

BRIDGES

ACTIVITY GUIDE

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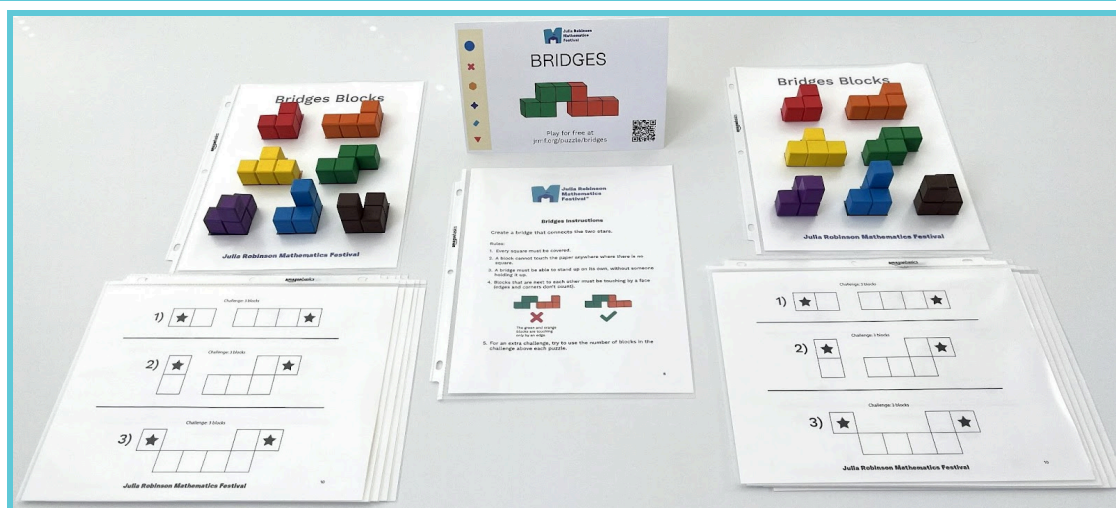
**Julia Robinson
Mathematics
Festival**

Materials and Setup

Per table (assuming 5 students per table), you will need:

Per Table	Material Preparation	
5 sets of connected cubes	Each set has 7 cube shapes.	
3 copies of Instructions	1 page each	p. 8
5 copies of Bridges Blocks*	1 page each (with light blue lock) 1 page each (with brown block) 1 page each (pastel colors)	p. 9 p. 20 p. 21
*We've noticed that sets of blocks sometimes come with alternate colorings (see p. 20 & 21). You may want to order the blocks before you print the Bridges Blocks sheets.		
5 copies of Tasks	9 pages each <i>can be printed double-sided</i>	p. 10-18
1 copy of Table Sign	1 page <i>print on cardstock for sturdiness</i>	p. 19

Per Table	Purchasing Materials		
5 sets of cubes	1 set for \$1.85		Note: This item regularly goes in and out of stock. You could try here too. Or here .
13 plastic sheet protectors	pack of 100 for \$7.67	pack of 500 for \$26.99	These are recommended in order to protect the documents that students will be handling.





Objective

Create a bridge that connects all of the islands.

Rules:

1. Every square must be covered.
2. A block cannot touch the paper anywhere where there is no square.
3. Blocks that are next to each other must be touching by a face (edges and corners don't count).
4. A bridge must be able to stand up on its own, without someone holding it up.
5. For an extra challenge, try to use the number of blocks in the challenge listed above each puzzle.

Materials

Each Bridges table should be prepped for 5 stations.

Each station needs:

1. Bridges cube set (7 shapes).
2. Bridges instructions.
3. Bridges Blocks sheet.
4. Bridges tasks.

How to Play

Introduce the activity without overexplaining it and without telling what strategies students might want to use. As much as possible, avoid giving away answers. Students should be encouraged to explore, experiment, and learn from their mistakes.

1. Model the rules using the cubes to explain.
2. Solve the first challenge together.
3. Have the student explore the next challenges, either on their own or with a partner.

Standards

1. Make sense of problems and persevere in solving them. CCSS.MP1
2. Model with mathematics. CCSS.MP4
3. Attend to precision. CCSS.MP6
4. Look for and make use of structure. CCSS.MP7



Asking Good Questions

1. Ask questions about confidence.
 - a. When a student asks you “Is this right?”, instead of saying “yes” or “no” right away, ask them how confident they are in their answer. Here are some examples:
 - i. “Maybe. What do you think? How confident are you?”
 - ii. “On a scale of 1-5, how confident are you in your answer?”
 - b. If a student is not confident in their answer, follow up by asking “What would help you feel more confident in your answer?” or “Why do you not feel confident?” This helps you determine how best to help the student through their explorations.
2. Ask students about choices.
 - a. When a student is stuck or shows you a wrong answer, instead of jumping in and showing the student the correct answer, start by asking about the choices that the student made along the way. Here are some suggested steps to follow:
 - i. Start from the beginning.
 - ii. Ask students to show you what they’ve tried so far.
 - iii. When the student gets to a point where they have different choices, ask the student “What other choices can you make here?”
 - iv. Have the student make a different choice and try to solve the puzzle. This helps the student see that they have the power to make different choices during an activity, and they’ll start to do this on their own in the future.
 - v. If you’re familiar with the puzzle or a particular solution, stop the student only when a different choice will help them get to the solution. This will help them feel successful faster without you giving away too much of the answer.
3. Ask students about strategies.
 - a. If a student is getting into the activity and has been doing it for a while, ask the student if there are any strategies they’ve come up with to help them solve the puzzle or win the game.
 - b. Follow up by asking if they think their strategies will work for all puzzles and/or larger puzzles, more complex puzzles, etc. Have the student explore more complex puzzles to test out their strategies.
 - c. This is a great way to encourage a student to dive deeper into an activity and to start looking for patterns, structure, and proofs.

