

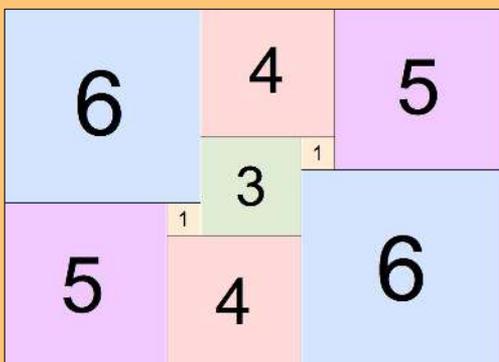


Julia Robinson
(1919 - 1985)

Puzzling with Squares

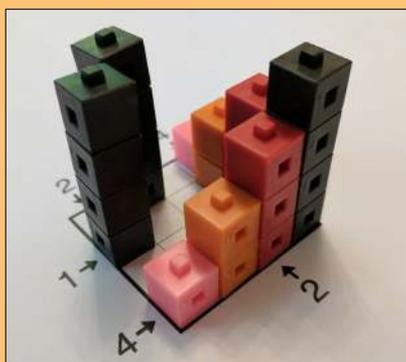
Squaring Puzzles

by Gord Hamilton, MathPickle.com



Skyscrapers

by Conceptis and Peter Liljedahl



“The JRMF really gets it right. Usually the best parts of mathematics are kept away from the public, as if you needed to be a mathematician to get to the fun stuff! It’s refreshing to see a festival that brings this stuff to light, and in such a relaxed atmosphere. If you’re lucky enough to have a JRMF near you, don’t miss it! It’s the best math party around.”

– Vi Hart, **Mathemusician**, [youtube.com/user/ViHart](https://www.youtube.com/user/ViHart)

“I’m not that good in math class, but this got me excited. I tried something really difficult. I saw an adult stuck at the same problem.”

– Lindsey, **Grade 6**

“I liked working together with my friends. The teacher at the table didn’t help us much. We did this ourselves.”

– Connor, **Grade 3**

Festival activities are designed to open doors to higher mathematics for students in grades K–12. Visit www.JRMF.org for more information about Julia Robinson Mathematics Festivals.

Compiled by Neha Aluwalia, Neel Surya, Saniya Nagali,
Maya Sissoko, Kavitha Rau, and Nancy Blachman.

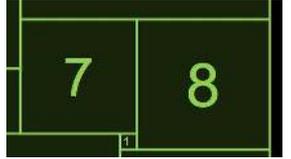
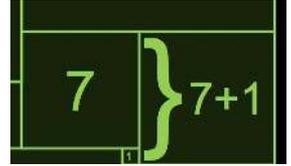


Squaring Puzzles

by Gord Hamilton, Math Pickle

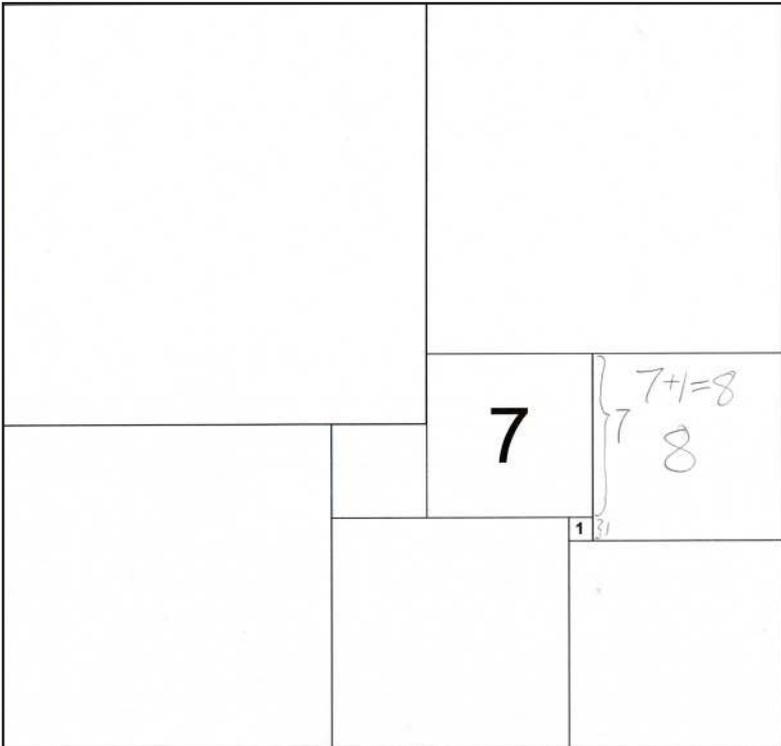
"These abstract squaring puzzles offer you an opportunity to practice addition and subtraction with numbers. They also link these numerical activities to geometry. What a beautiful way to practice subtraction!"

