

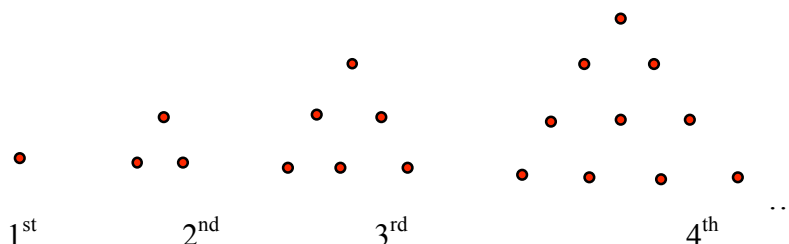
PATTERNS

OACS Benchmarks for Algebra (grades 5 – 7)

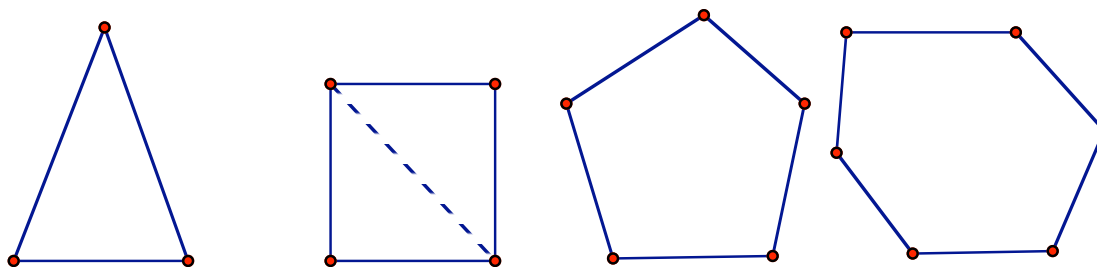
- A. Analyze and extend patterns, and describe the rule in words. Describe patterns using a variety of formal and informal symbolic representations; represent the n^{th} term of a pattern; be able to explain why the n^{th} term of a pattern must be correct.
- B. Use patterns to make predictions, identify relationships, and solve problems.

Extending patterns:

- Extend the pattern of dots below. How would you describe the pattern of dots? If someone wanted to know how many dots it would take to make the 10th object in this pattern, how would you find out how many there were? Can you do it without drawing the dots all the way to the 10th object?



- Given a sequence of geometric shapes where the number of sides increases by one and starting with a triangle, draw in all possible diagonals originating from a single vertex. This will break up these shapes into triangles. Extend this pattern of shapes for up to 10 sides. Find the number of such triangles for the following shapes: (note there are no diagonals to draw in the triangle).



Shape	Triangle	Quadrilateral	Pentagon	Hexagon	7-gon	8-gon	9-gon	10-gon
Triangles Created:	1	2						

Predict how many triangles would be formed by these diagonals for a 17-sided figure.
Explain how you made your prediction.

- An “up and down sequence” is one that consists of consecutive integers starting at 1 going up to a given number n and back down to 1. For example, if n is 7, the sum of the up and down sequence would be: $1 + 2 + 3 + 4 + 5 + 6 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 49$. Find the sums of the first 7 up and down sequences. Predict the sum of the up and down sequence when $n = 15$.
Explain how you did it.