Answers

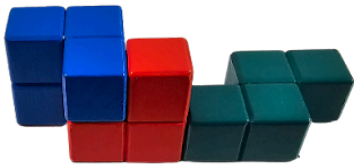
Below are example solutions for each puzzle. Most puzzles may have more than one solution.



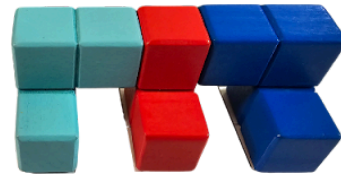
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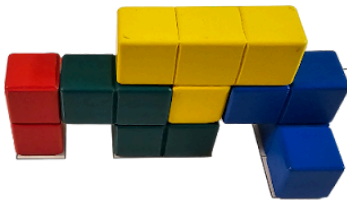
Puzzle 2



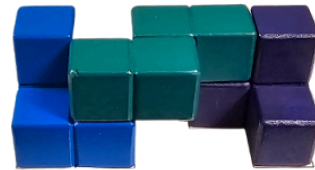
Puzzle 3



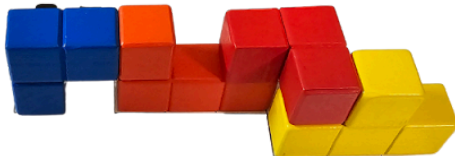
Puzzle 4



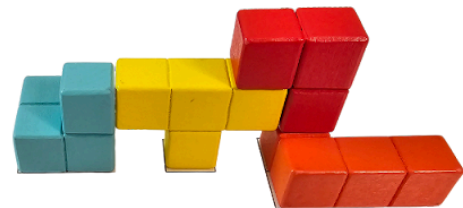
Puzzle 5



Puzzle 6



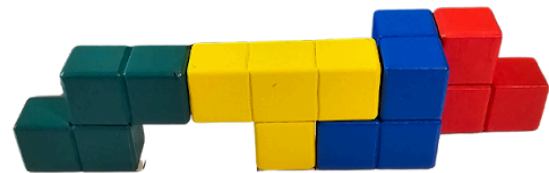
Puzzle 7



Puzzle 8



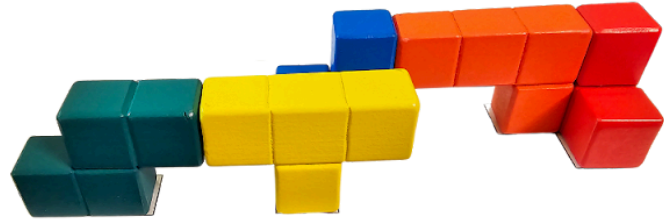
Puzzle 9



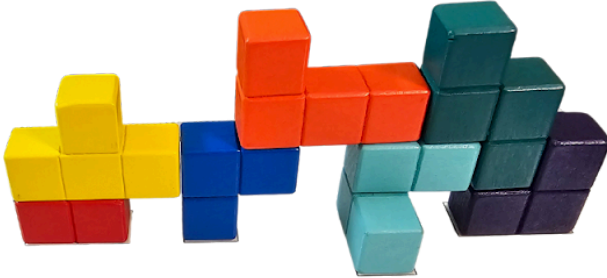
Puzzle 10



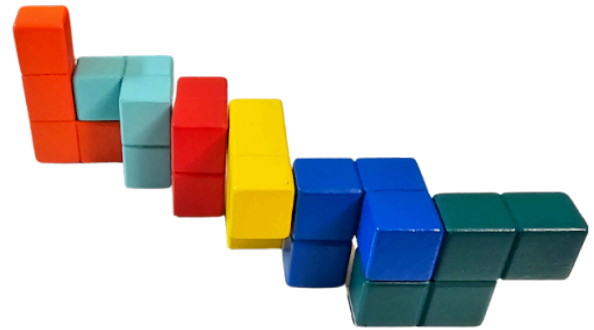
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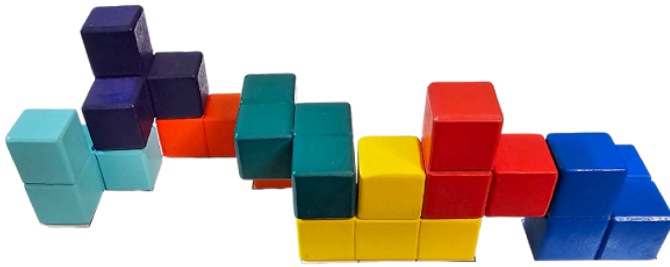
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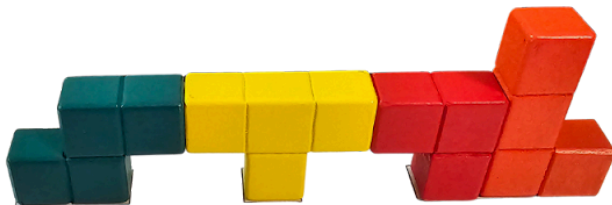