—Gord Hamilton, MathPickle.com



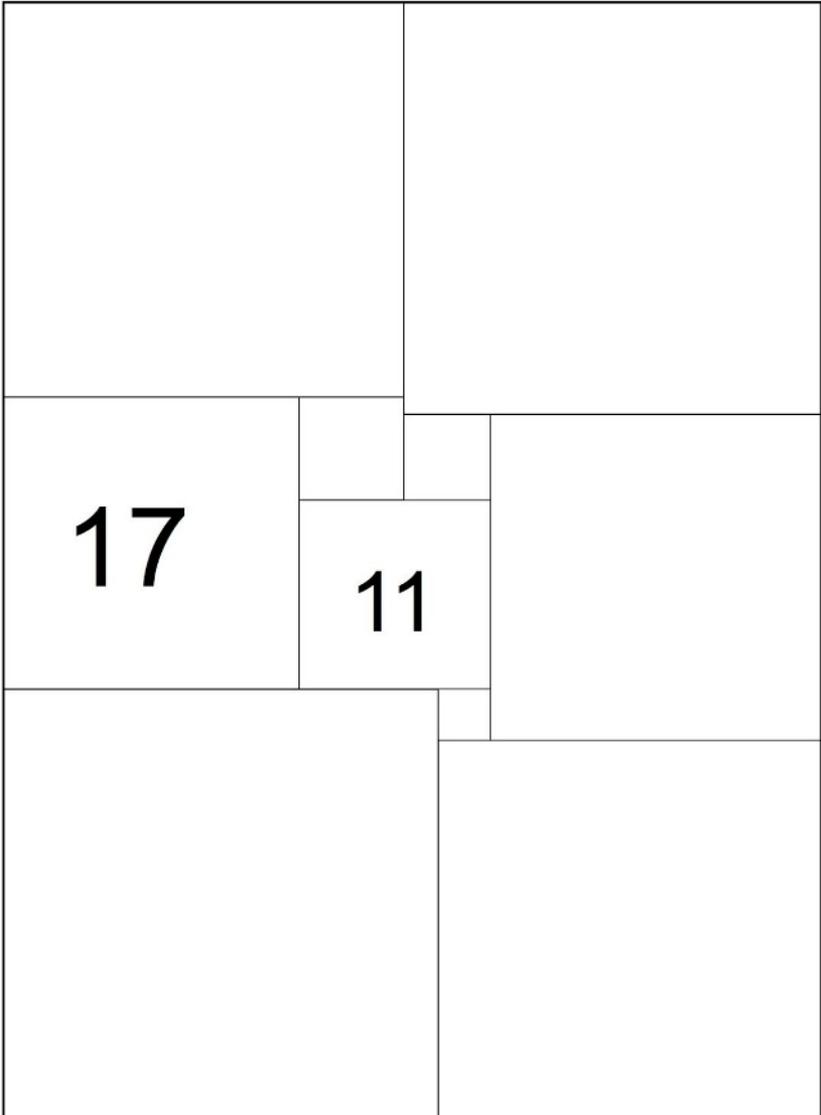
The number inside a square represents the length of each side of that square. Using this information, find the lengths of the sides of each square and record the number inside the square.

Note: Assume that all interior rectangles are squares in this booklet. However, the outermost rectangle may not be a square.



