

# YIN-YANG

## ACTIVITY GUIDE

### TABLE OF CONTENTS

Materials and Setup (p. 2)

Activity Leader Guide (p. 3-5)

Student Instructions (p. 6)

Yin-Yang Tasks (p. 7-16)

Table Sign (p. 17)



**Julia Robinson  
Mathematics  
Festival**

## Materials and Setup

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

Per Table		Material Preparation	
200 colored tokens		Each station needs about 40 two-colored tokens	
3 copies of Instructions		1 page each	p. 6
5 copies of Tasks		10 pages each <i>can be printed double-sided</i>	p. 7-16
1 copy of Table Sign		1 page <i>print on cardstock for sturdiness</i>	p. 17

Per Table		Purchasing Materials	
5 sets of two-colored tokens	<a href="#">pack of 200</a> for \$7.69		
28 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 students will be handling.



## Objective

Fill each grid with red and yellow tokens.

Rules:

1. Place either a red or yellow token in each empty square.
2. You cannot have a 2x2 square that is all red or all yellow.
3. All of the red tokens must be connected, and all of the yellow tokens must be connected.

## Materials

Each Yin-Yang table should be prepped for 5 stations.

Each station needs:

1. 40 two-color tokens.
2. Yin-Yang instructions.
3. Yin-Yang 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. Demonstrate the rules by starting the first puzzle with them.
2. Have the student help you place the first few tokens. Reinforce that you cannot have a 2x2 square that is all red or all yellow.
3. Have the student solve the first puzzle and then explore the next puzzles.

## Standards

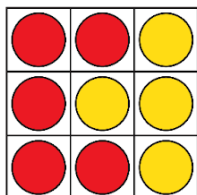
1. Make sense of problems and persevere in solving them. CCSS.MP1
2. Construct viable arguments and critique the reasoning of others. CCSS.MP3
3. Model with mathematics. CCSS.MP4
4. Look for and make use of structure. CCSS.MP7

## Asking Good Questions

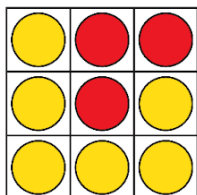
1. Ask questions about confidence.
  - a. When a student asks you “Is this right?”, instead of saying “yes” or “no” right away, ask them how confident they are in their answer. Here are some examples:
    - i. “Maybe. What do you think? How confident are you?”
    - ii. “On a scale of 1-5, how confident 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