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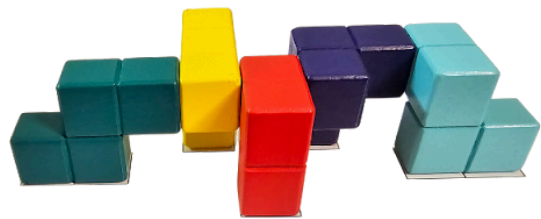
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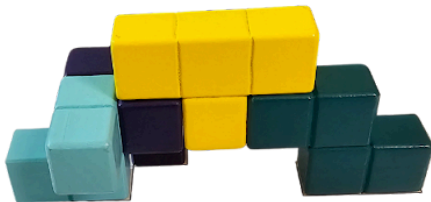
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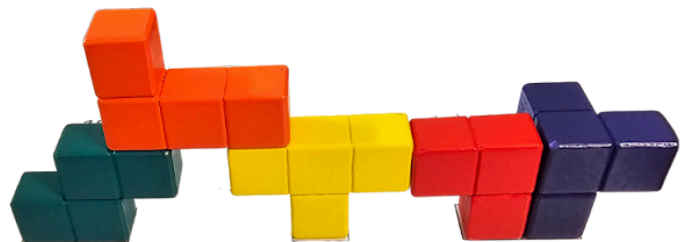
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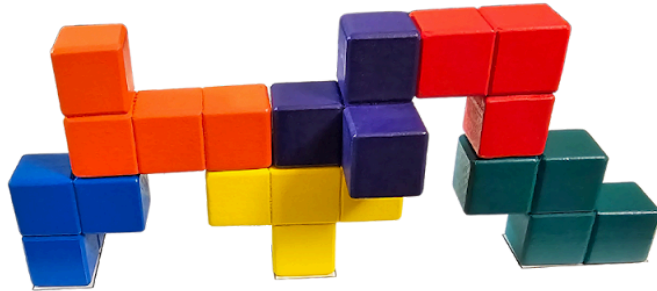
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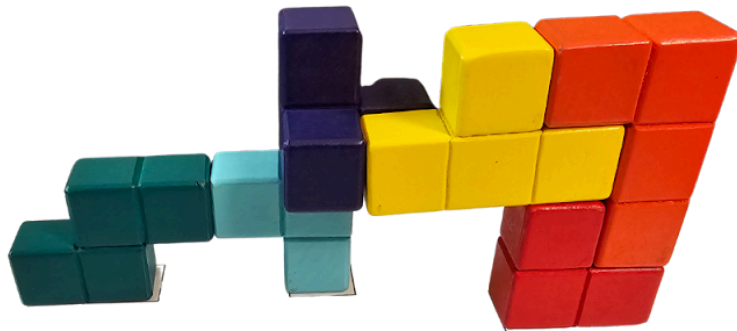
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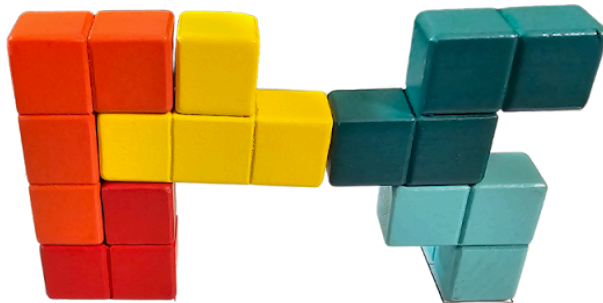
Puzzle 19



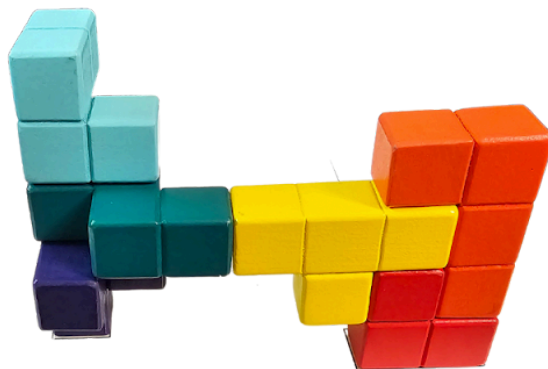
Puzzle 20



Puzzle 21



Puzzle 22



Puzzle 23

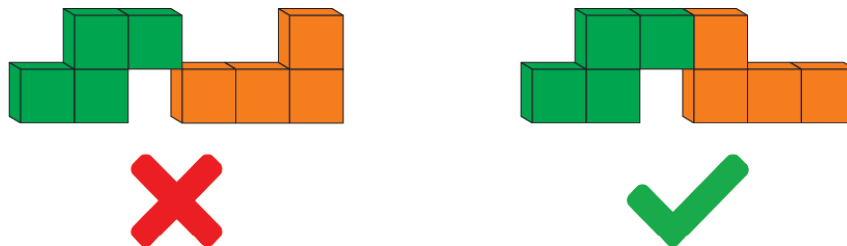


Bridges Instructions

Build a bridge that connects all of the islands.

