

MOSAICS

ACTIVITY GUIDE

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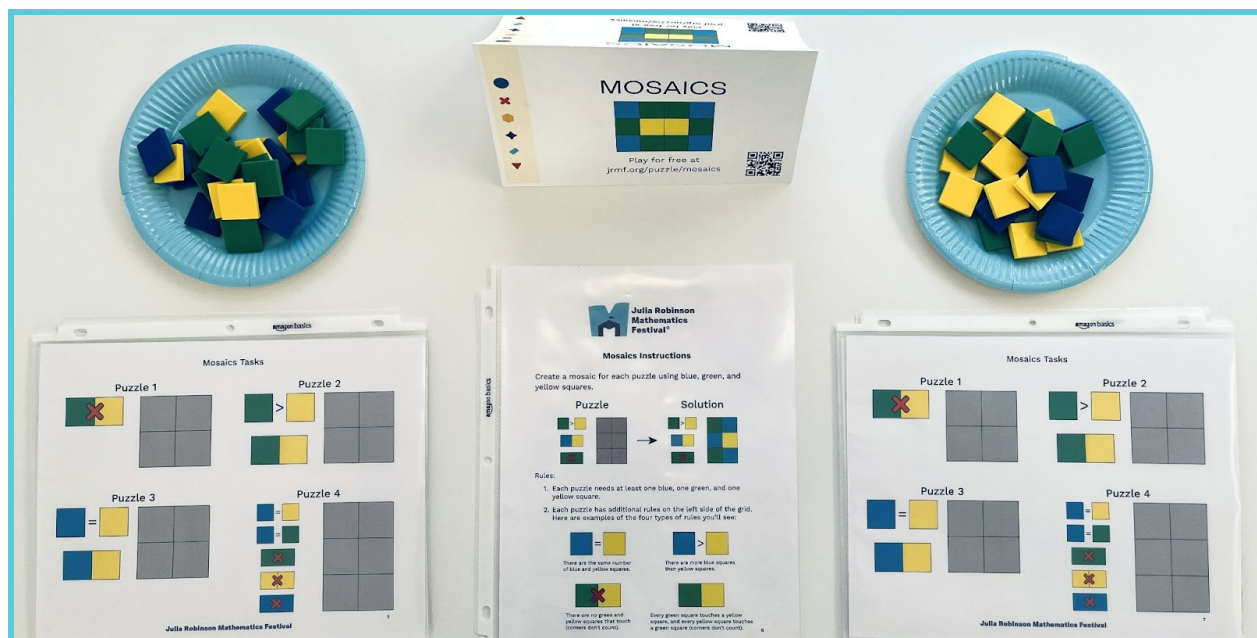
**Julia Robinson
Mathematics
Festival**

Materials and Setup

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

Per Table	Material Preparation	
5 sets of 18 colored square tiles	In each set, you will need about 6 each of blue, green, and yellow.	
3 copies of Instructions	1 page each	p. 6
5 copies of Tasks	8 pages each <i>can be printed double-sided</i>	p. 7-14
1 copy of Table Sign	1 page <i>print on cardstock for sturdiness</i>	p. 15

Per Table	Purchasing Materials		
5 sets of tiles (each set has 12 of each color)	pack of 400 for \$24.45		
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

Create a mosaic for each puzzle using blue, green, and yellow squares.

Rule:

1. Each puzzle needs at least one blue, one green, and one yellow square.
2. Each puzzle has additional rules (see p. 6).

Materials

Each Mosaics table should be prepped for 5 stations.

Each station needs:

1. About 6 each of blue, green, and yellow square tiles.
2. Mosaics instructions.
3. Mosaics tasks.

How to Play

We encourage you to explore the activity yourself ahead of time.

You can try our online version [here](#).

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 four types of rules using the tiles to explain. Then point at random puzzle images and ask the student to tell you what this/that rule means.
2. Ask the student to solve the first puzzle with you.
3. Have the student explore the next puzzles, using the tiles to solve.