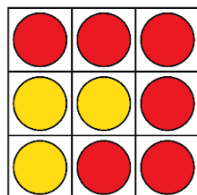
Puzzle 1



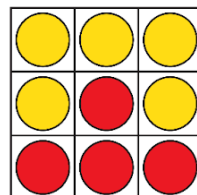
Puzzle 2



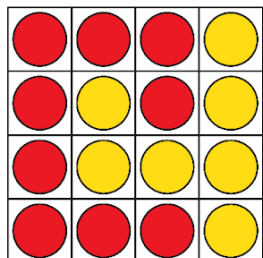
Puzzle 3



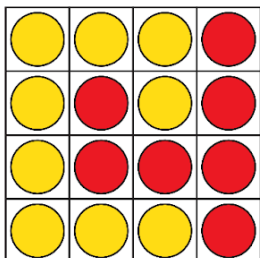
Puzzle 4



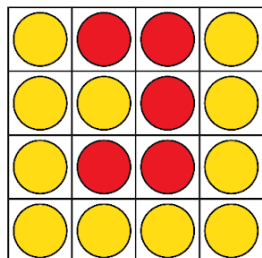
Puzzle 5



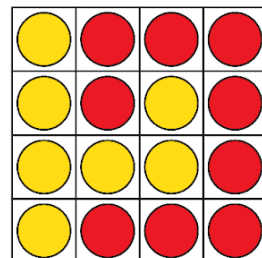
Puzzle 6



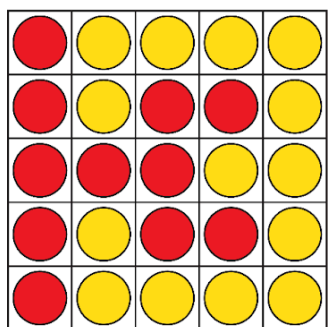
Puzzle 7



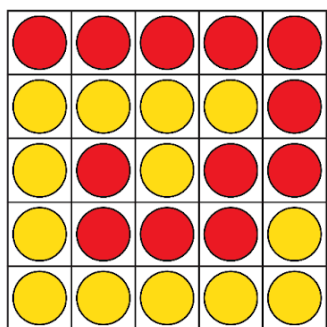
Puzzle 8



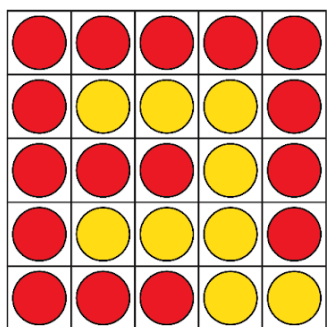
Puzzle 9



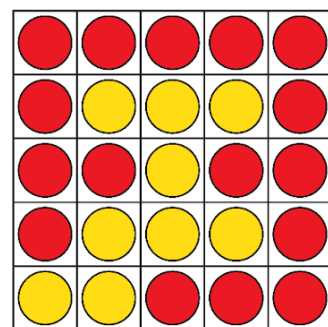
Puzzle 10



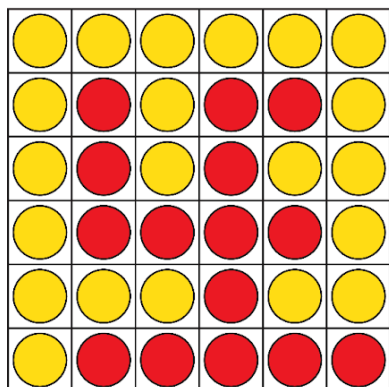
Puzzle 11



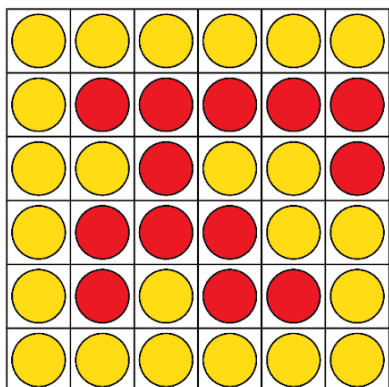
Puzzle 12



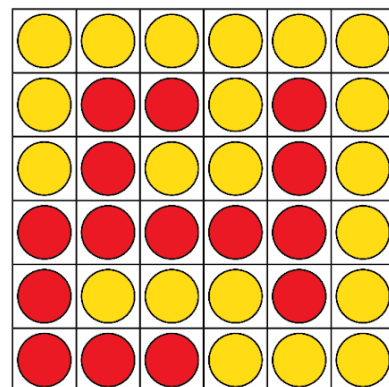
Puzzle 13



Puzzle 14



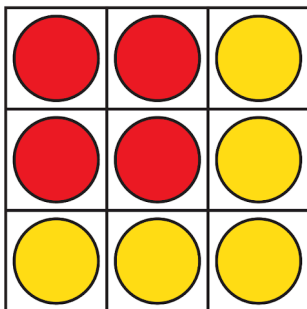
Puzzle 15



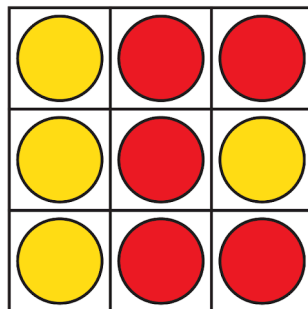
## Yin-Yang Instructions

### Rules:

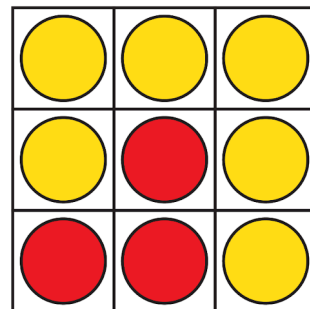
1. Place either a red or yellow token in each empty square.
2. You cannot have a 2x2 square that is all red or all yellow.
3. All of the red tokens must be connected, and all of the yellow tokens must be connected.



There is a 2x2 red square.

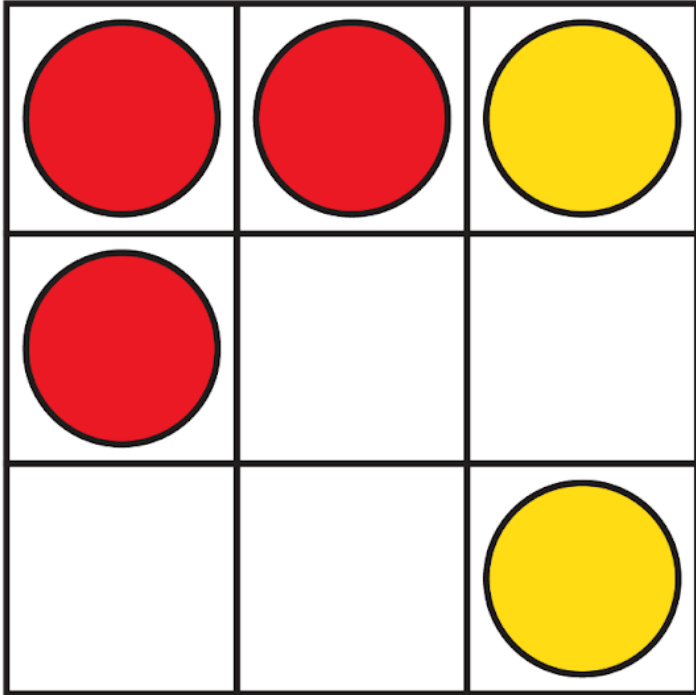


The yellows are not connected.