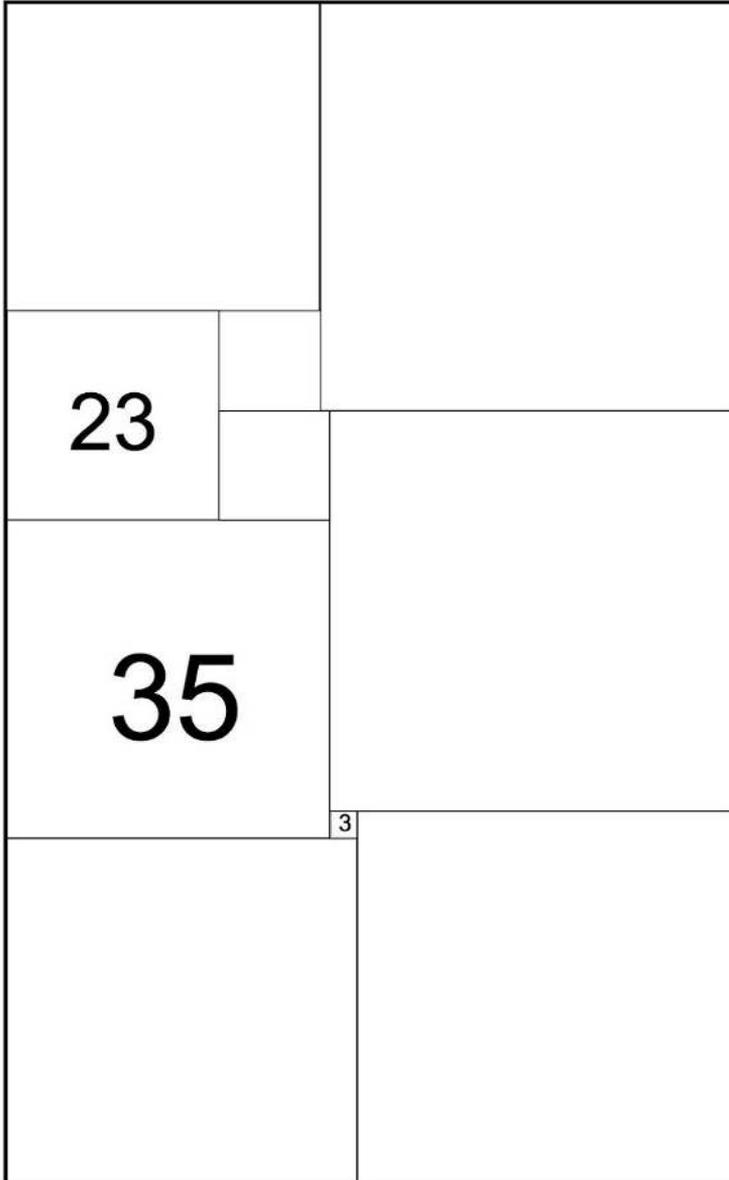
Using the known lengths of the sides of some squares, use addition and subtraction to determine the lengths of the sides of the other squares.

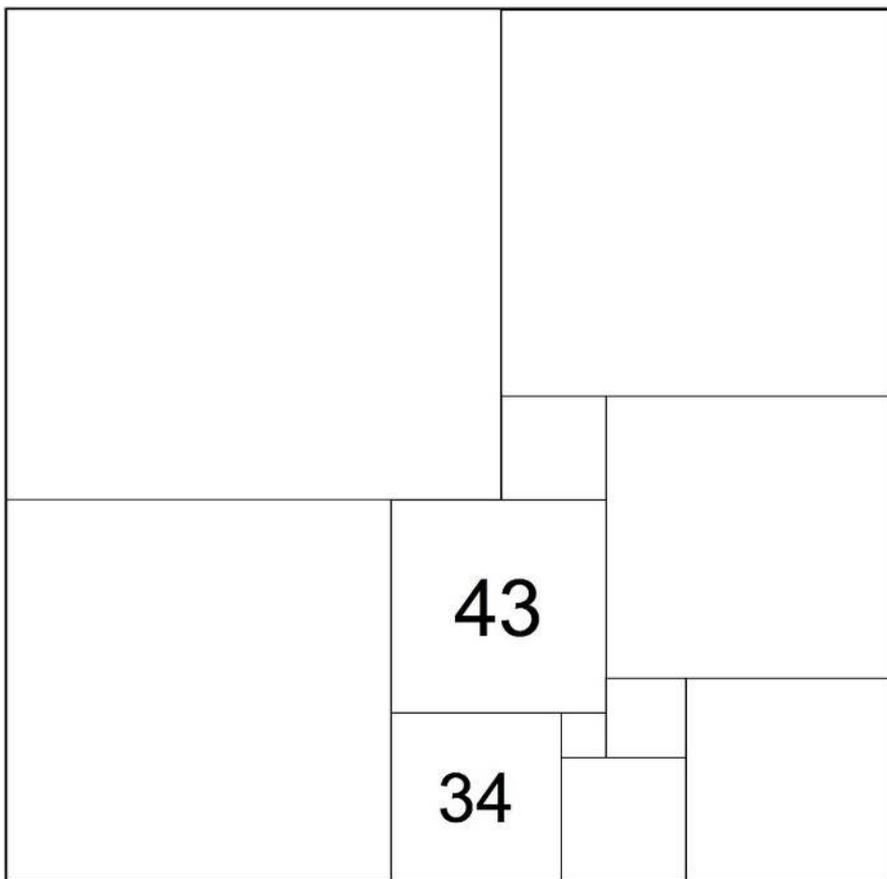
Hint: Start by determining the size of the square near the center of the rectangle.





