular octagon has 8 sides of length 4, so $8 \times 4 = 32$. So the final answer is 32.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A stop sign is a regular octagon with 8 equal sides: $8 \times 12 = 96$ inches. So the final answer is 96 in.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A regular hexagon has total angle measure $720°$, so each angle is $720 \div 6 = 120°$. So the final answer is $120°$.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The picture frame is a pentagon with 5 equal sides: $5 \times 9 = 45$ cm. So the final answer is 45 cm.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A nonagon has 9 sides, so $(9 - 2) \times 180 = 7 \times 180 = 1260°$. So the final answer is $1260°$.

19. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The garden is a regular hexagon, so it has 6 equal sides: $6 \times 8 = 48$ feet of edging. So the final answer is 48 ft.

20. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A decagon has angle sum $(10 - 2) \times 180 = 1440°$; divide by 10 to get $144°$. So the final answer is $144°$.

21. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The flower bed is a heptagon with 7 equal sides, so $7 \times 6 = 42$ meters. So the final answer is 42 m.

22. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A dodecagon has 12 sides: $(12-2)\times180 = 1800°$. So the final answer is $1800°$.

23. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A regular nonagon's total is $1260°$, and $1260 \div 9 = 140°$ for each angle. So the final answer is $140°$.

24. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide the perimeter by the 5 equal sides: $65 \div 5 = 13$ cm per side. So the final answer is 13 cm.

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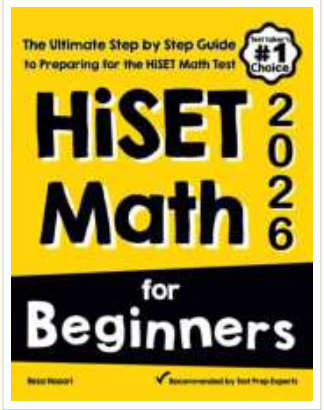

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