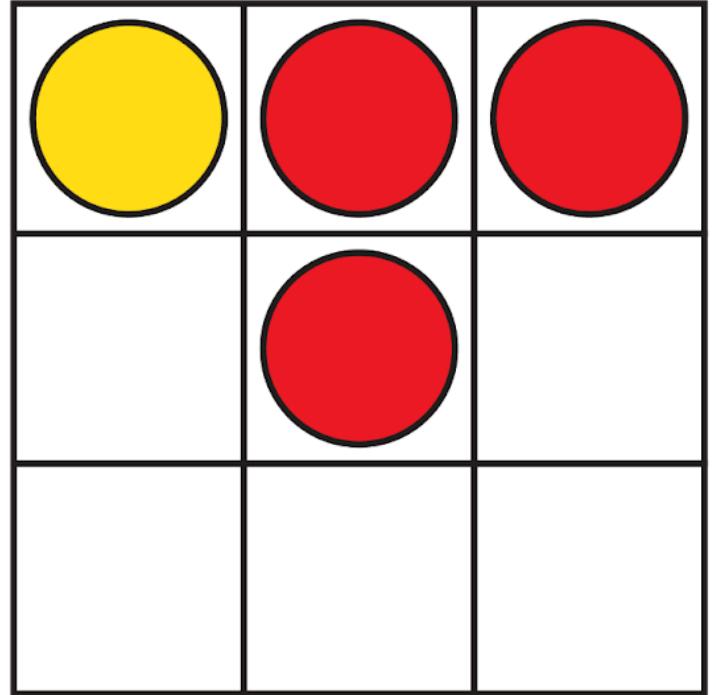


# Yin-Yang

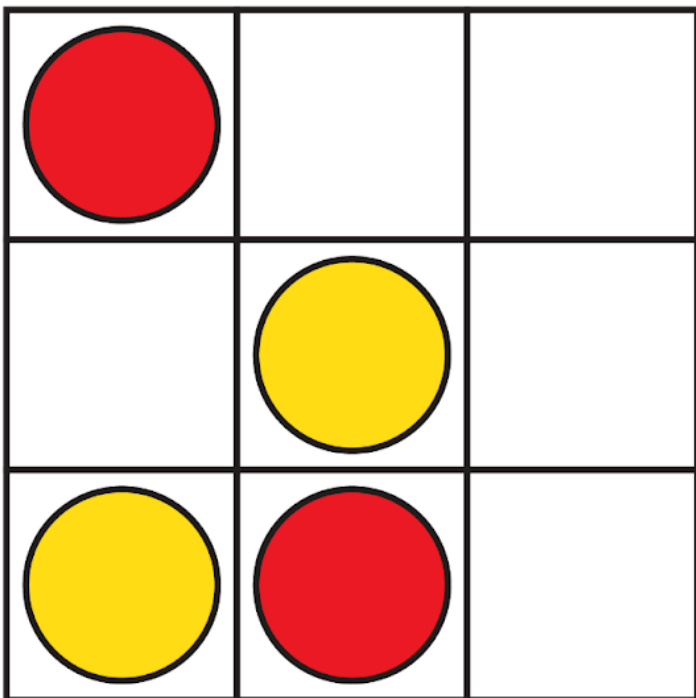
## Puzzle 1



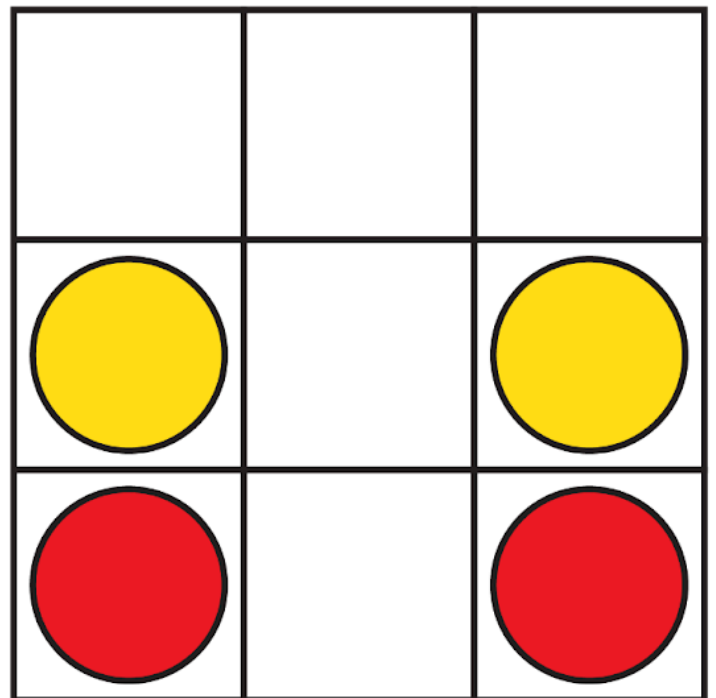
## Puzzle 2



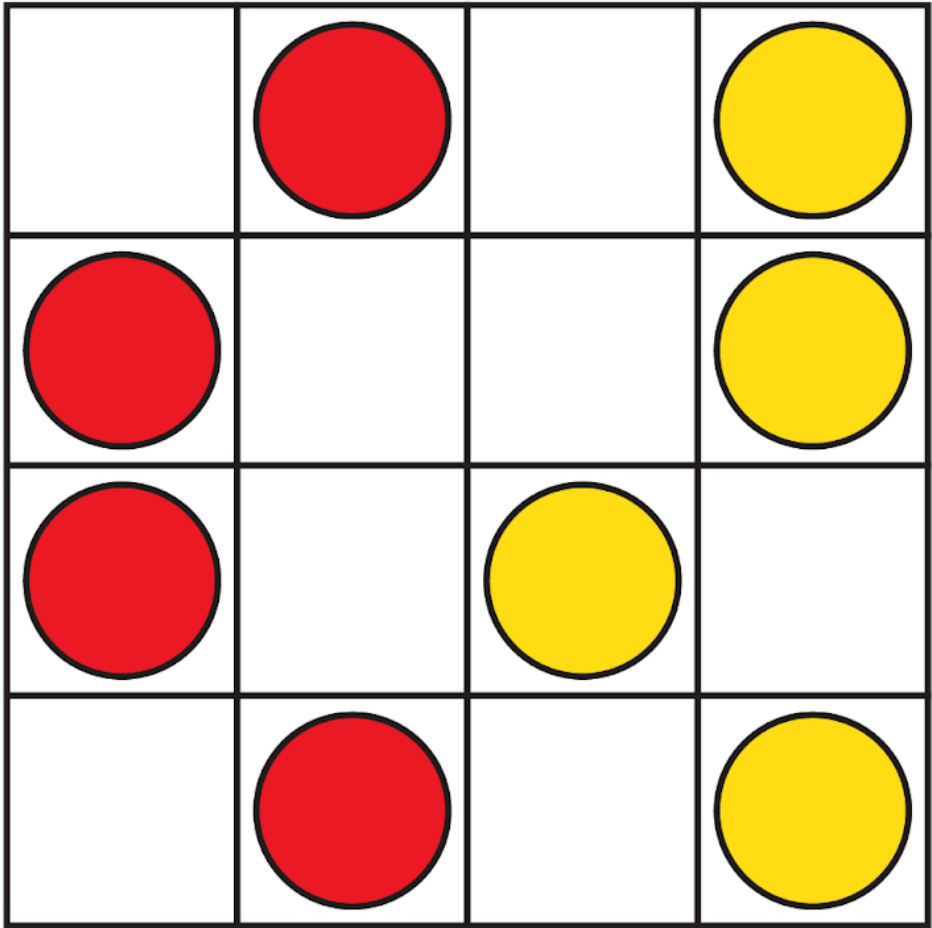
## Puzzle 3



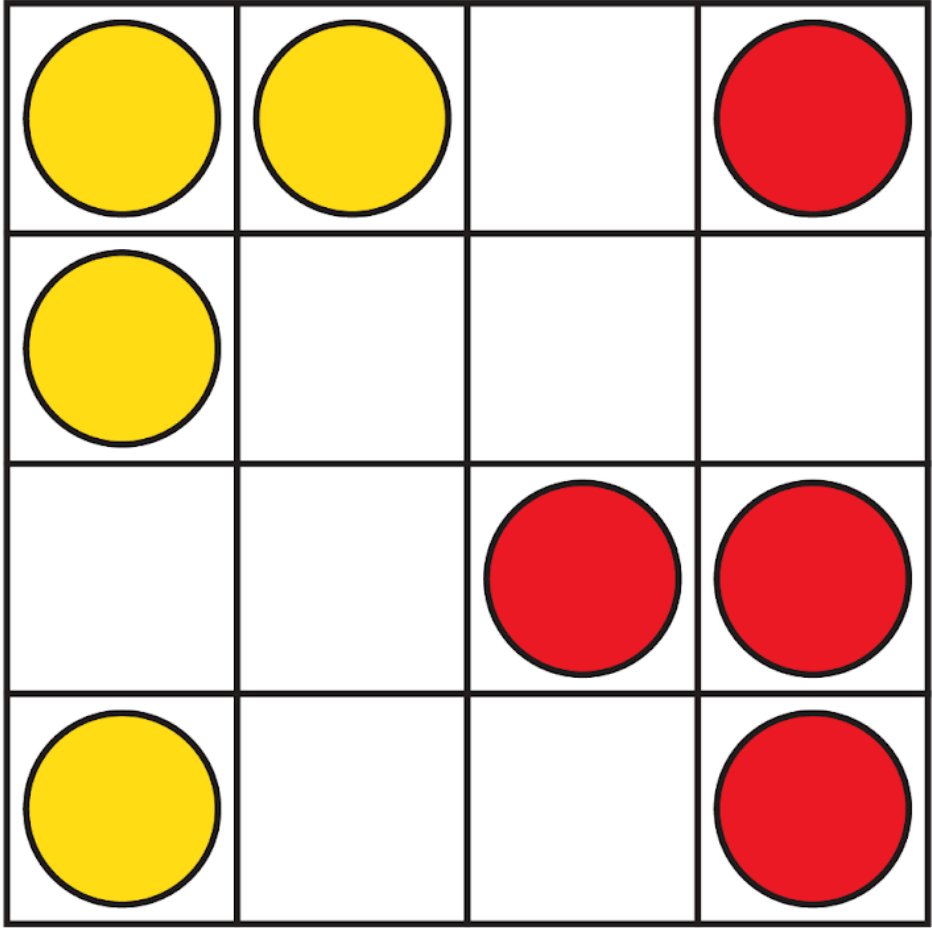
## Puzzle 4



Yin-Yang



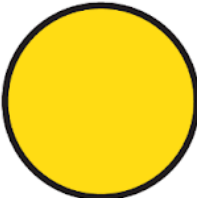
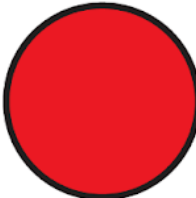
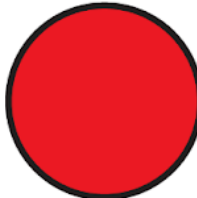
