

Stairway to the Sky

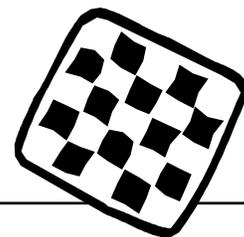


Figure out how many blocks it will take to build a stairway 10 blocks tall.

What you need

About 50-60 Cubes (sugar cubes, small 1 cm squared cubes, or other cube-shaped blocks)

What to do

1. A 1-step stairway would take one cube. 
2. Now build a 2-step stairway. How many cubes did it take? 
3. How many cubes will it take to build a 4-step stairway? Take a guess, then build it and see how close you were.
4. How many cubes will it take to build a 10-step stairway? Take a guess, then build it and see how close you were.
5. Ask someone to challenge you by picking how many steps tall they want a stairway to be (start off between 5 and 15). See if you can figure out how many blocks it will take before you actually build it.

What to ask

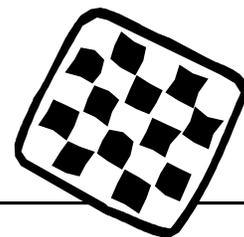
- Look at the sequence of just the bottom row. Do you see a pattern?
- Look at the sequence of the diagonal row for patterns.
- How many have to be added to the 2-step stair to make a 3-step stair? How many have to be added to the 3-step stair to make a 4-step stair? What do you notice about the patterns here?
- Can you find a pattern in the total number in each (e.g. 1,3,6,10...)? How would you describe it to someone?



Did you know?

Some patterns are recognizable by their predictable shapes. Cubed numbers can be expressed as a succession of smaller to larger cubes. Like $1 \times 1 \times 1$ (1 cubed), $2 \times 2 \times 2$ (2 cubed), $3 \times 3 \times 3$ (3 cubed) can be built for exploration. Patterns such as the Fibonacci sequence can be explored at this website:
<http://pass.maths.org.uk/issue3/fibonacci>





What's next?

- Try changing the height of the stairs (from 1 cube tall, to 3 cubes, to 5 cubes). How does this change the pattern?
- Build pyramids instead of stairs. How does this change the number of cubes needed? Do you see a pattern?

To learn more

Pattern

by Henry Pluckrose

A picture book containing brilliantly colored photographs that have patterns. The pictures provide opportunities to discuss repeating core patterns and other patterns.

The Mysterious Multiplying Jar

by Mitsumasa Anno

This book introduces the concept of factorials through interesting illustrations and a story.

How it helps with school

Texas Essential Knowledge and Skills (TEKS) Standards

Patterns, Relationships, and Algebraic Thinking: 3.6A; 4.7; 5.5B

Probability and Statistics: 3.14A; 5.12B

Underlying Processes and Mathematical Tools: 3.15A-D, 3.17A-B; 4.14A-D, 4.16A-B; 5.14A-D, 5.16A-B

National Council of Teachers of Mathematics (NCTM) Standards

Algebra, Data Analysis and Probability, Reasoning and Proof, Representations