MAGIC FLOWERS

FESTIVAL GUIDE

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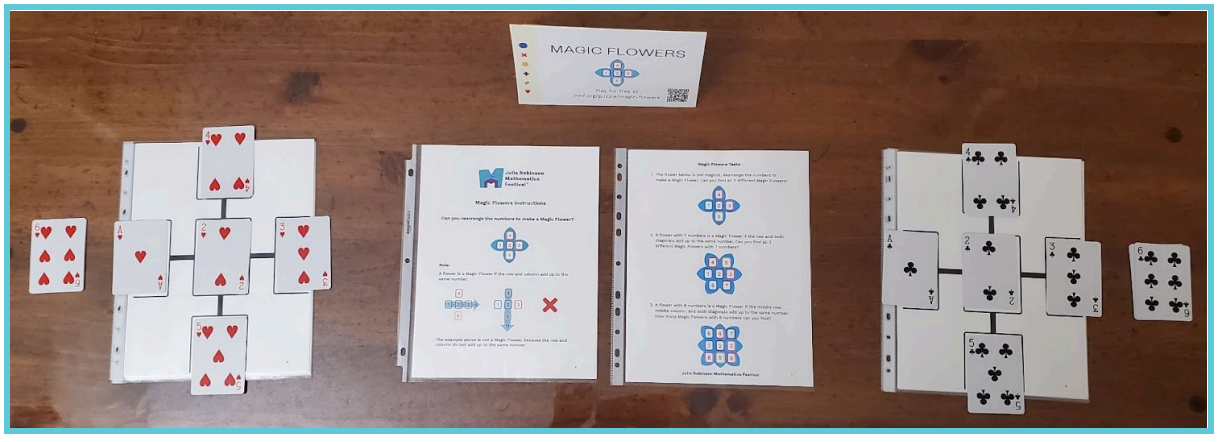
Julia Robinson Mathematics Festival

Materials and Setup

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

Per Table	**Material Preparation**	
5 sets of playing cards (1-9)		
3 copies of Instructions	1-page sheet	p. 6
5 copies of Tasks	2-page sheet *can be printed double-sided*	p. 7-8
5 x Number Play Mats	6-page sheet *can be printed double-sided*	p. 9-14
1 copy of Table Sign	1-page sheet *print on cardstock for sturdiness*	p. 15

Per Table	**Purchasing Materials**		
2 decks of playing cards	2 decks for $6.99		Sort two decks of cards into suits and use 5 sets of cards 1 - 9.
23 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

Arrange five numbers into a magic flower.

Rule:
1. Every group of three numbers in a line must have the same sum, which is called the **Magic Flower Number**.

Materials

Each Magic Flowers table should be prepped for 5 stations.
Each station needs:
1. Set of number cards (1-9)
2. Magic Flowers instructions.
3. Magic Flowers tasks.
4. Number play mats.

How to Play

We strongly encourage you to explore the activity yourself ahead of time.
You can try our digital version here: jrmf.org/puzzle/magic-flowers

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. Have ready to go the numbers 1 through 5 laid out in a petal formation on the 5-Flower play mat.
2. Ask the student to sum each line of three numbers.
3. Ask if they could rearrange the numbers so that every group of three numbers in a line has the same sum - the Magic Flower Number.
4. Have them try to make three different flowers with 5 numbers before moving onto the rest of the tasks.

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. Attend to precision. CCSS.MP6

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.

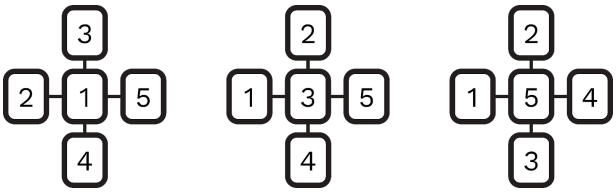
3. Ask students about strategies.
    a. If a student is getting into the activity and has been doing it for a while, ask the student if there are any strategies they’ve come up with to help them solve the puzzle or win the game.
    b. Follow up by asking if they think their strategies will work for 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.

4. Activity specific questions.
    a. Is there anything special about numbers that are in certain places? Is there anything special about the number in the middle, the pairs of numbers that surround the middle number?
    b. Can you predict what the magic number is going to be before you make the magic flower?
    c. Do you think you will always be able to build a magic flower for any 9 *consecutive* numbers? If so, how? If not, why not?
    d. Do you think you will always be able to build a magic flower for any 9 numbers? If so, how? If not, why not?