Beginner Version

See [here](#) for a beginner version to engage younger students or students of any age who:

1. Have strong math anxieties
2. Don't feel confident with math or math puzzles
3. Have learning differences
4. Want a gentler start to the activity

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

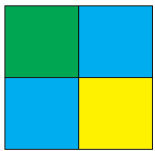
Asking Good Questions

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.

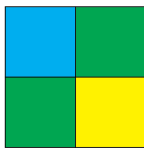
Answers

Some puzzles have more than one solution:

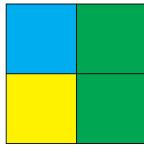
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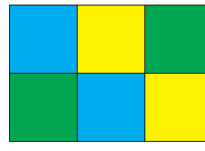
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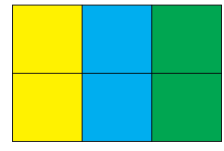
Puzzle 3



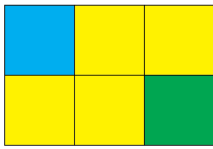
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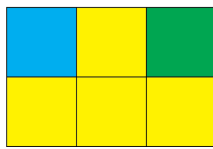
Puzzle 5



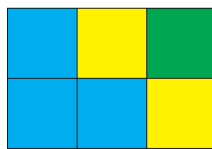
Puzzle 6a



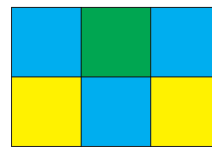
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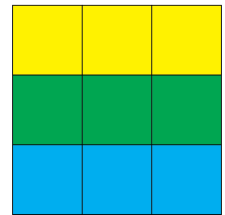
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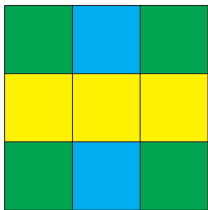
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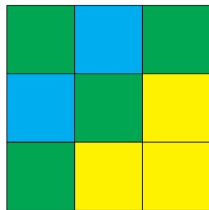
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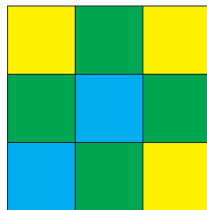
Puzzle 10a



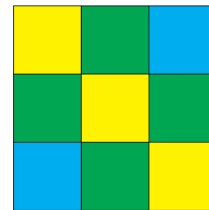
Puzzle 10b



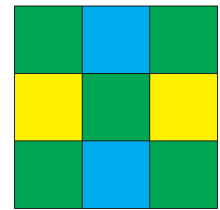
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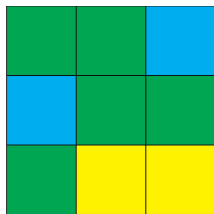
Puzzle 11b



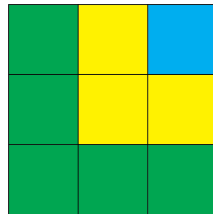
Puzzle 12



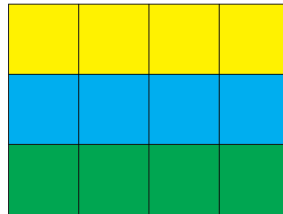
Puzzle 13



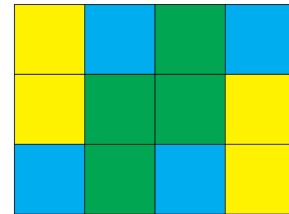
Puzzle 14



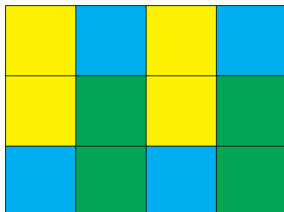
Puzzle 15



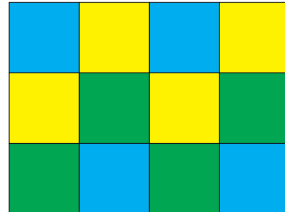
Puzzle 16a



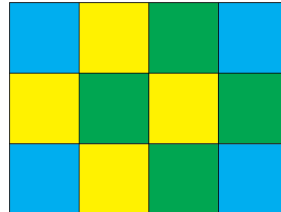
Puzzle 16b



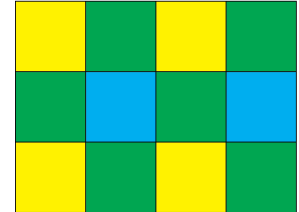
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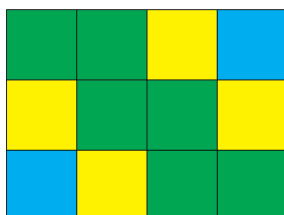
Puzzle 17b