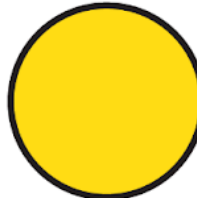
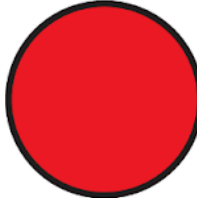
Puzzle 5



Puzzle 6

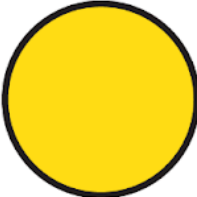
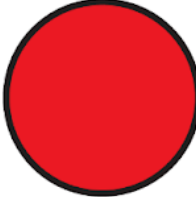
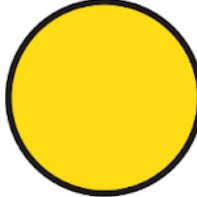
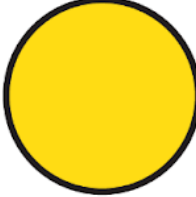
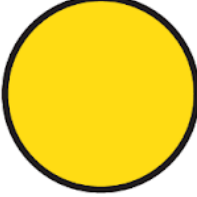


Yin-Yang

Puzzle 7

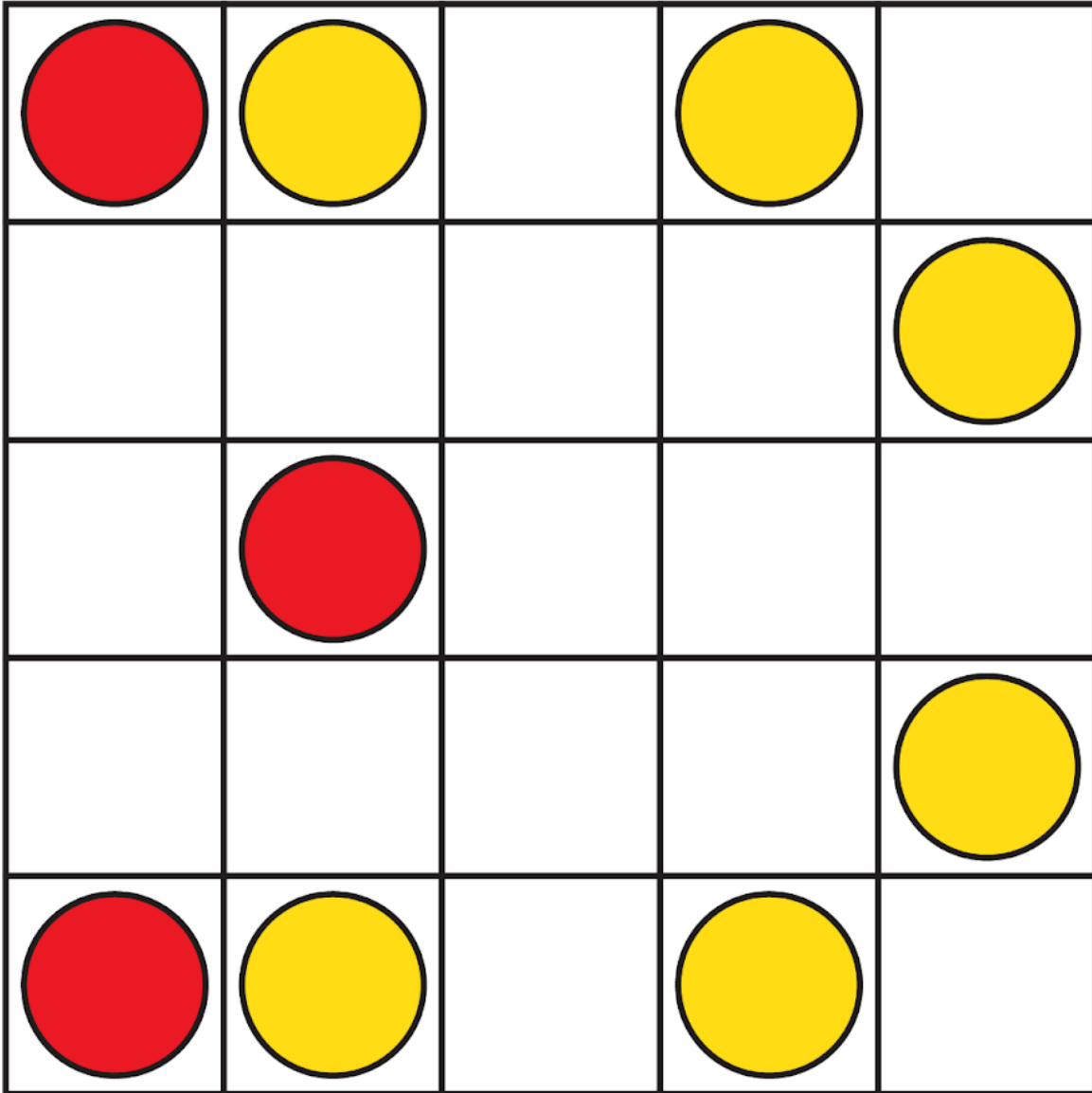
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Puzzle 8