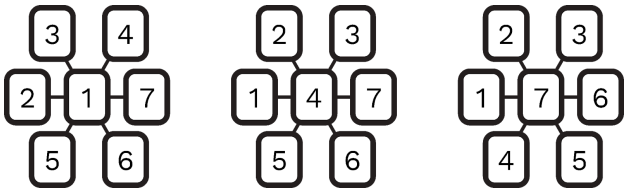
Answers

Below are example solutions for each task. Answers may vary as each solution may be rotated and/or flipped. For the Magic Triangle tasks, there are additional solutions not listed.

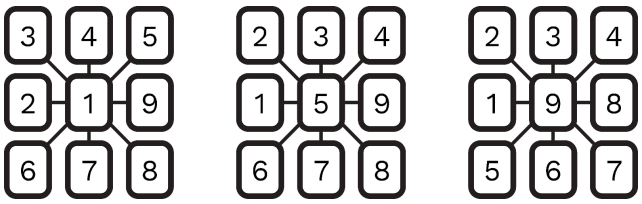
1. Magic 5-Flowers - sums are 8, 9, or 10.



2. Magic 7-Flowers - sums are 10, 12, or 14

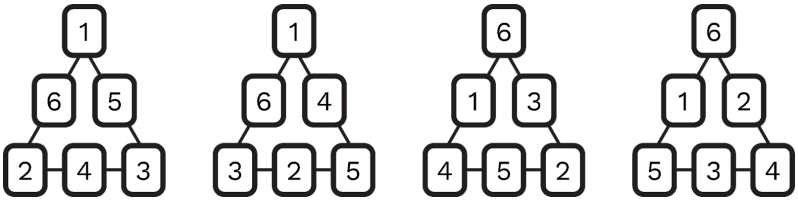


3. Magic 9-Flowers - sums are 12, 15, or 18

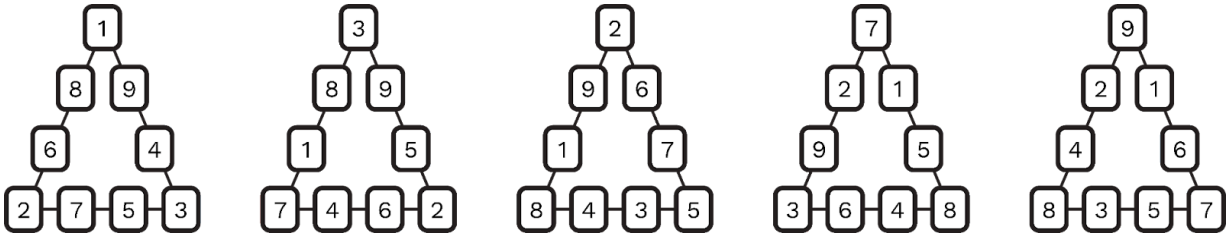


Answers to Magic Triangles and Squares Tasks

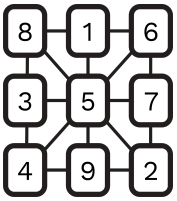
1. Magic 6-Triangle - sums are 9, 10, 11, or 12



2. Magic 9-Triangle - sums are 17, 19, 20, 21, or 23



3. Magic Square - sum is 15



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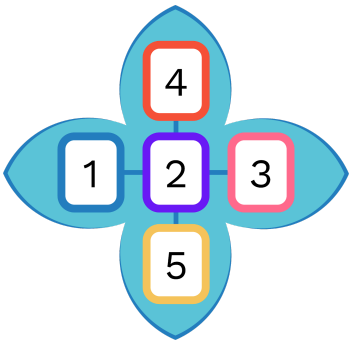
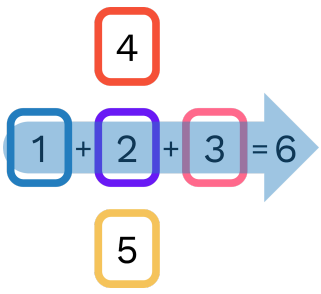
Magic Flowers Instructions

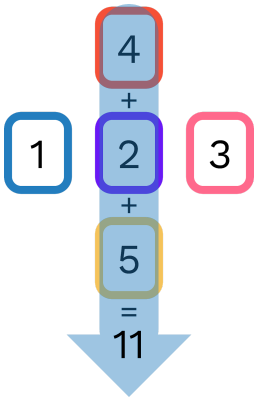
Can you rearrange the numbers to make a Magic Flower?



Rule:

A flower is a Magic Flower if the row and column add up to the same number.

