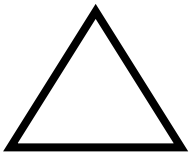
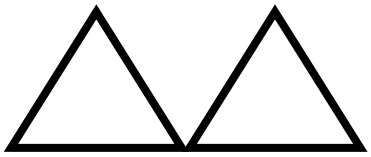
Tri-Triangles

Level A

Lisa is making triangle patterns out of toothpicks of all the same length. A triangle is made from three toothpicks. Her first pattern is a single triangle.

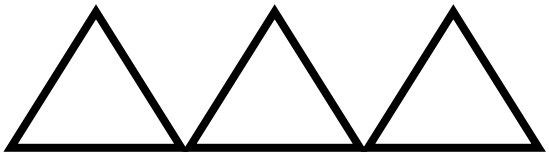


Her second pattern is shown below.



How many toothpicks are needed for her second pattern?

Her third pattern is shown below.



How many toothpicks are needed for her third pattern?

If she continues the same pattern, how many toothpicks are needed for the fifth pattern?

How many toothpicks are needed for the tenth pattern?

If you had 27 toothpicks, what pattern number could you make?

Explain how you know.

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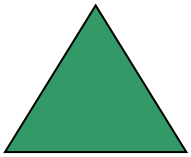
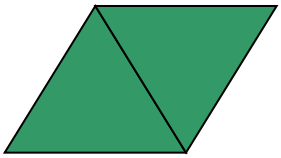
Level B

Your classroom has triangular-shaped tables.



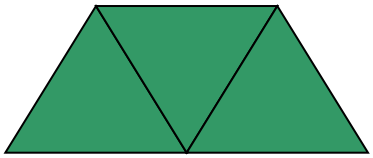
Three students can sit around one table.

Two tables can be pushed together so that two sides are adjacent.



How many students can sit around the tables in this arrangement?

Tables can be added to the arrangement by pushing together tables so that each additional table is adjacent to one side of the row of tables. The arrangement may grow to be a long row of tables.



How many students can sit around three tables in this arrangement?

How many students can sit around five tables in a row arrangement?

Without drawing the arrangement, determine how many students can sit around twelve desks in a row. Explain how you figured it out.

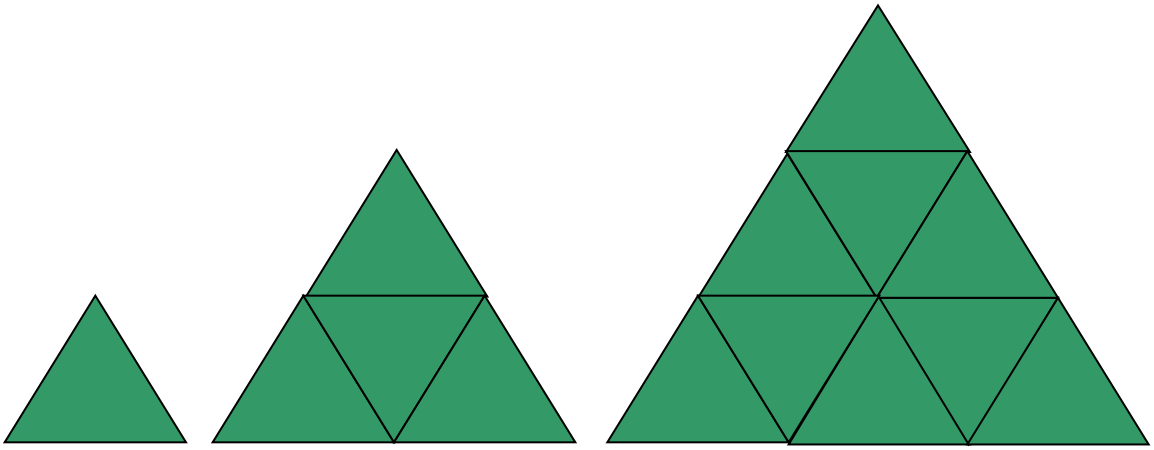
How many tables in a row are needed to seat 105 students?

Explain your answer.

Tri-Triangles

Level C

Anne uses triangles to make the following patterns:



Pattern 1 Pattern 2 Pattern 3

The pattern continues in the same geometric design.

Draw Pattern 4. How many triangles are needed?

How many triangles are needed to construct Pattern 7?

How many triangles are needed to construct Pattern 16?

Explain how you determined your rule.

Write a rule to find the number of triangles needed for the **n**th pattern. Explain your rule.