Rules:

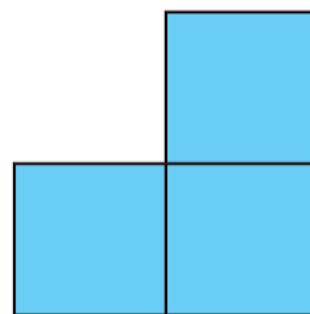
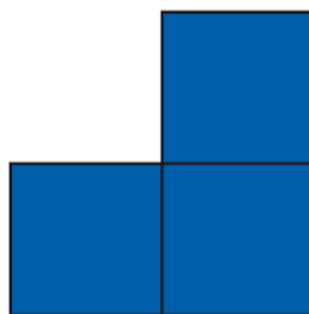
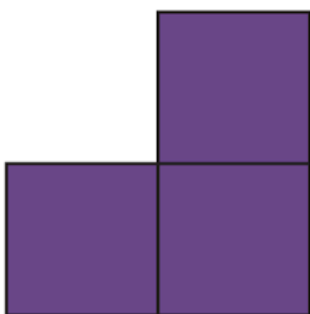
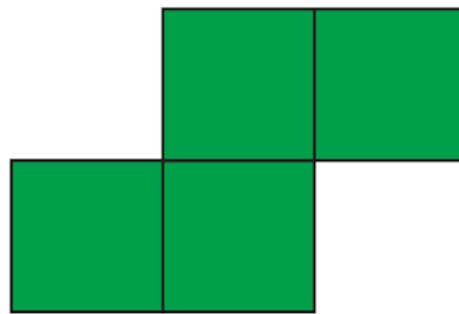
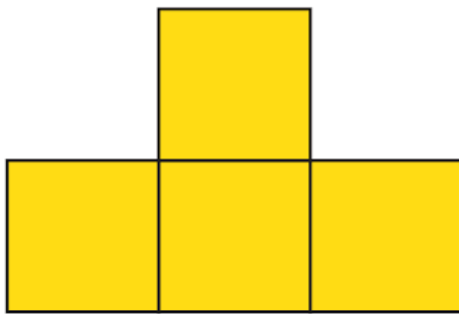
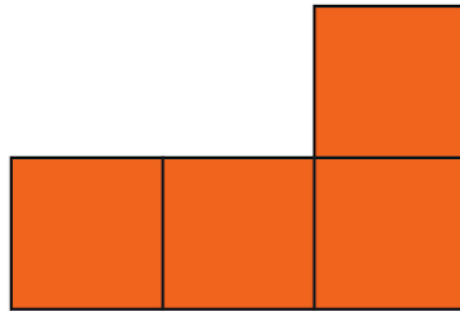
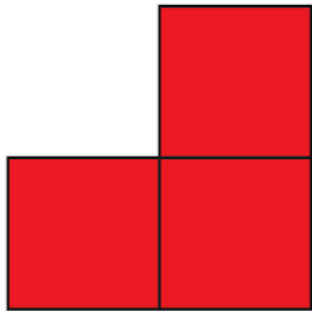
1. Every square must be covered.
2. A block cannot touch the paper anywhere where there is no square.
3. Blocks that are next to each other must be touching by a face (edges and corners don't count).



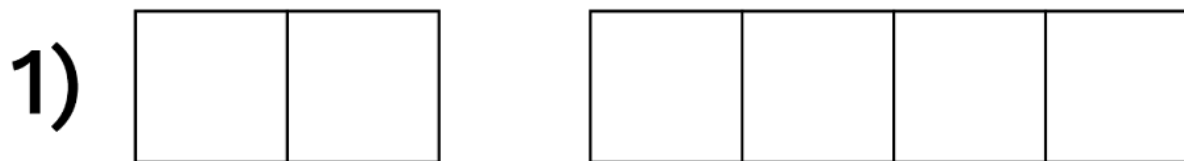
The green and orange blocks are touching only by an edge.

4. A bridge must be able to stand up on its own, without someone holding it up.
5. For an extra challenge, try to use the number of blocks in the challenge above each puzzle.