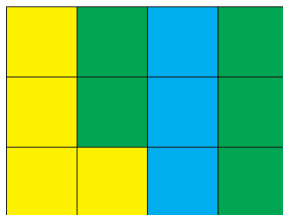
Puzzle 18



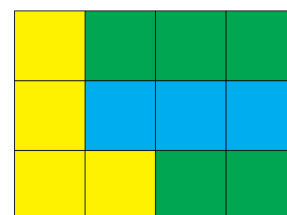
Puzzle 19



Puzzle 20a

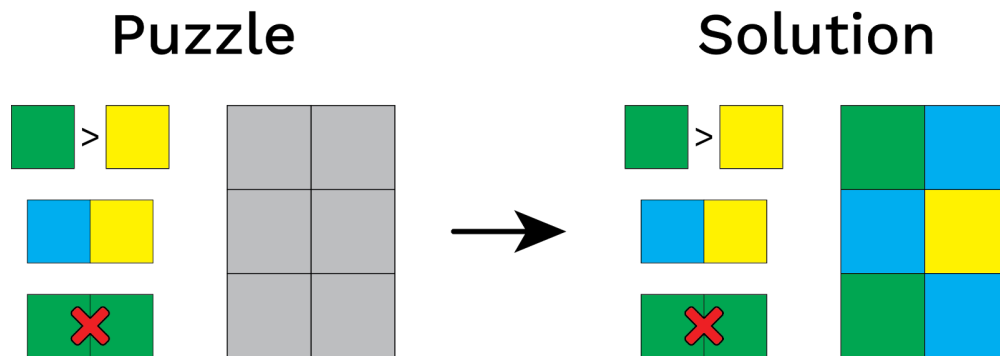


Puzzle 20b



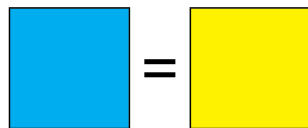
Mosaics Instructions

Create a mosaic for each puzzle using blue, green, and yellow squares.

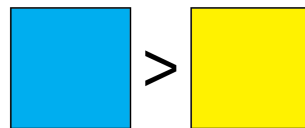


Rules:

1. Each puzzle needs at least one blue, one green, and one yellow square.
2. Each puzzle has additional rules on the left side of the grid.
Here are examples of the four types of rules you'll see:



There are the same number of blue and yellow squares.



There are more blue squares than yellow squares.



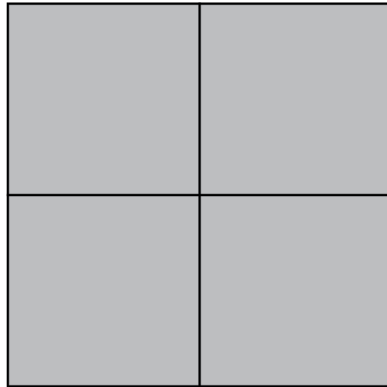
There are no green and yellow squares that touch (corners don't count).



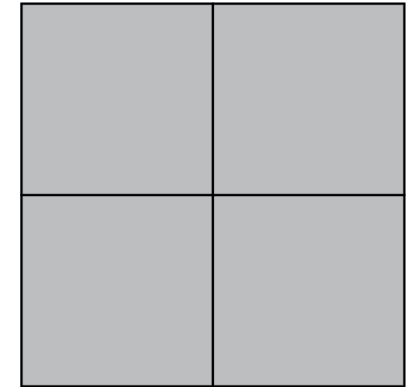
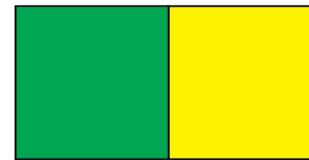
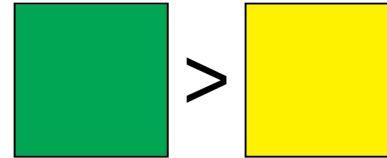
Every green square touches a yellow square, and every yellow square touches a green square (corners don't count).

