

Lesson Title: Polygonal Number Patterns**Geo 1.3****Utah State Core Standard and Indicators** Geometry Standards 2-4 Process Standards 1-5**Summary**

In this lesson, students explore and describe the patterns found in polygonal numbers. They use the patterns to make predictions. They also match equations to the patterns.

Enduring Understanding

Finding, generalizing and communicating about patterns is at the heart of mathematics. This is the process which enables problem solving, reasoning and critical thinking.

Essential Questions

How do we use patterns to make predictions and solve problems?

Skill Focus

- Observing and representing patterns using geometric models and algebraic formulas

Vocabulary Focus**Assessment****Materials:** Calculators**Launch****Explore****Summarize****Apply**

Alg 6.0

Figurate Number Patterns in Geometry

Find the number sequences in the following figurate patterns.

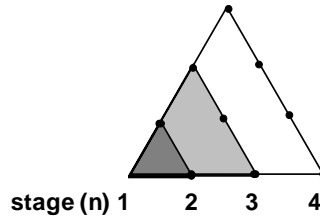
1) TRIANGULAR NUMBERS: Draw the next two triangles in the pattern.

Count the total dots on the triangles at each stage in the sequence.

The Pattern is for the total number of dots at each stage is:

1, _____, _____, _____, _____, _____.

Describe the patterns.



Which formula describes how to find these numbers? a) $\frac{1}{2}(n + 1)$ b) $n(n-1) + 2$

Use the formula to find the 20th triangular number. _____

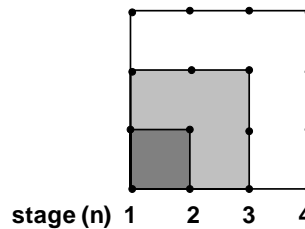
1) SQUARE NUMBERS: Draw the next two squares in the pattern.

Count the total dots on the squares at each stage in the sequence.

The Pattern is for the total number of dots at each stage is:

1, _____, _____, _____, _____, _____, _____.

Describe the patterns.



Which formula describes how to find these numbers? a) $4n - (n + 1)$ b) $n \times n$

Use the formula to find the 20th square number. _____

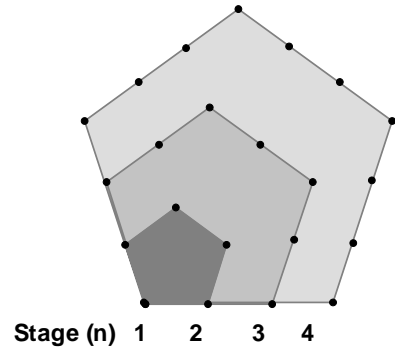
3) PENTAGONAL NUMBERS: Draw the next two stages in the pattern.

Count the dots on the pentagons at each stage in the sequence..

The Pattern is for the total number of dots at each stage is:

1, _____, _____, _____, _____, _____, _____.

Describe the patterns.



Which formula describes the nth pentagonal number? a. $4(n+1)$ b. $4n - 3$

Use the formula to find the 15th pentagonal number. _____

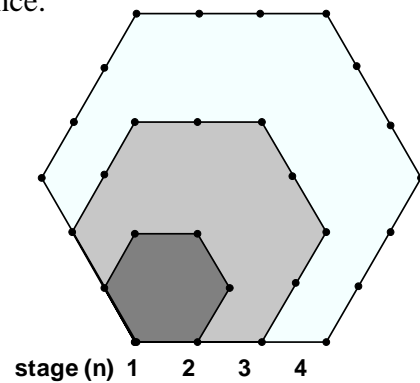
4) HEXAGONAL NUMBERS: Draw the next two stages in the pattern.

Count the dots in the pentagons at each stage in the sequence.

The Pattern is for the total number of dots at each stage is:

1, _____, _____, _____, _____, _____, _____.

Describe the patterns.



Which formula describes the nth hexagonal number? a. $\frac{1}{2} n(4n - 2)$ b. $5n(n-6)$

Use the formula to find the 15th hexagonal number. _____

5) Use the patterns from above to fill in the numeric patterns in this table of figurate numbers.

Natural Numbers	1	2	3	4	5	6	7	8
Triangular Numbers	1							
Square Numbers	1							
Pentagonal Numbers	1							
Hexagonal Numbers	1							

Describe the patterns you observe in the numbers.