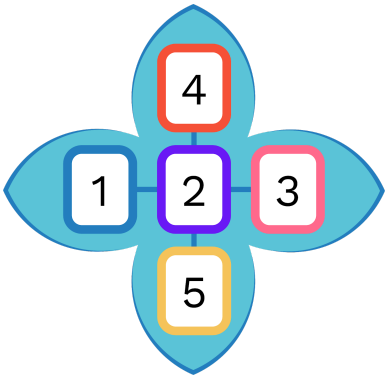




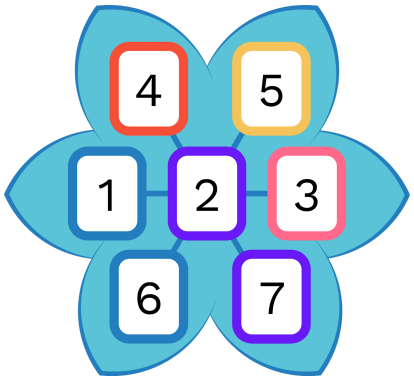
The example above is not a Magic Flower, because the row and column do not add up to the same number.

Magic Flowers Tasks

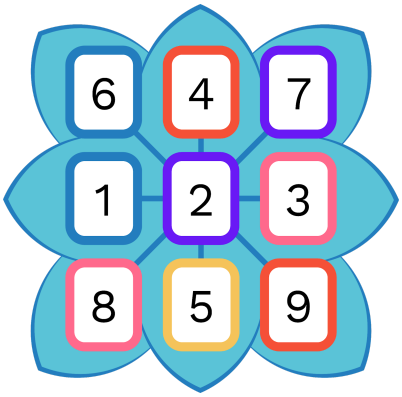
1. The flower below is not magical. Rearrange the numbers to make a Magic Flower. Can you find all 3 different Magic Flowers?



2. A flower with 7 numbers is a Magic Flower if the row and both diagonals add up to the same number. Can you find all 3 different Magic Flowers with 7 numbers?



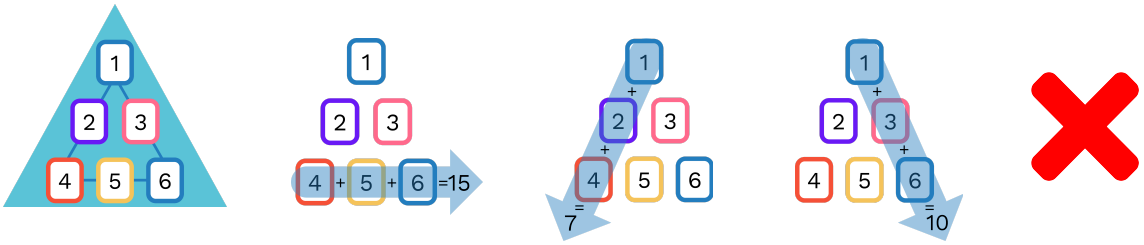
3. A flower with 9 numbers is a Magic Flower if the middle row, middle column, and both diagonals add up to the same number. How many Magic Flowers with 9 numbers can you find?



Magic Triangles and Squares Tasks

Rule:

A triangle is a Magic Triangle if each of the three sides add up to the same number.



The triangle above is not a Magic Triangle, because the three sides do not add up to the same number.

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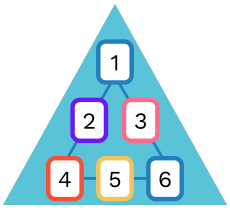
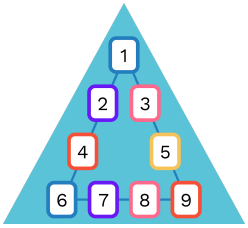
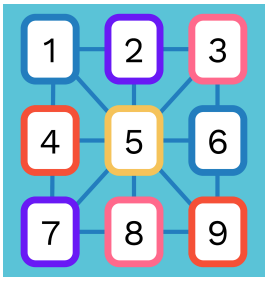
1. Rearrange the numbers 1-6 to make a magic triangle. Can you make a maMagic Triangle using the numbers 2-7? 3-8? 4-9?