Mosaics Tasks

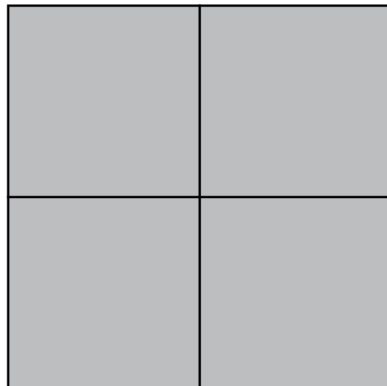
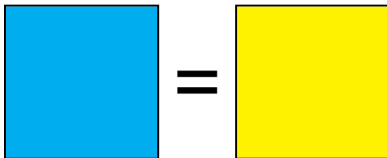
Puzzle 1



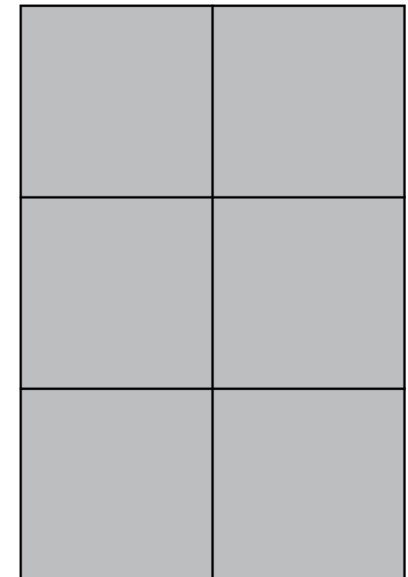
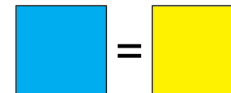
Puzzle 2



Puzzle 3

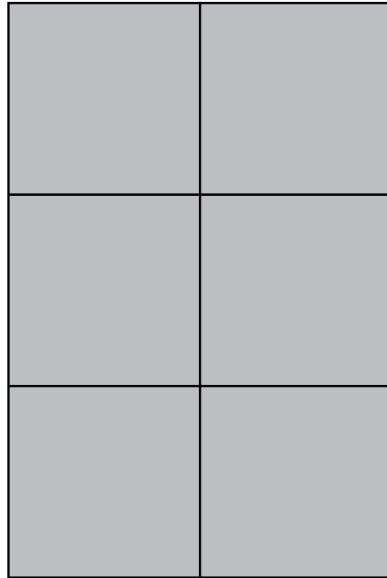
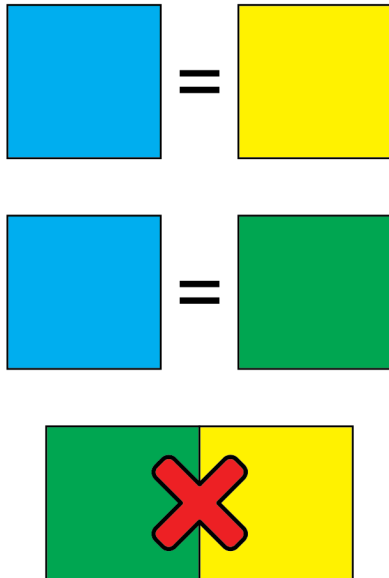


Puzzle 4

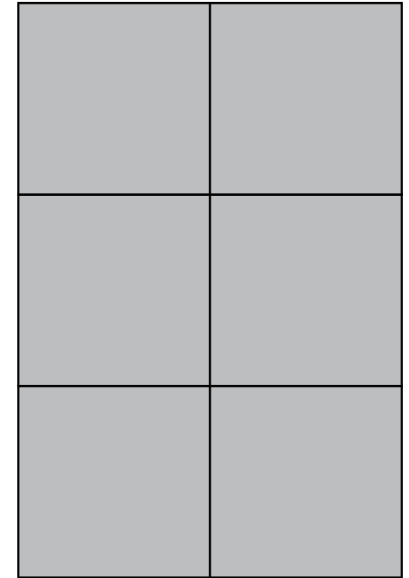
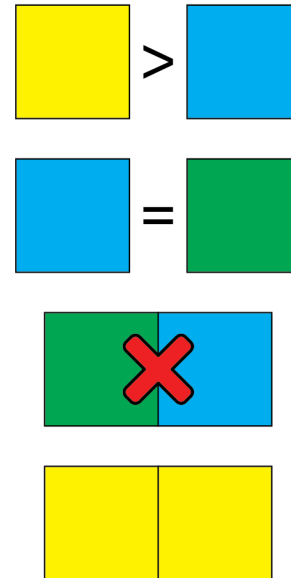