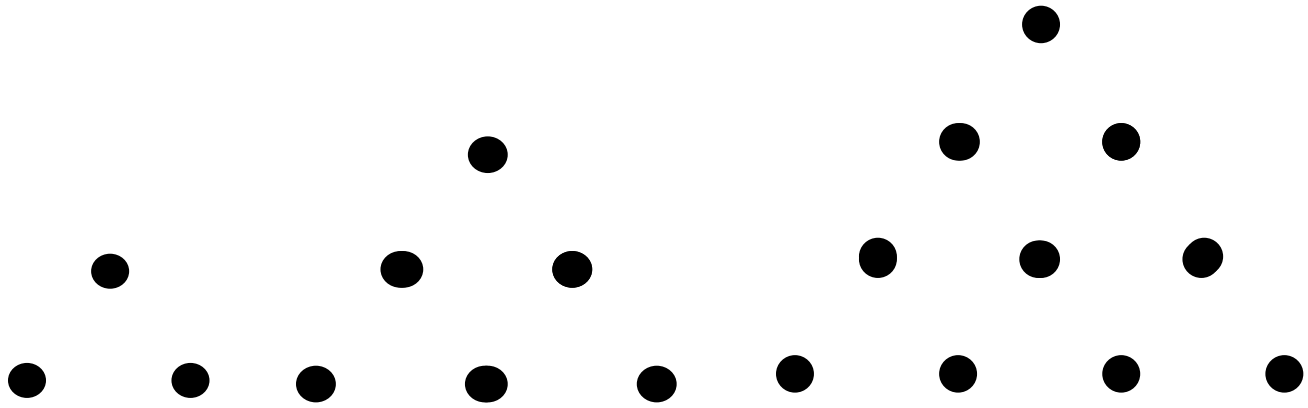
Suppose a pattern had 2,025 triangles. What is the pattern number?

Explain.

Tri-Triangles

Level D

Jo constructs triangular patterns using dots.



The pattern continues in the same geometric design.

How many dots are needed to make Pattern 5?

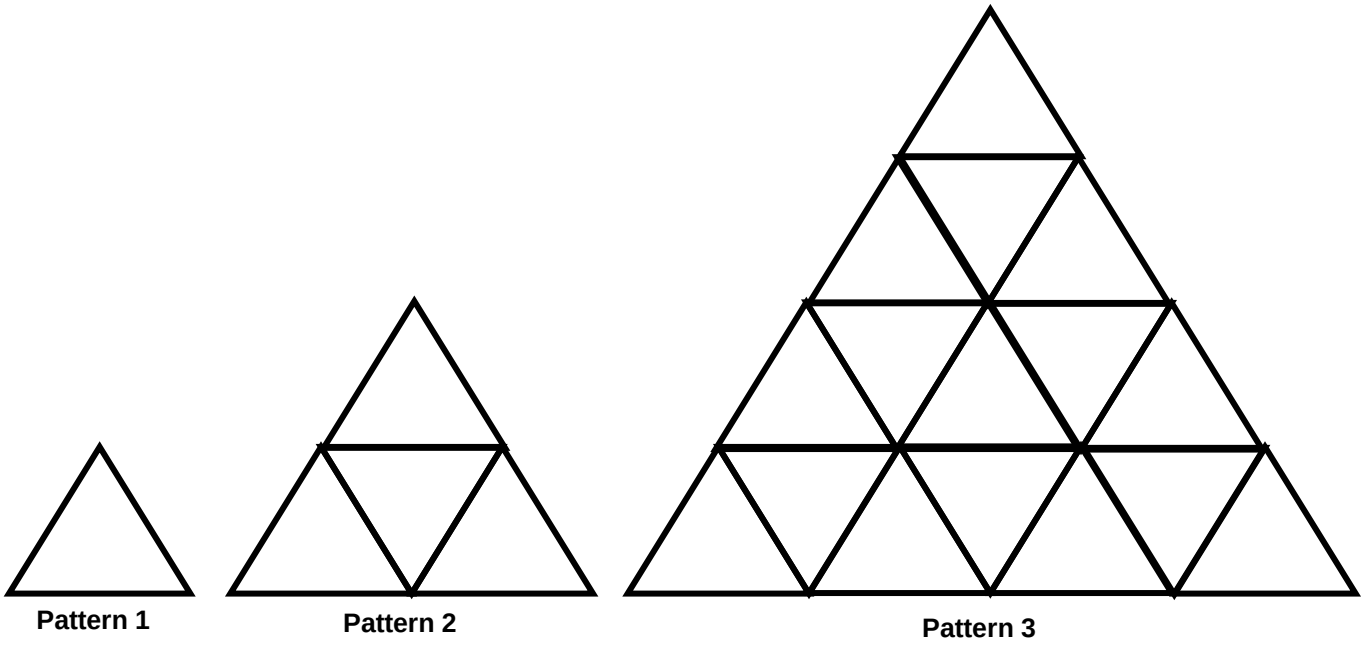
How many dots are needed for the **n**th pattern?

Explain your rule.

Jo was born in 1953, and she was wondering if she could make a triangular pattern out of exactly 1,953 dots. If she could, what would the pattern number be? Explain your reasoning.

Tri-Triangles

Level E



Craig constructs the designs above from equal line segments. The design in Pattern 1 is made up of three-line segments. Pattern 2 is made up of nine-line segments. Pattern 3 is made up of thirty-line segments, and so on.

How many line segments are needed to make Pattern 8?

How many line segments are needed to make Pattern 16?

Determine a function for finding the number of line segments needed to make the pattern for any number **n**. Justify why your function works.

You have 6,294,528 equal line segments. Can you construct a design that belongs in this sequence using just those line segments? If so, what pattern number would that be? If not, how many more line segments might you need to construct a design that fits the sequence?

Tri-Triangles

Manipulatives