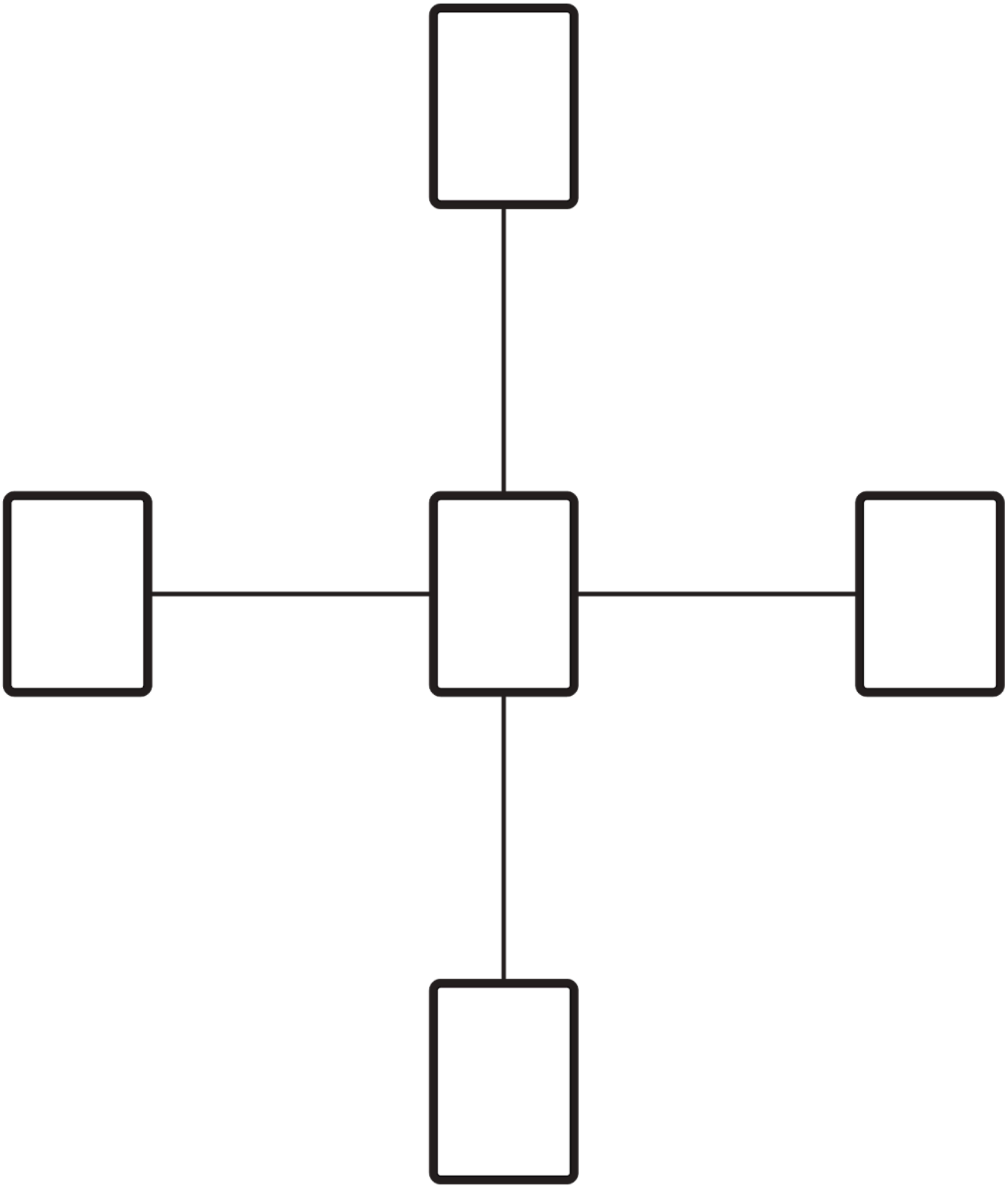
2. Below is not a Magic Triangle. Can you rearrange the numbers 1-9 to make a Magic Triangle?