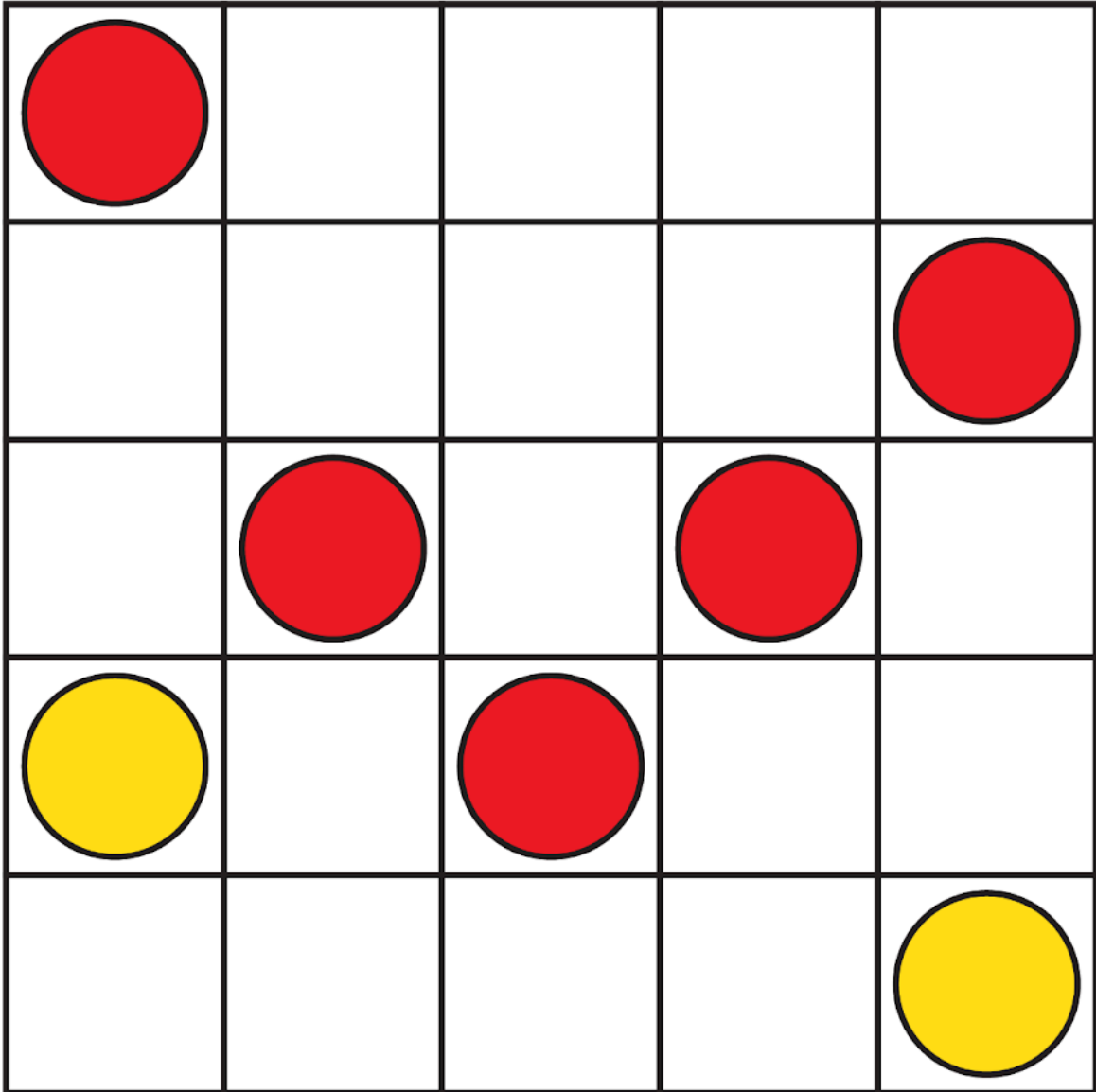
# Yin-Yang

## Puzzle 9



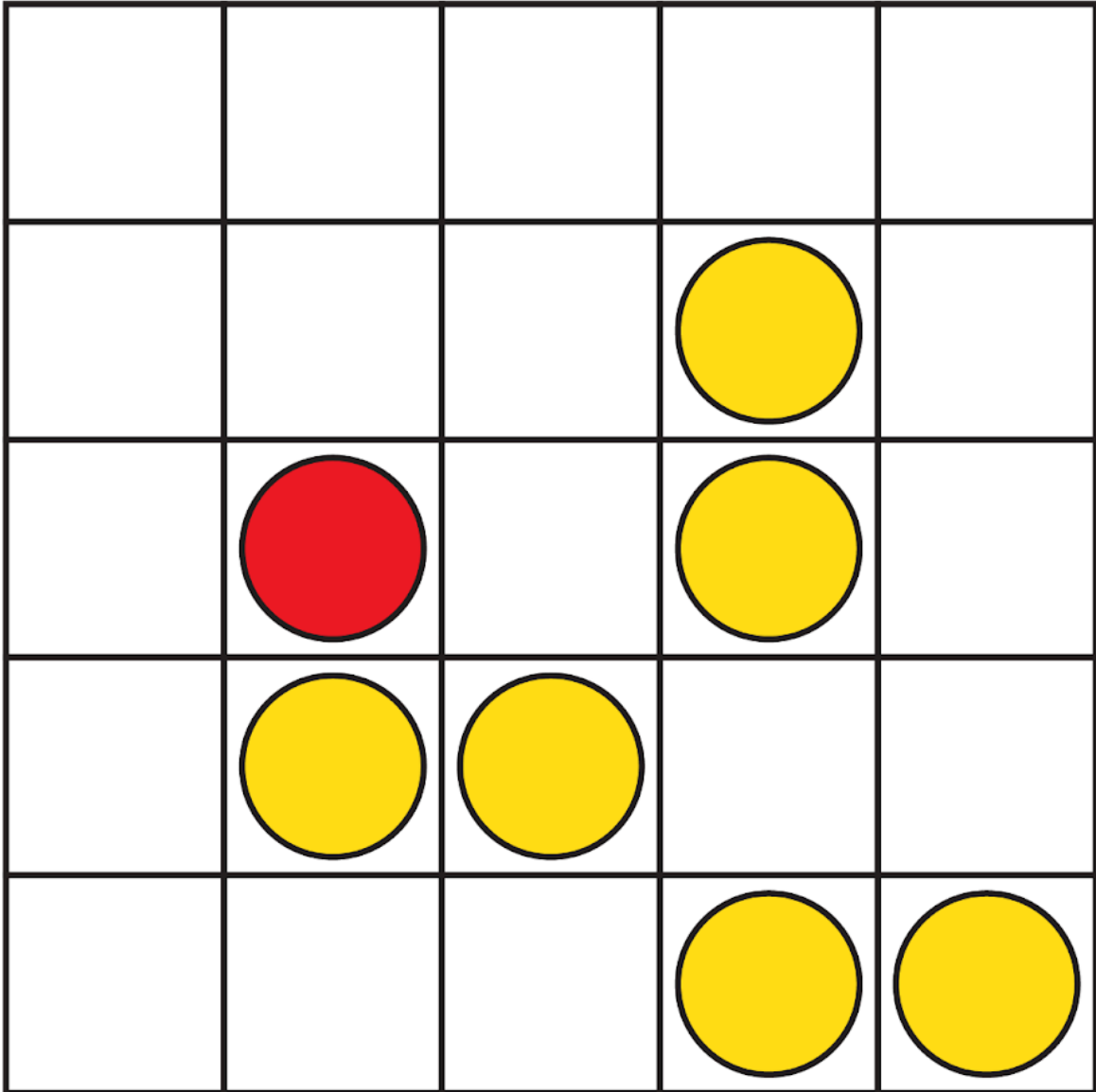
# Yin-Yang

## Puzzle 10