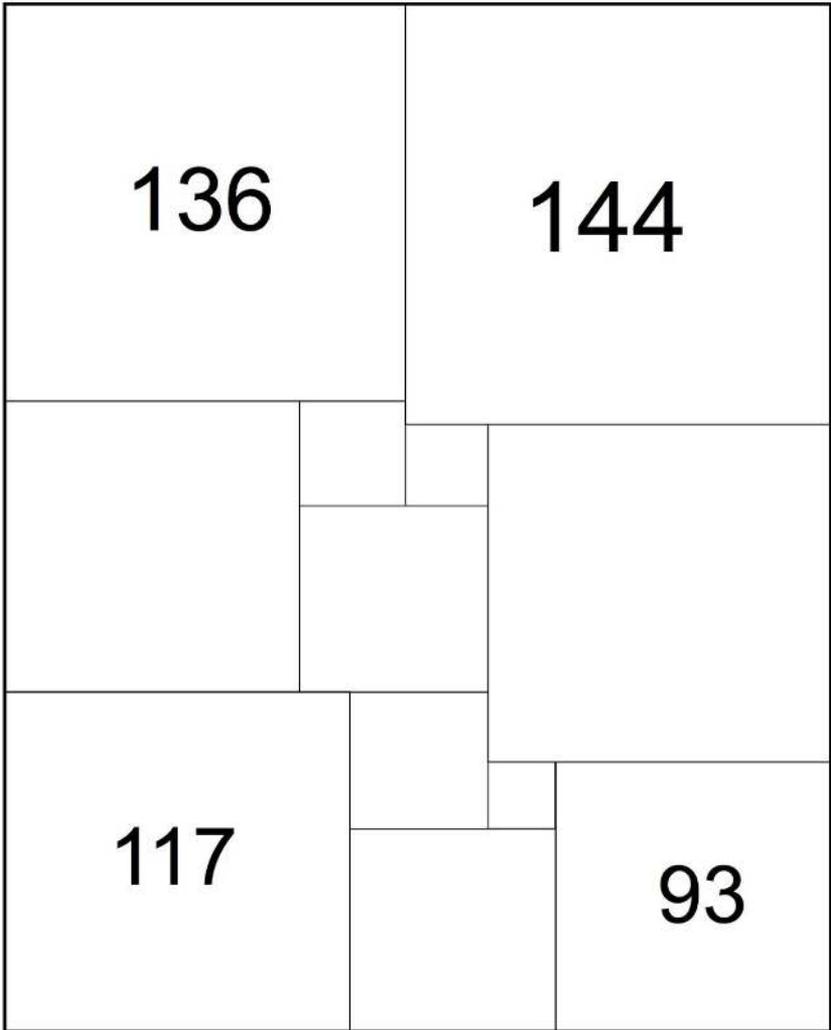
Using the provided side lengths, determine the lengths of the sides of the other squares and also the lengths of the sides of the outside rectangle.





Find more Julia Robinson Mathematics Festival problem sets at:
jrmf.org/problems.php

Working with triple-digit side lengths now, find the length of each square and the lengths of the sides of the rectangle in which they are enclosed.