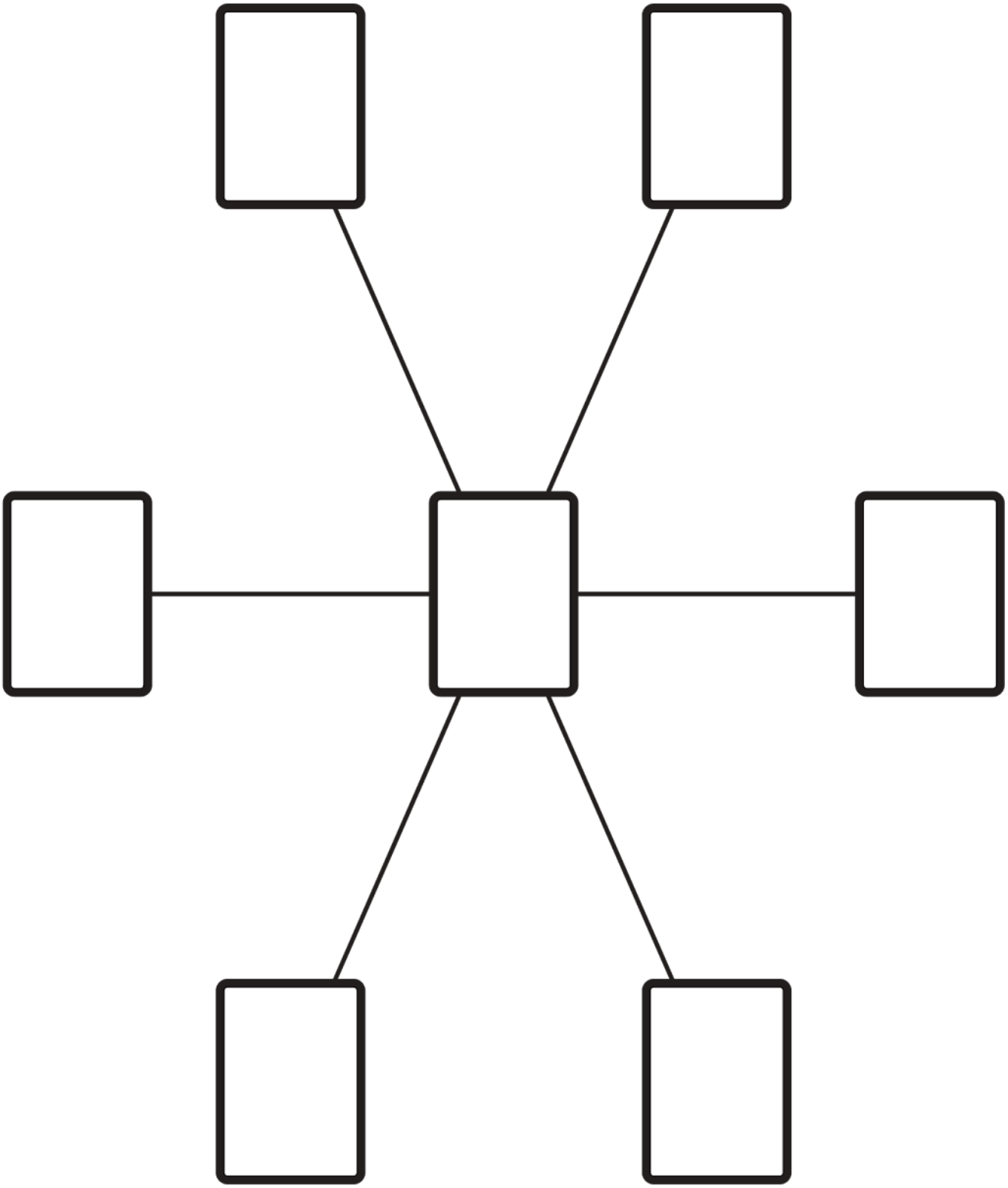
3. A square is a Magic Square if every row, column, and diagonal add up to the same number. Below is not a Magic Square. Can you rearrange the numbers 1-9 to make a Magic Square?