Mosaics Tasks

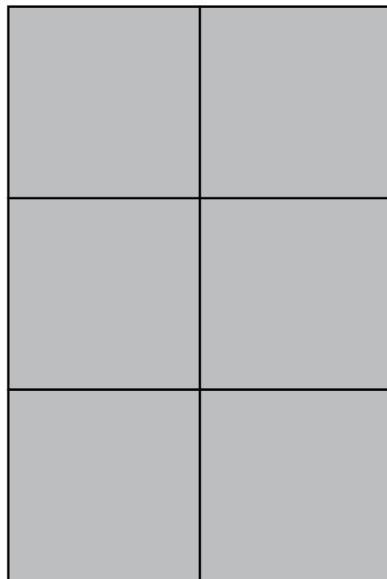
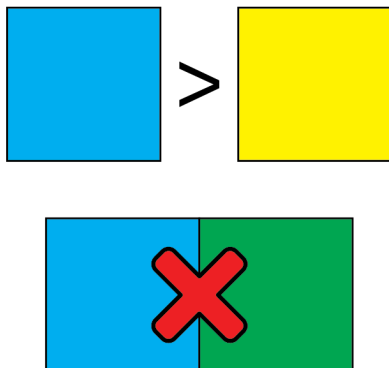
Puzzle 5



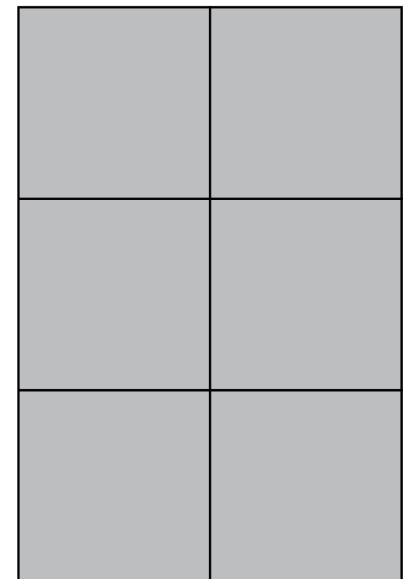
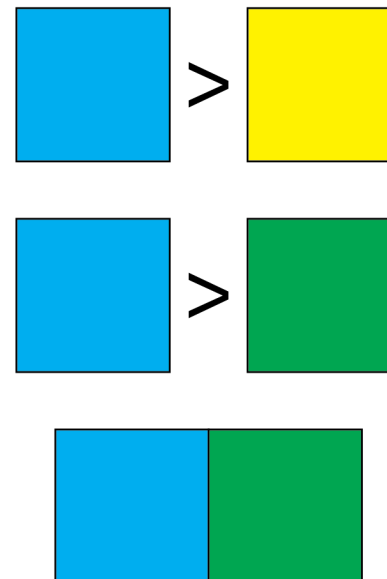
Puzzle 6



