

# CATCH UP FESTIVAL GUIDE

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## Materials and Setup

Per table (assuming 4 pairs of children per table), you will need:

Per Table	Material Preparation	
4 sets of cuisenaire rods size 1 to 8		
2 copies of Instructions	1-page sheet	p. 6
4 copies of Tasks	1-page sheet	p. 7
4 copies of Catch Up Play Mat	1-page sheet	p. 8
1 copy of Table Sign	1-page sheet <i>print on cardstock for sturdiness</i>	p. 9
Paper and pencils		

Per Table	Purchasing Materials		
4 sets of rods sizes 1 to 8	<a href="#">pack of 74</a> for \$15.86		
10 plastic sheet protectors	<a href="#">pack of 100</a> for \$7.67	<a href="#">pack of 500</a> for \$26.99	These are recommended in order to protect the documents that children will be handling.



## Objective

The goal is to build the longer line of blocks.

Rules:

1. Players take turns placing blocks in a line.
2. The game starts by Player 1 placing one of the blocks. Player 2's turn is next.
3. A player's turn ends when their line of blocks is the same length or longer than their opponent's.
4. Players keep placing blocks until all of the blocks have been used. The player with the longer line of blocks wins.

## Materials

Each Catch Up table should be prepped for 4 stations of two children.

Each station needs:

1. 8 Cuisenaire rods (sizes 1 cm to 8 cm).
2. Catch Up instructions.
3. Catch Up tasks.
4. Catch Up play mat.

## How to Play

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

1. Demonstrate the rules by playing a game with the child (or pair of children).
2. Encourage them to explain their thinking out loud as they choose which move to make.
3. Have the child explore the game. Catch Up is a 2-player game, so collaborating with a partner is preferred, but the game can also be played with an imaginary partner.

## Standards

1. Make sense of problems and persevere in solving them. CCSS.MP1
2. Construct viable arguments and critique the reasoning of others. CCSS.MP3
3. Model with mathematics. CCSS.MP4
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

### Strategy for 5 Blocks:

- The first five blocks sum to 15. This means that if a player reaches a length of 8, they will win the game.
  - a. Player 1 will win if they start with the 3 block. Player 1 will win if they are able to take the 5 block, the 1 and 4 blocks, or the 2 and 4 blocks on their next turn. No matter what Player 2 does, they cannot prevent all three of these scenarios on Player 1's next turn.
  - b. If Player 1 takes any other block, Player 2 can win. For example, if Player 1 takes the 5 block, Player 2 can take the 1, 3, and 4 blocks, reaching a length of 8 and guaranteeing a win.

### Strategy for 6 Blocks:

- The first six blocks sum to 21. This means that if a player reaches a length of 11, they will win the game.
  - a. Player 1 can always win if they start with the 2 block. Some good responses to Player 2 (A: B meaning if Player 2 takes A, Player 1 takes B) – 3: 4; 4: 1,3; 5: 6; 6: 1,5; 1,3: 6; 1,4: 6; 1,5: 6; and 1,6: 4,5.
  - b. Player 2 can win if Player 1 starts with anything other than the 2 block.

### Strategies for more than 6 Blocks:

- With 7 blocks, if both players play perfectly, the outcome is a tie. Player 1 can steer the game this way by choosing block 1, 2, 3, or 4. Otherwise Player 2 can win.
- A game with 8 blocks similarly ends in a tie. The first player can steer the game this way from any starting block.
- With 9 or 10 blocks, Player 2 has the advantage.

### How to Beat Strategy #1: The computer always takes the smallest block:

1. If there are an even number of blocks:
  - a. If the computer goes first, you should always take the smallest block.
  - b. If the computer goes second, start with the second-smallest block. On all subsequent turns, take the smallest block.
2. If there are an odd number of blocks:
  - a. If the computer goes first, take the 3 block. After the computer takes the 2 block, it will be your turn again. Because you and the computer are tied at this point and there are an even number of blocks left, you will see the same scenario as in 1b. Use this strategy to win.
  - b. If the computer goes second, take the 3 block and use the same strategy as 1b.

### How to Beat Strategy #2: The computer always takes the largest block:

- Coming soon

### How to Beat Strategy #3: The computer alternates between taking the smallest and largest block:

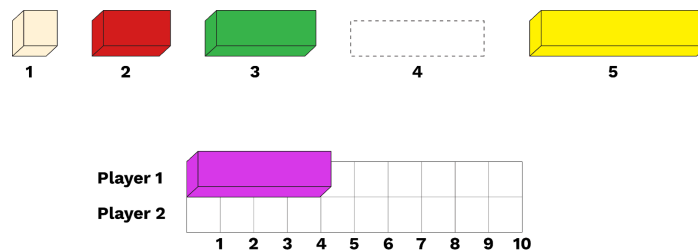
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## Catch Up Instructions

### Rules:

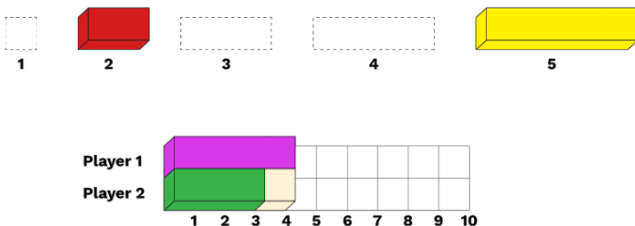
1. Players take turns adding blocks to their line.



Player 1 starts by adding the 4 block to their line.