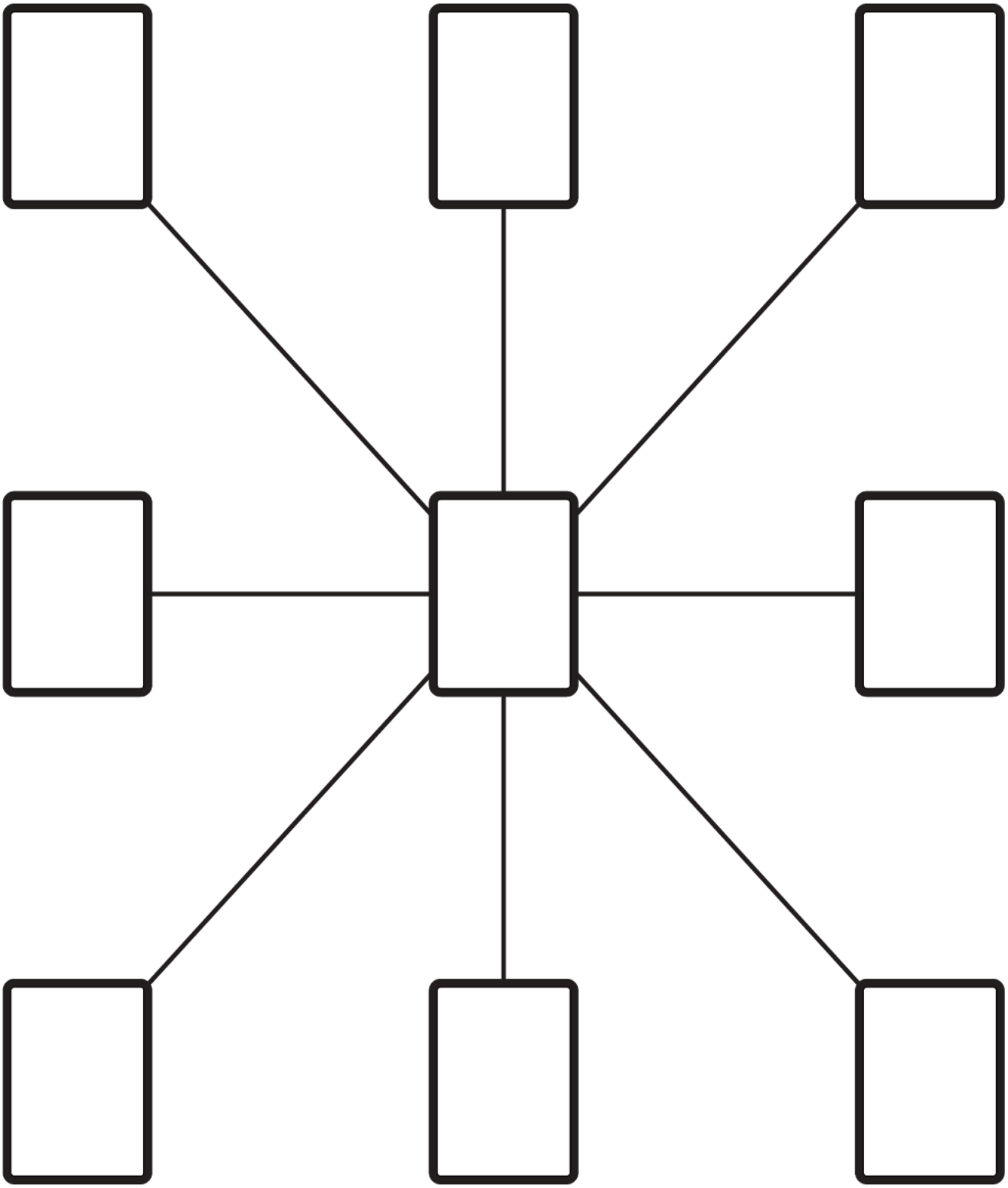
Magic Flowers #1



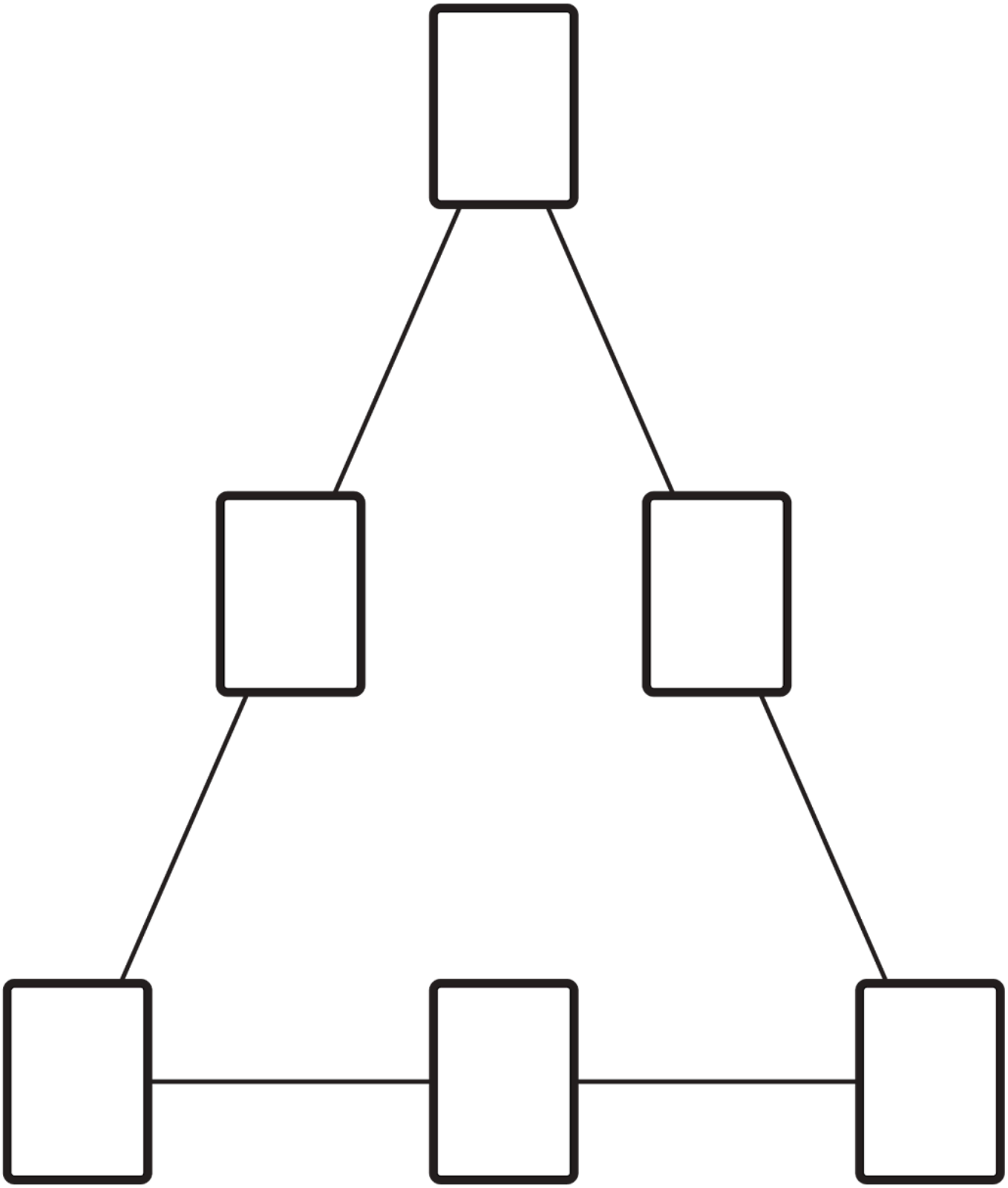
Magic Flowers #2



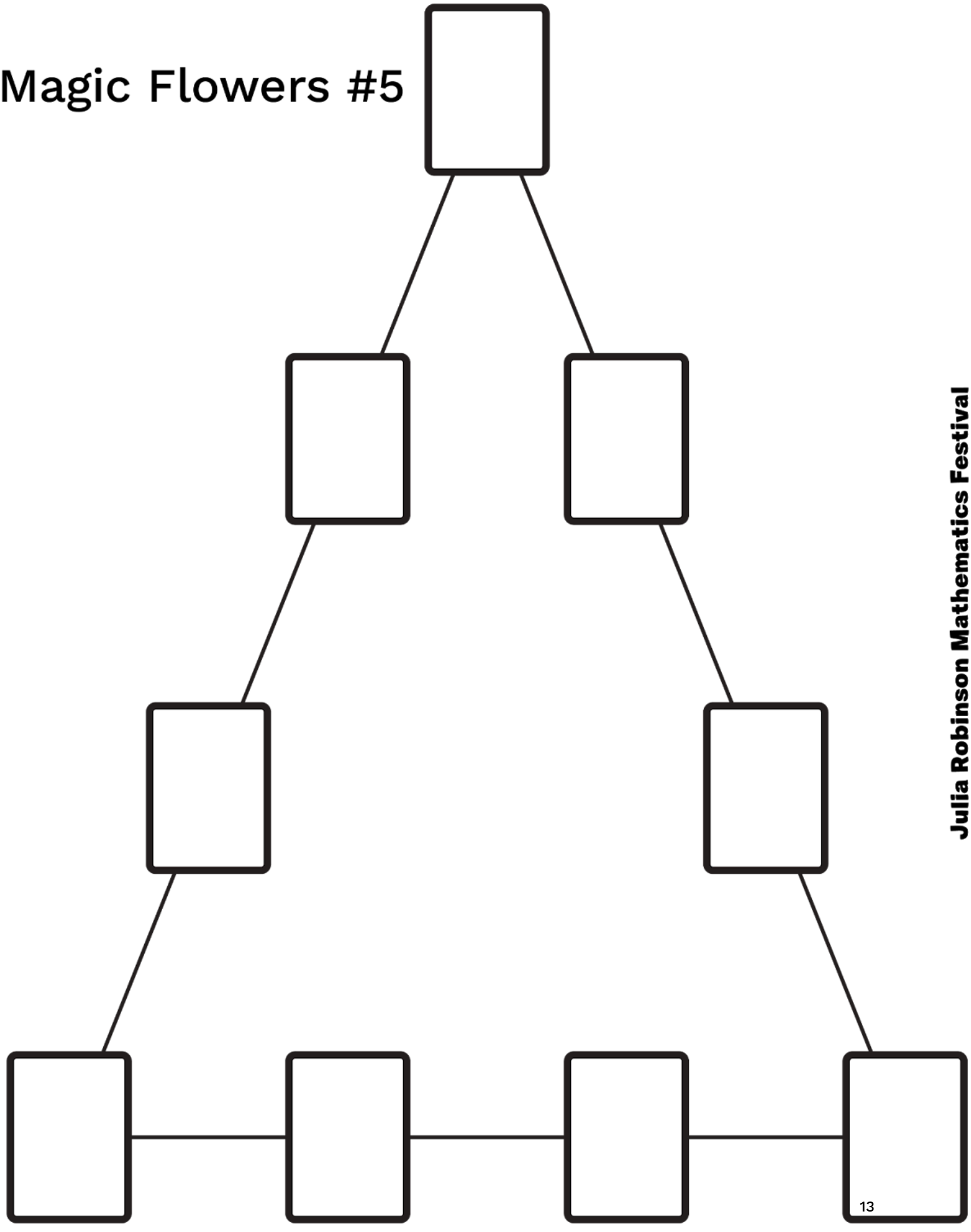
Magic Flowers #3