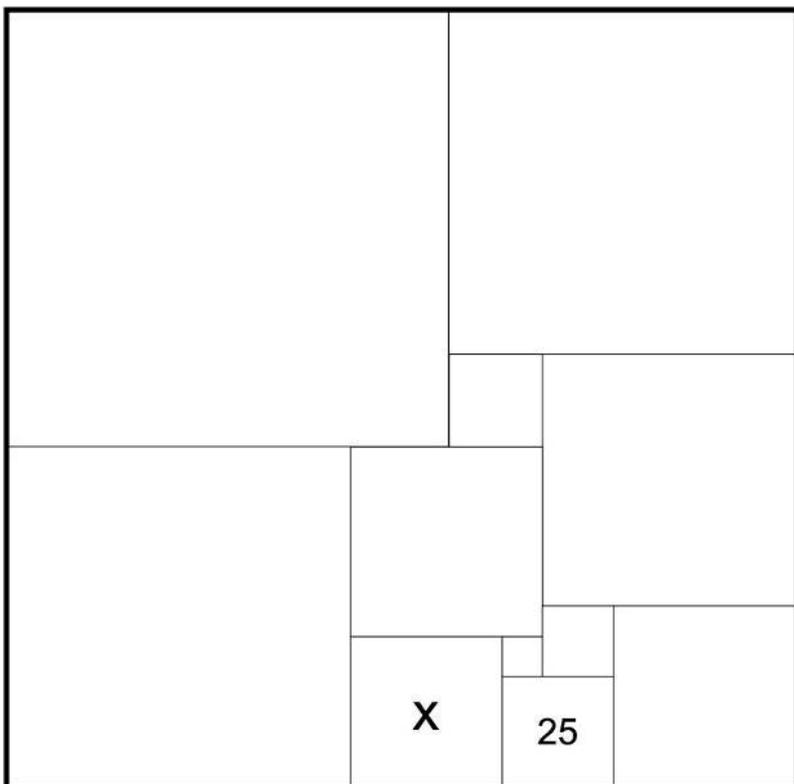
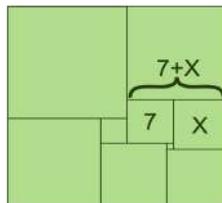
Find more square and subtracting puzzles online at:
mathpickle.com/project/squaring-the-square/



Algebra on Rectangles – by Gord Hamilton, Math Pickle

This is another rectangular tiling, but this time you are given fewer clues. Use the 25 by 25 square to figure out the dimensions of all the other squares – and the value of x .

As in the previous puzzle, the number or variable (letter) in each square represents the length of the sides of that square.



What is the largest ratio possible (biggest square : smallest square) in a rectangle tiled with all different sized squares?

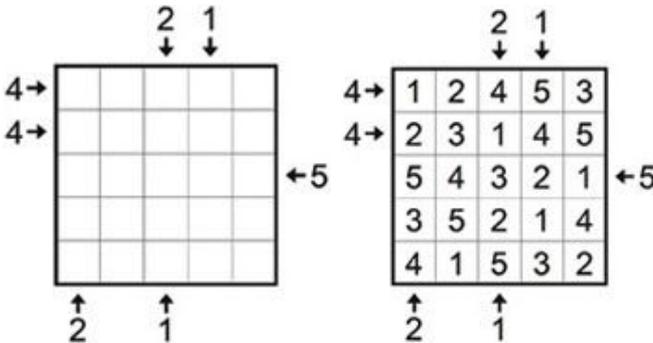
Find more algebra on square puzzles on the MathPickle website at:

mathpickle.com/project/algebra-on-rectangles

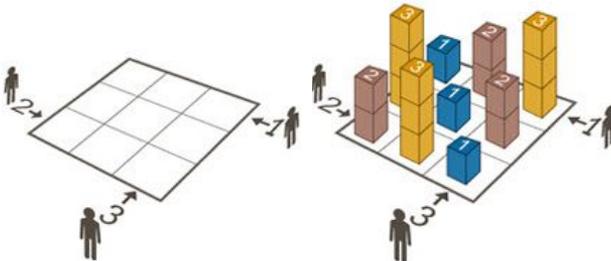
Skyscrapers – Skyscraper Puzzles provided by Peter Liljedahl

Please help the city planner figure out where to build skyscrapers according to the following rules:

- Place a skyscraper in each square.
- Each row and each column must have skyscrapers of different heights, i.e., no two skyscrapers in a row or column have the same number of floors.
- The number outside the grid (the clues) specifies how many skyscrapers you can see if you stand on that number.
- Taller skyscrapers block the view of shorter skyscrapers located behind them.
- The number inside the grid indicates the number of stories in a skyscraper.