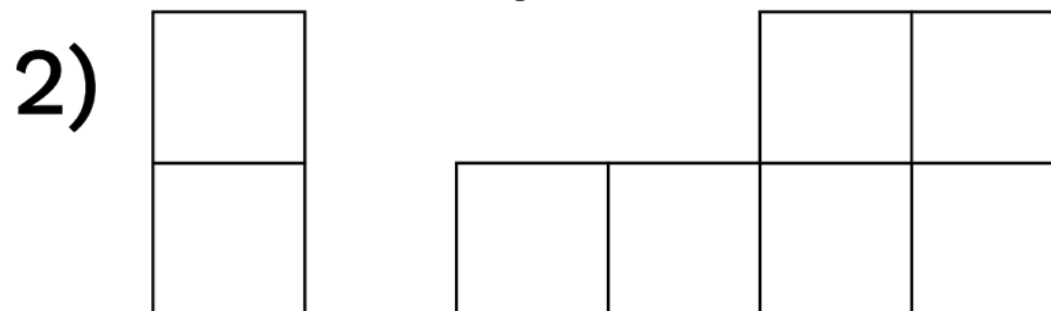
Bridges Blocks



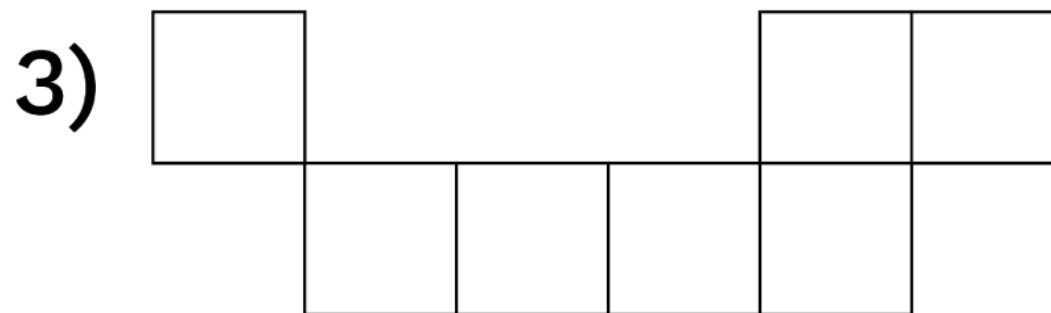
Challenge: 3 blocks



Challenge: 3 blocks

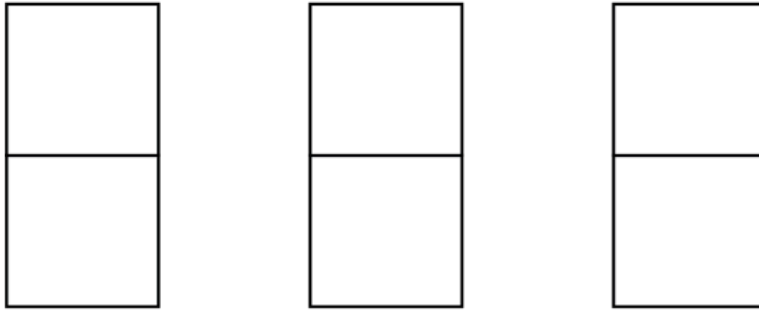


Challenge: 3 blocks



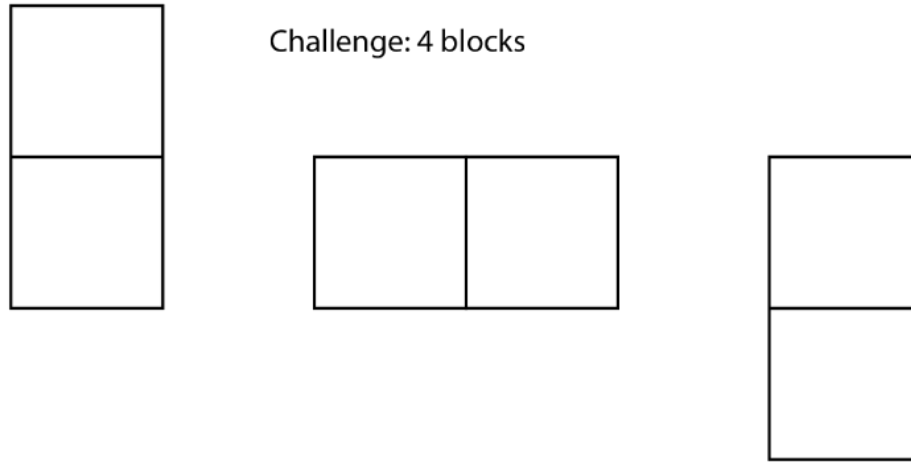
Challenge: 3 blocks

4)



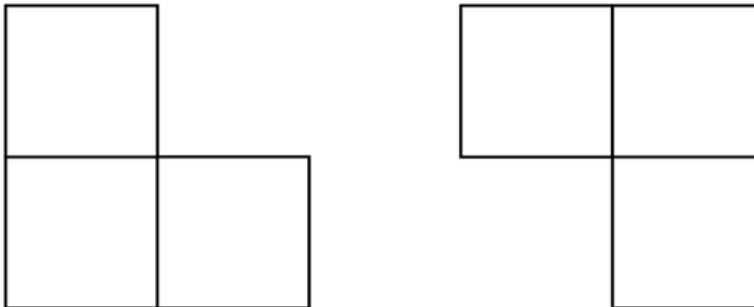
5)

Challenge: 4 blocks



Challenge: 3 blocks

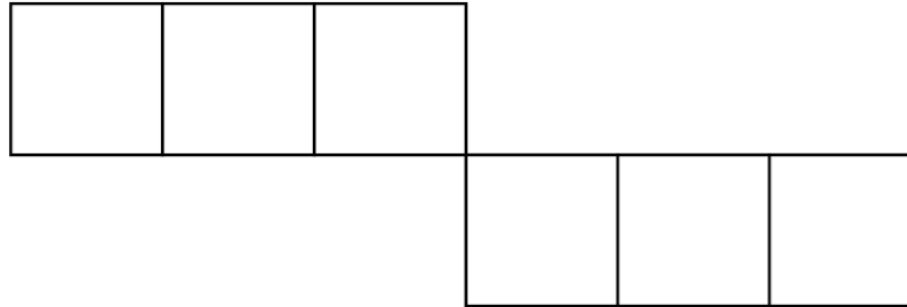
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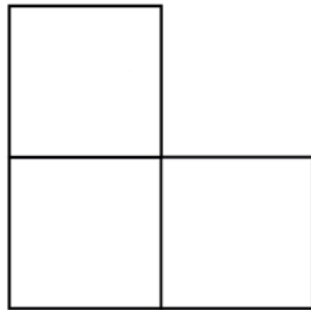
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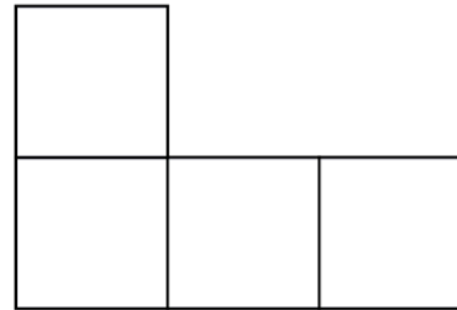
Challenge: 4 blocks