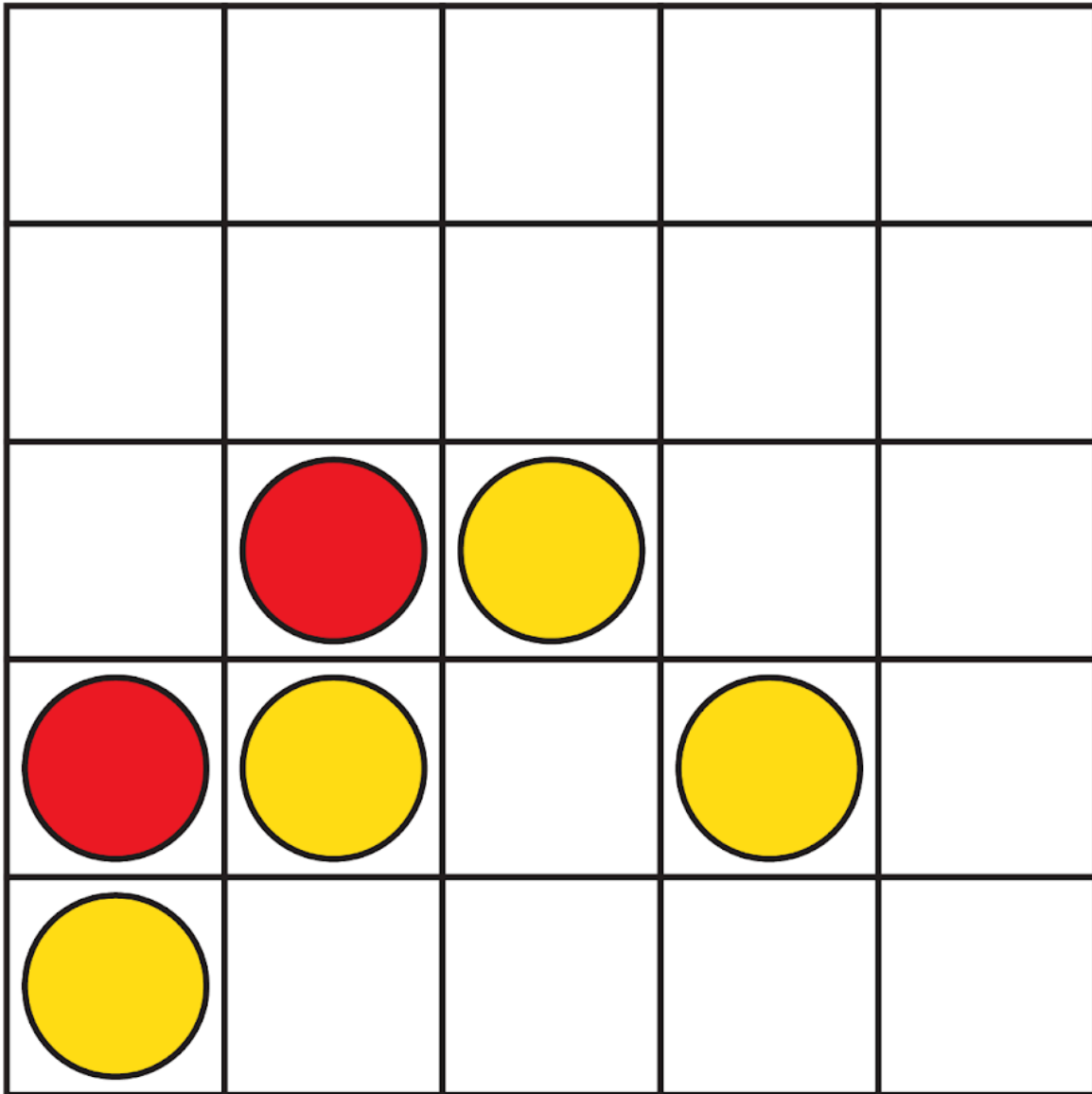
# Yin-Yang

## Puzzle 11



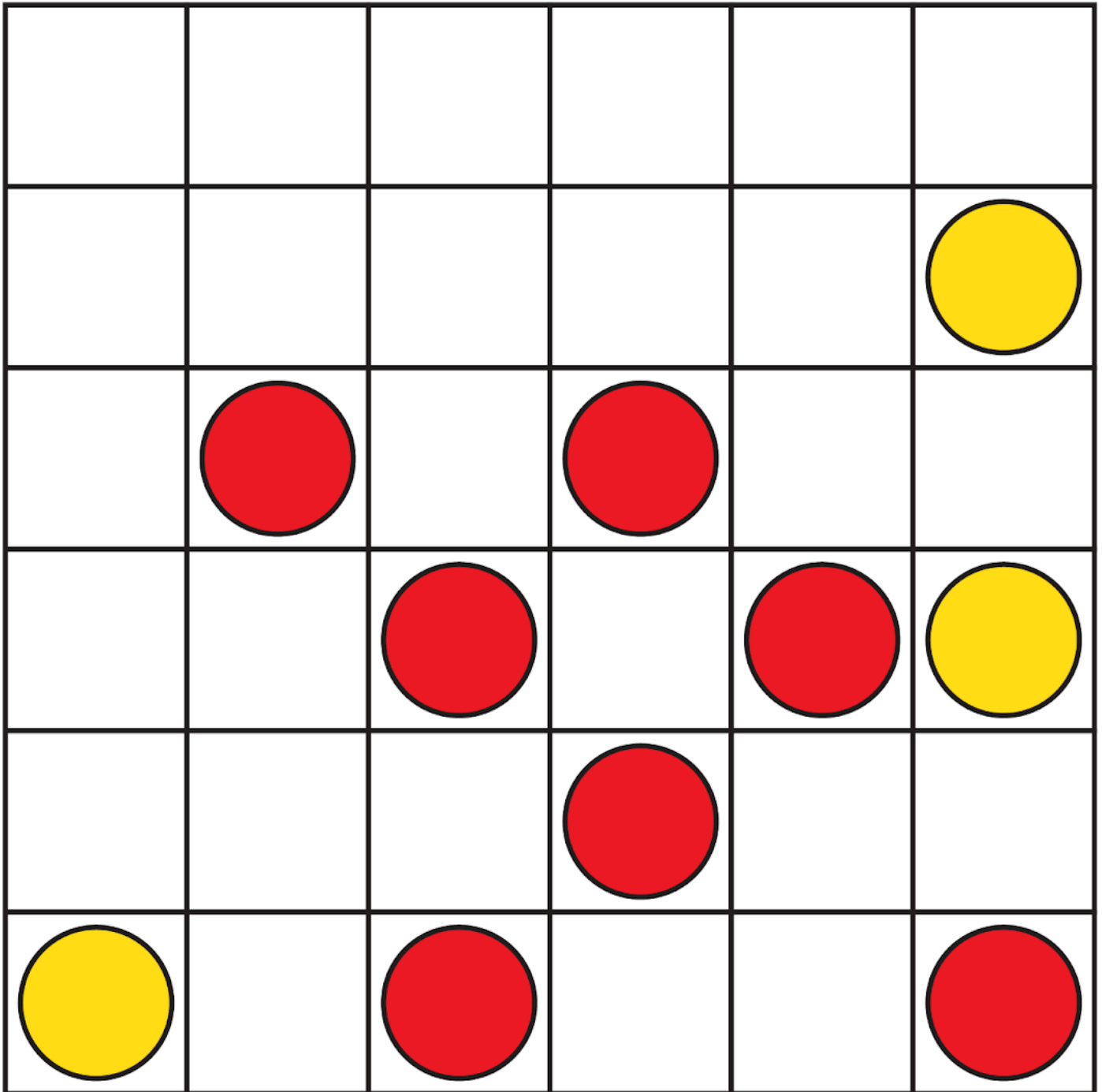
# Yin-Yang

## Puzzle 12