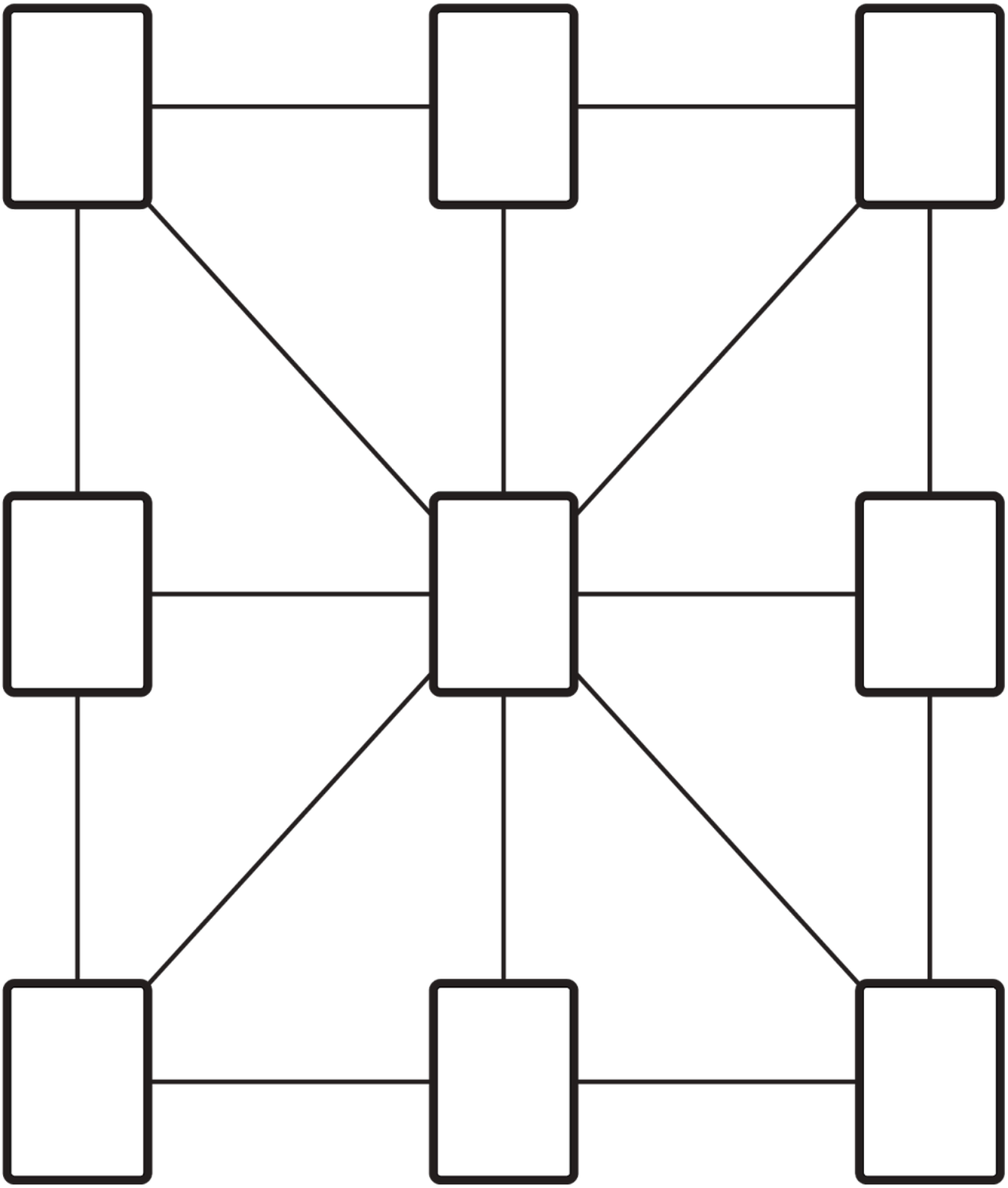
Magic Flowers #4



Magic Flowers #5



Magic Flowers #6



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Play for free at
jrmf.org/puzzle/magic-flowers

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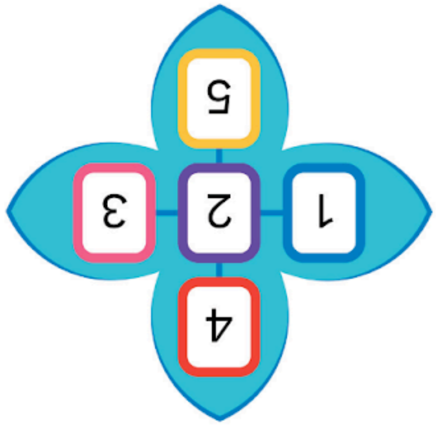

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