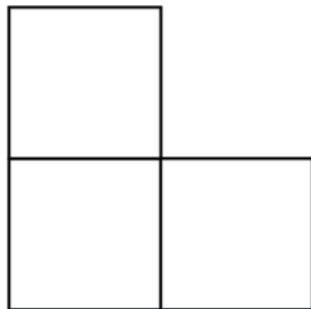
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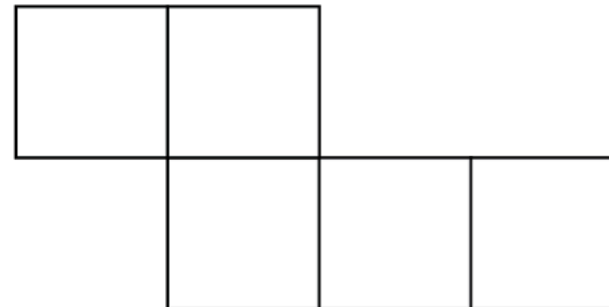
Challenge: 4 blocks



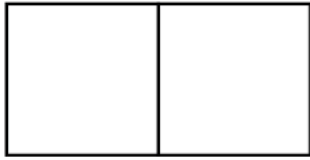
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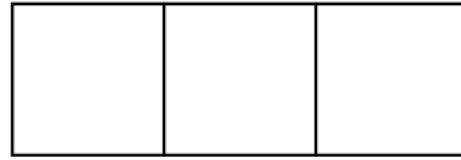
Challenge: 4 blocks



10)



Challenge: 4 blocks



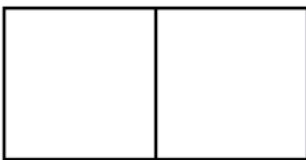
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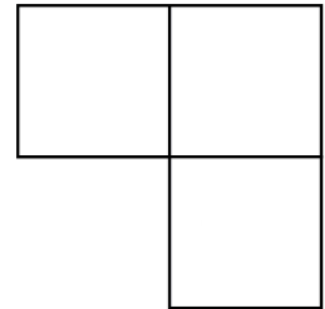
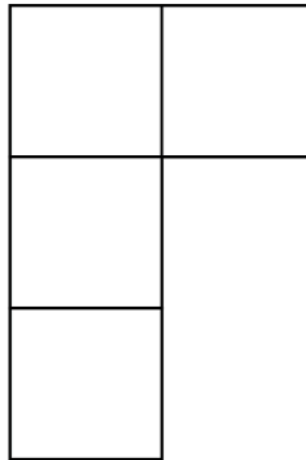
Challenge: 5 blocks



12)

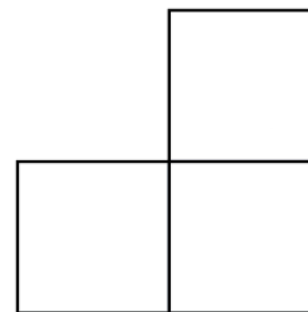
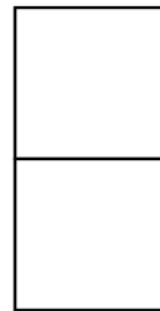
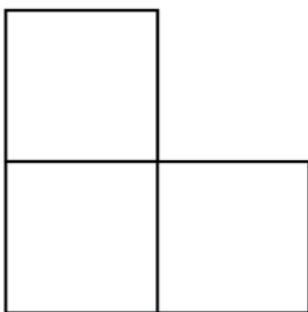


Challenge: 6 blocks



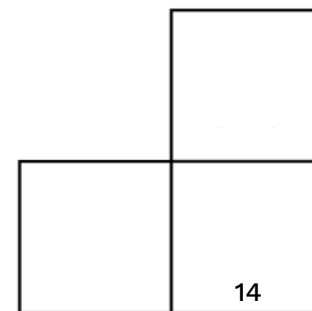
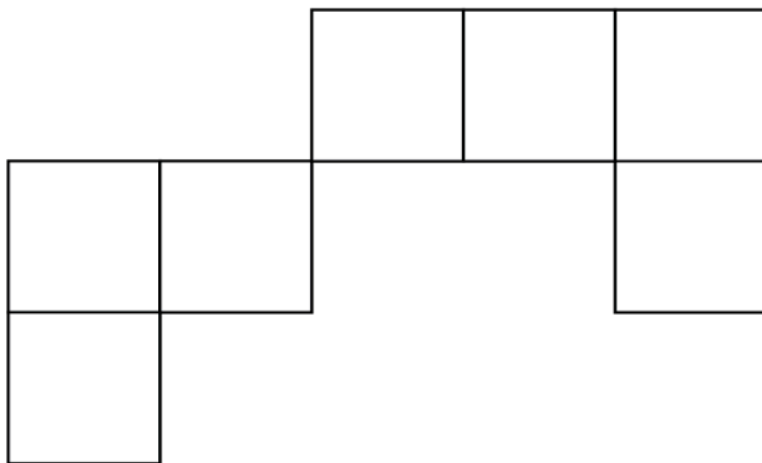
Challenge: 7 blocks