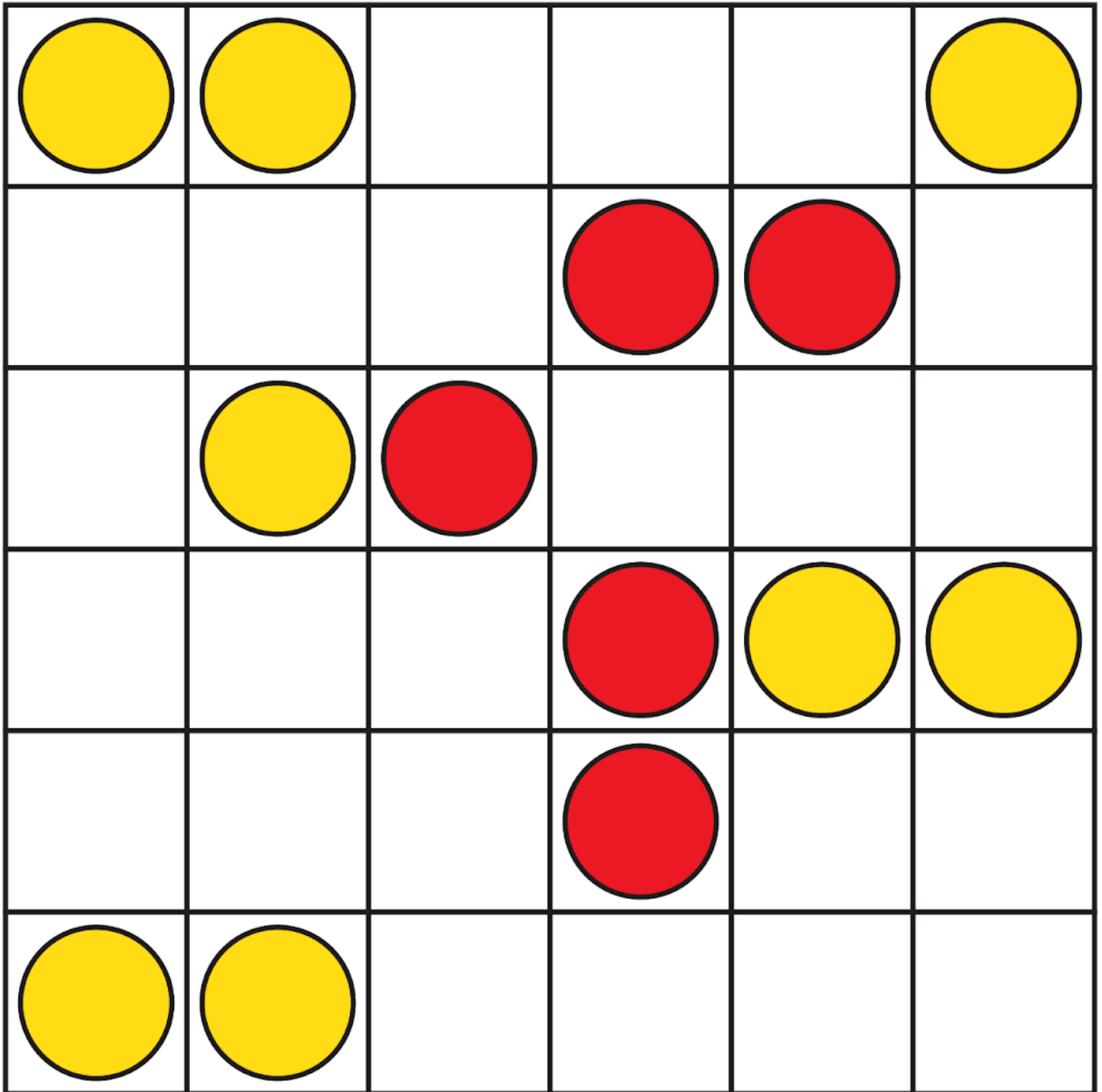
# Yin-Yang

## Puzzle 13



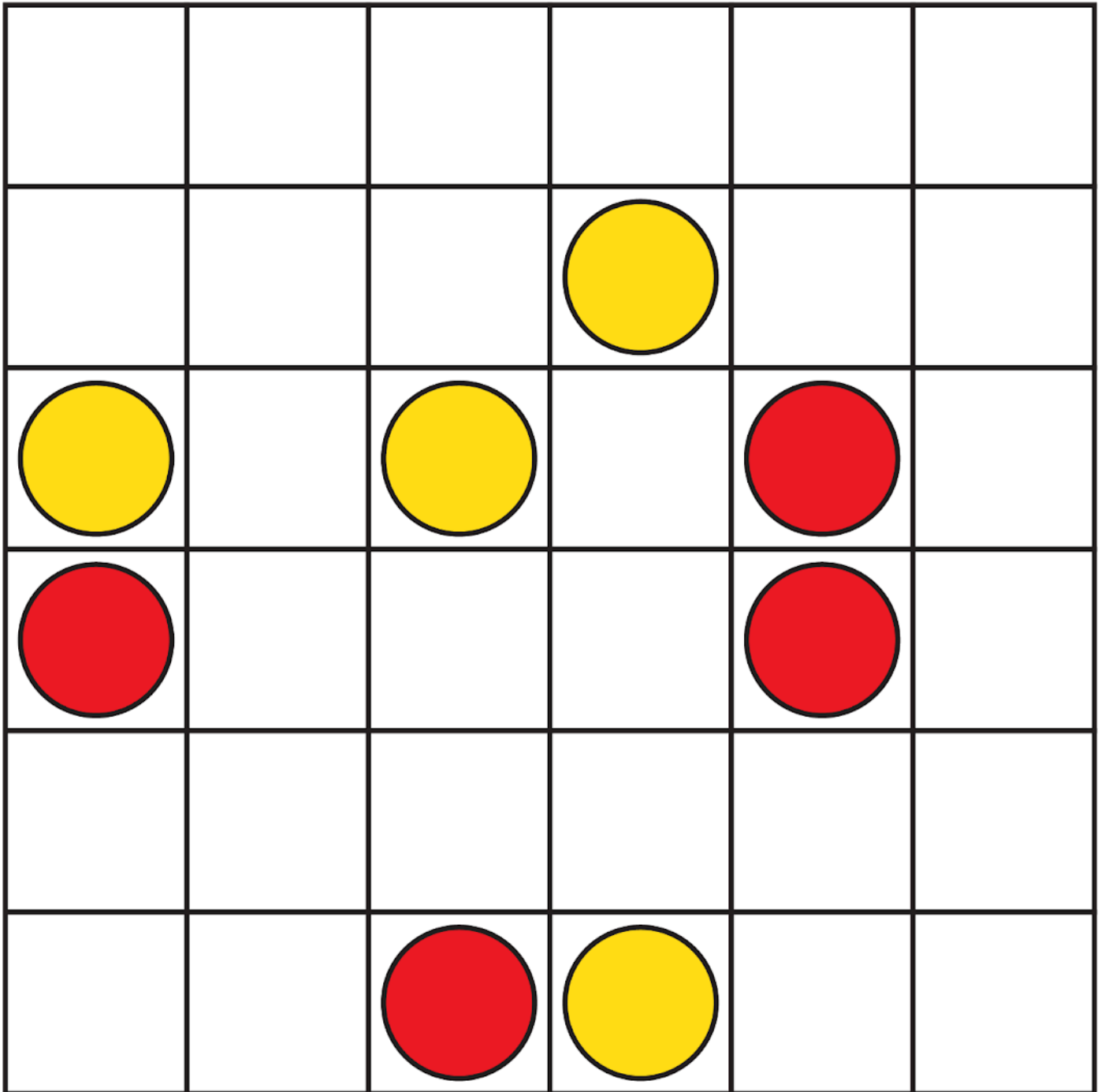
# Yin-Yang

## Puzzle 14



# Yin-Yang

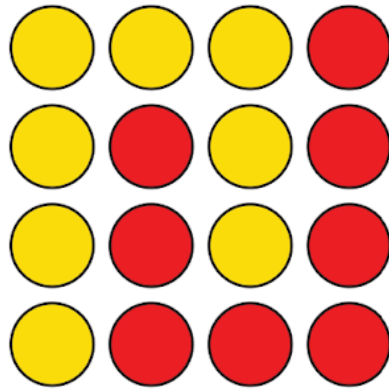
## Puzzle 15







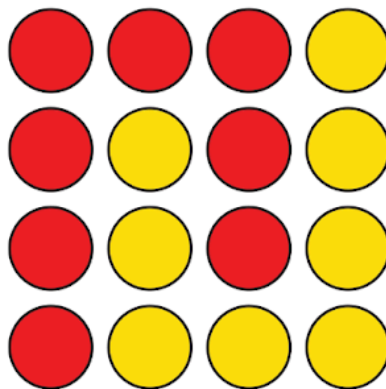
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