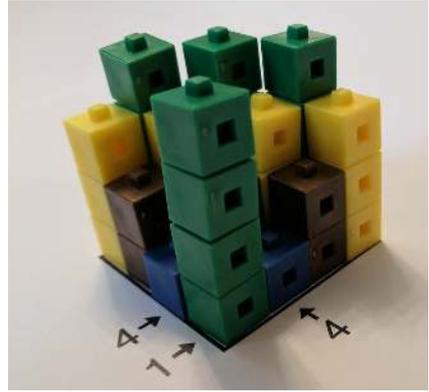
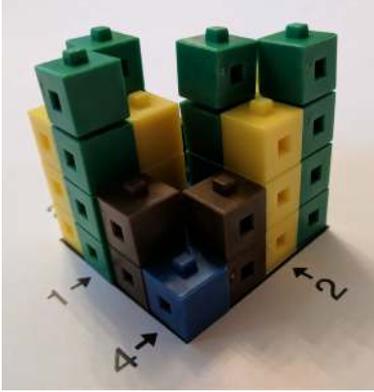
Below is a 3D diagram of what a puzzle would look like when viewed from an airplane. The blocks are city skyscrapers and the clues indicate how many of them are visible when viewed from that direction. With this diagram, it is clear how lower skyscrapers are hidden by the higher ones.



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conceptispuzzles.com/index.aspx?uri=puzzle/skyscrapers/rules

Solve the puzzles by building skyscrapers or by writing the height of each building in the grid.



Skyscrapers #1

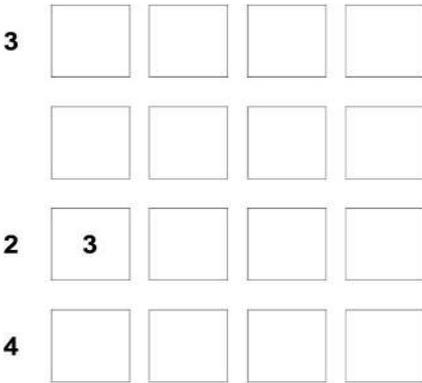
	3	2	1	3	
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
	1	3	3	2	

Skyscrapers #2

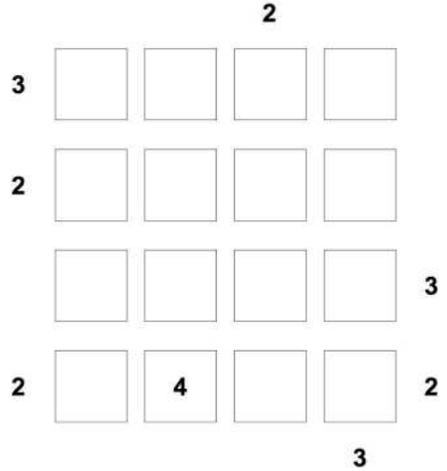
	2	2	2	1	
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	3
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
	2	3	1	4	