13)



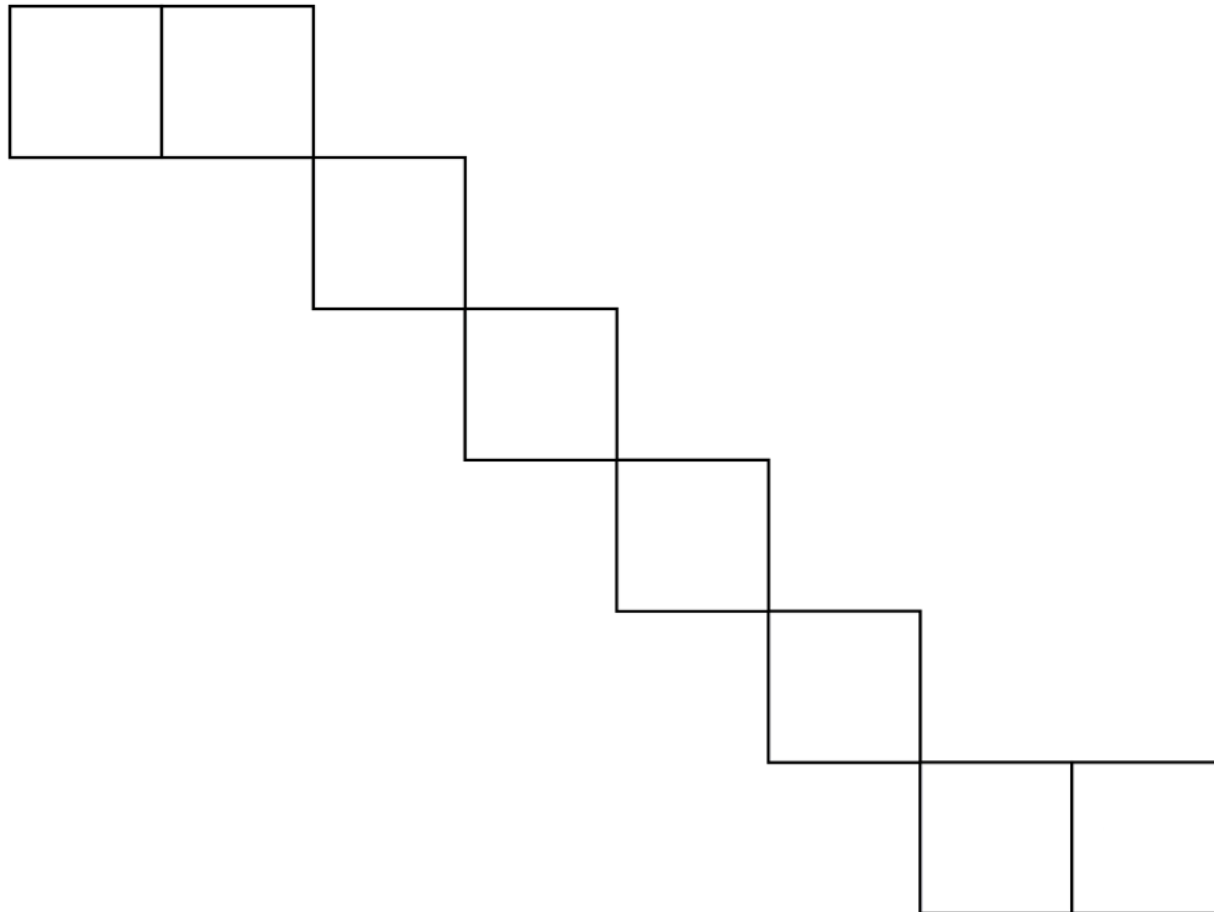
Challenge: 7 blocks

14)



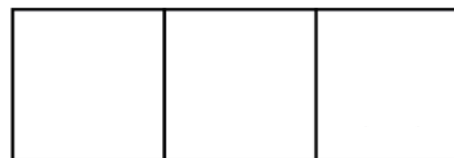
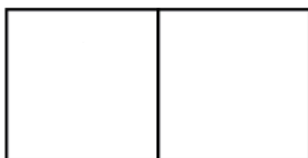
Challenge: 6 blocks

15)



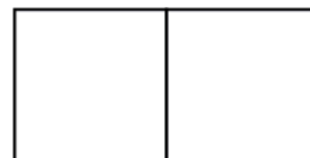
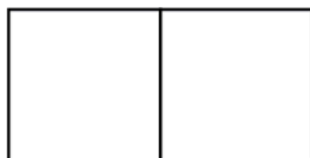
Challenge: 4 blocks

16)



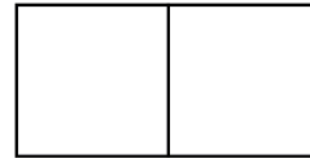
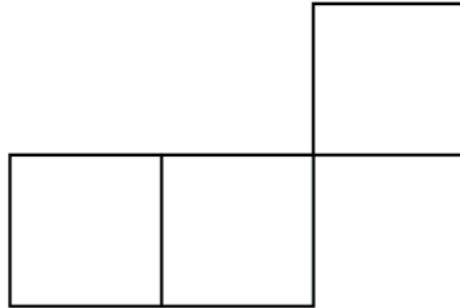
Challenge: 5 blocks

17)



Challenge: 4 blocks

18)