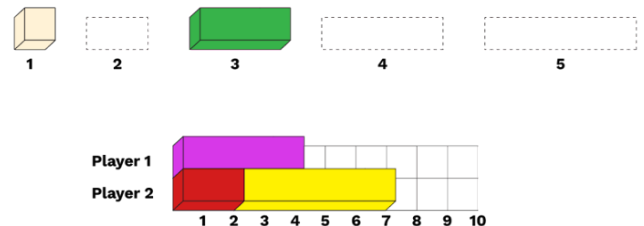
2. When a player's line is the same length or longer than their opponent's, it's the next player's turn.

### Example 1



Player 2 adds the 3 and 1 blocks to their line.  
Player 2's line is the same length as Player 1's.  
It's now Player 1's turn again.

### Example 2



Player 2 adds the 2 and 5 blocks to their line.  
Player 2's line is longer than Player 1's.  
It's now Player 1's turn again.

3. The game is over when all of the blocks have been added. The player with the longest line wins! If both players' lines are the same length, the game is a tie.

## Catch Up Tasks

1. Start with 5 blocks and play a few games. What are some good and bad moves?



1



2



3



4



5

2. Can you find a strategy that helps you win every time? Does it matter if you go first or second?
3. Can you find a winning strategy if you start with 6 blocks instead? How about 7? 8? More?
4. For which number of blocks can you make a tie?



6



7



8



1



2



3



4

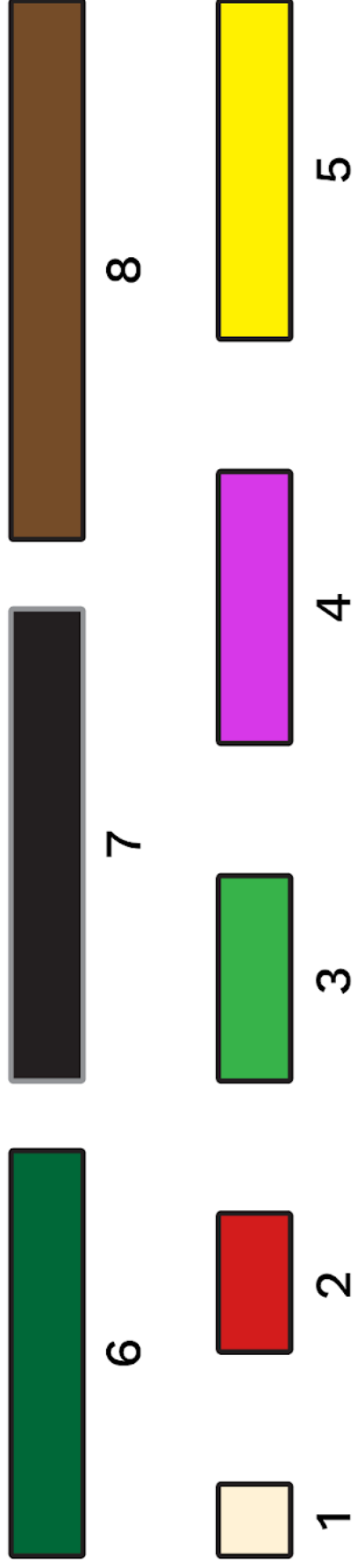


5

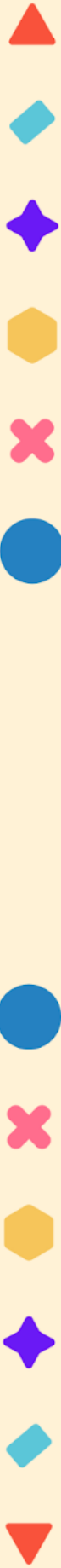
5. Pretend you're playing against a computer. Can you find a way to beat each of the strategies below? You get to choose if the computer goes first or second.
  - Strategy #1: The computer always takes the smallest block.
  - Strategy #2: The computer always takes the largest block.
  - Strategy #3: The computer alternates between taking the smallest and largest block.



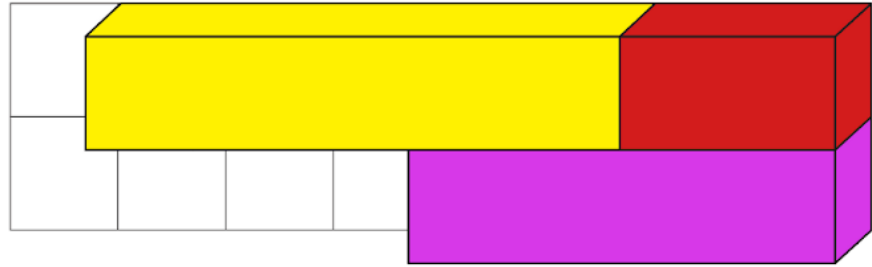
# Catch Up

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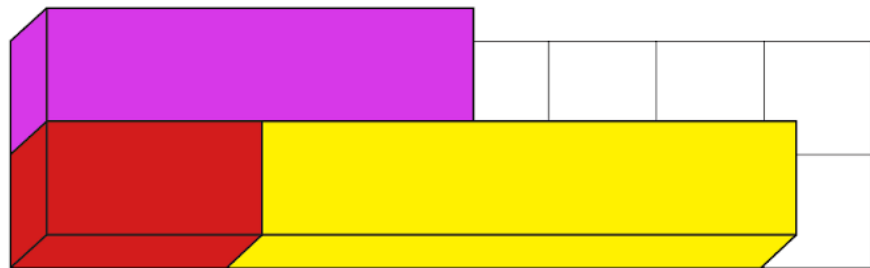


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