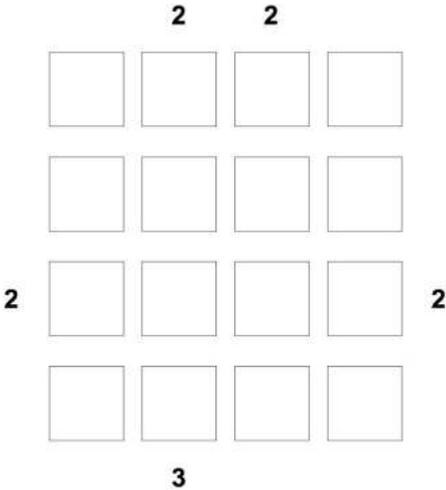
Skyscrapers #3



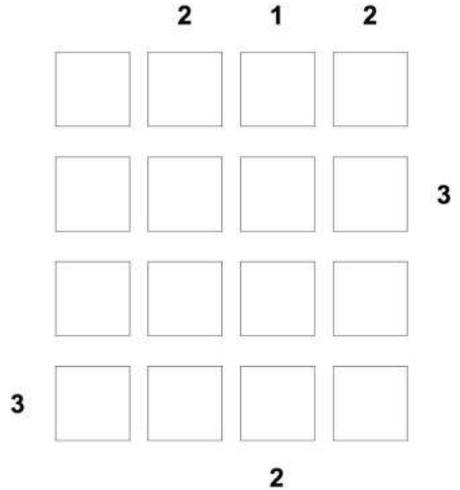
Skyscrapers #4



Skyscrapers #5



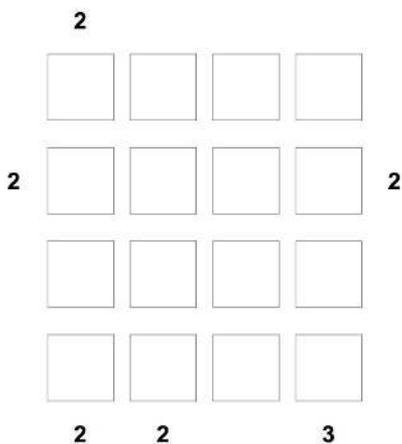
Skyscrapers #6



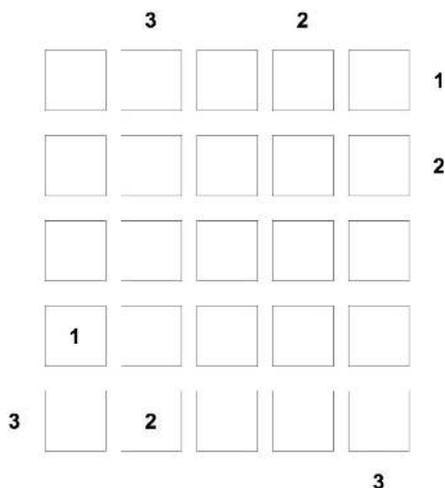
Find more Julia Robinson Mathematics Festival problem sets at:

jrmf.org/problems.php

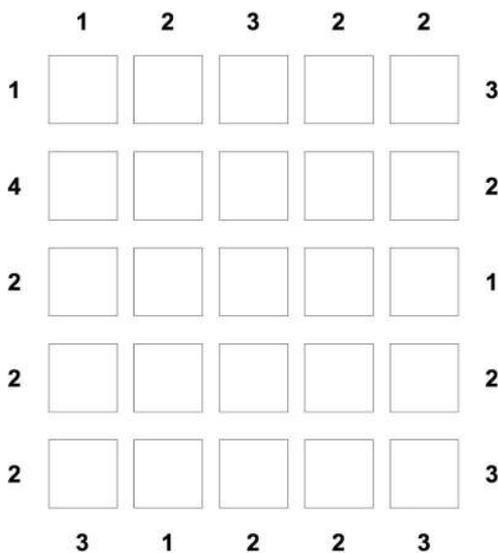
Skyscrapers #7



Skyscrapers #9



Skyscrapers #8



Craft Your Own Skyscraper Puzzle

- Work backwards from an answer.
- Put in all 4N clues outside the grid.
- Remove some of the clues to make a harder puzzle.
- Does your puzzle have just one solution?
- *Work forward with interesting clues.*
- Specify some “interesting” situations by specifying crafting relevant clues as you set up the puzzle.

Find more Skyscraper puzzles online at brainbashers.com/skyscrapers.asp and conceptispuzzles.com/index.aspx?uri=puzzle/skyscrapers



What is a Julia Robinson Mathematics Festival?



A Festival is an event at which students play with mathematics.

Typically, there are a dozen or more tables, each with a facilitator and a problem set, game, puzzle, or activity. Students are encouraged to look for patterns, pursue more than one approach, and share their explorations and discoveries. A facilitator at each table listens, supports, and guides the participants.

The aims of our Festivals are:

- To evoke mathematical interest and enthusiasm in problem solving and discovery.
- To help students make connections among widely different areas of mathematics.
- To broaden the kinds of teaching and learning experiences in the students' education.

Festivals reach many types of students, including those who don't enjoy competitions or working under time pressure. A Festival is also a community event, bringing together institutions and organizations as their constituents celebrate mathematics together.

Interested in volunteering, organizing or hosting a Festival?

Contact us for more information:

Founder: Nancy Blachman
EMAIL : info@jrmf.org

Executive Director: Mark Saul
WEBSITE : www.JRMF.org

JRMF is a program of the American Institute of Mathematics (AIM).