Challenge: 6 blocks

19)



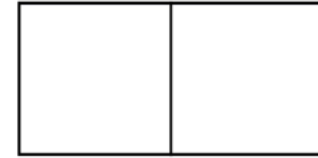
Challenge: 6 blocks

20)



Challenge: 6 blocks

21)



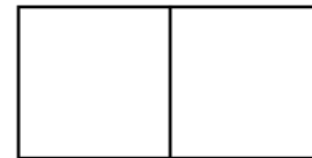
Challenge: 6 blocks

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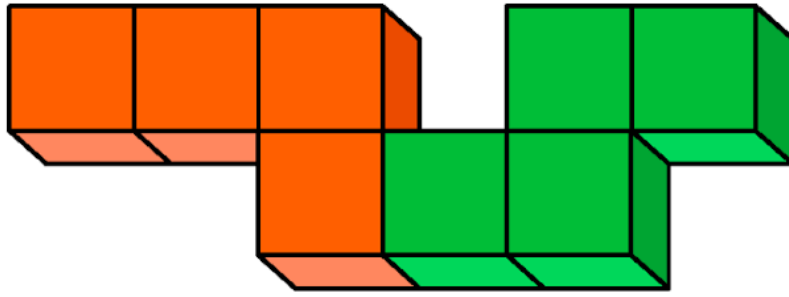
Challenge: 6 blocks

23)





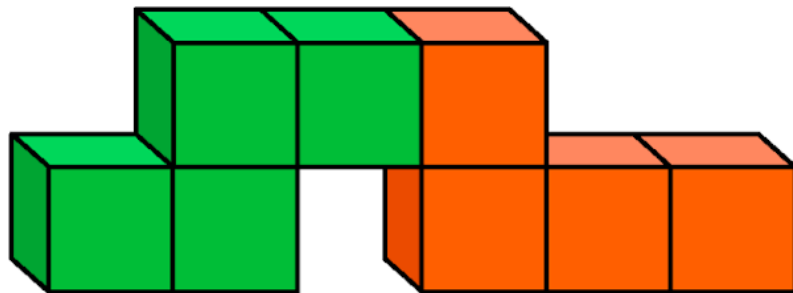
Play for free at
jrmf.org/puzzle/bridges



BRIDGES



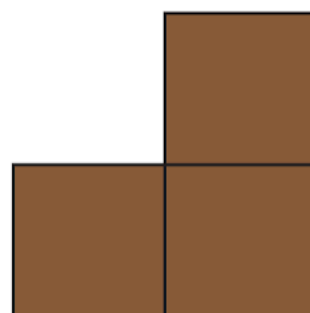
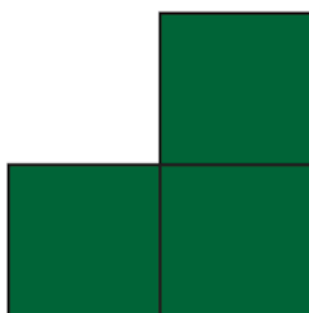
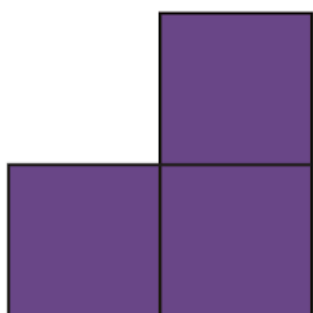
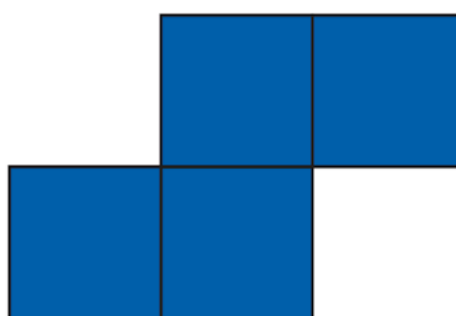
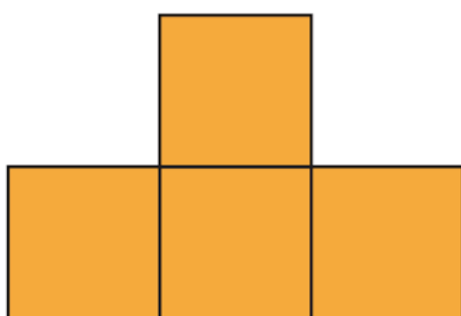
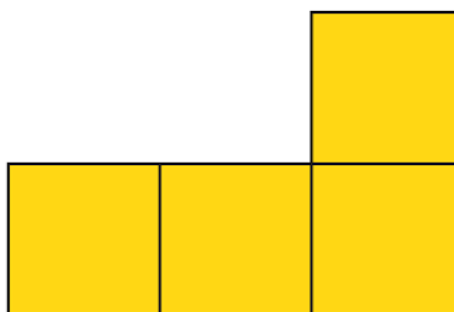
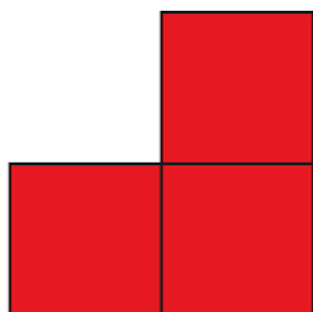
BRIDGES



Play for free at
jrmf.org/puzzle/bridges



Bridges Blocks



Bridges Blocks