Puzzle 7

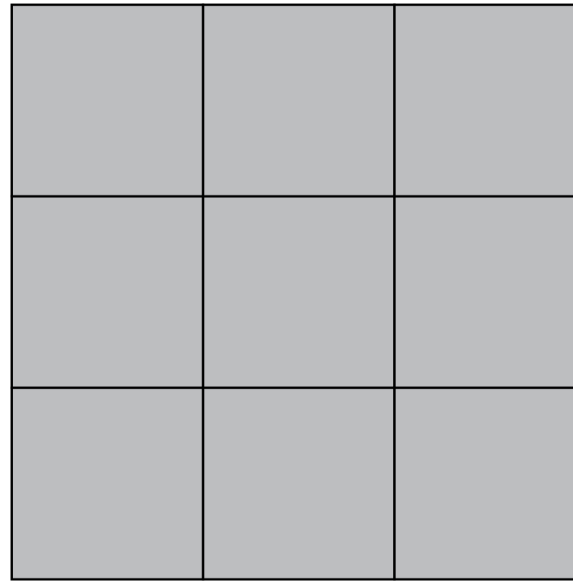
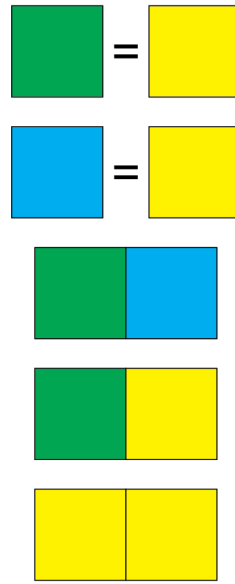


Puzzle 8

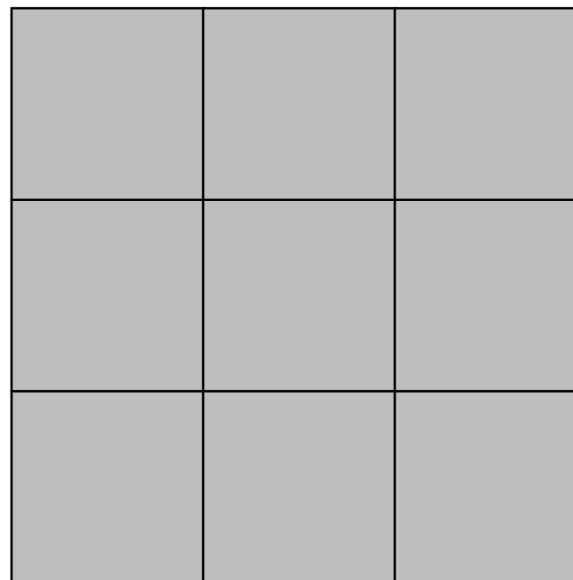
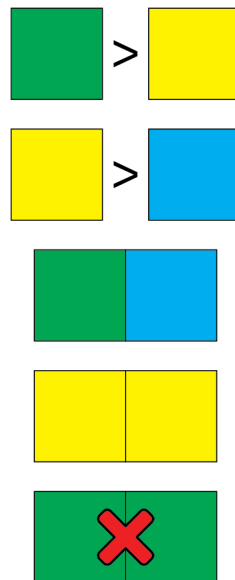


Mosaics Tasks

Puzzle 9

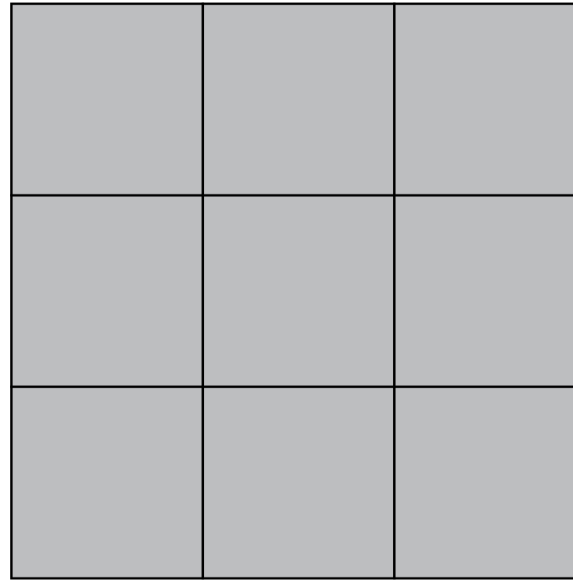
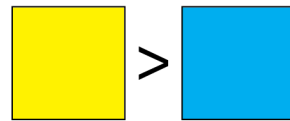
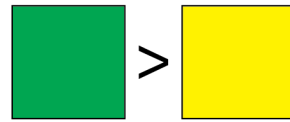


Puzzle 10

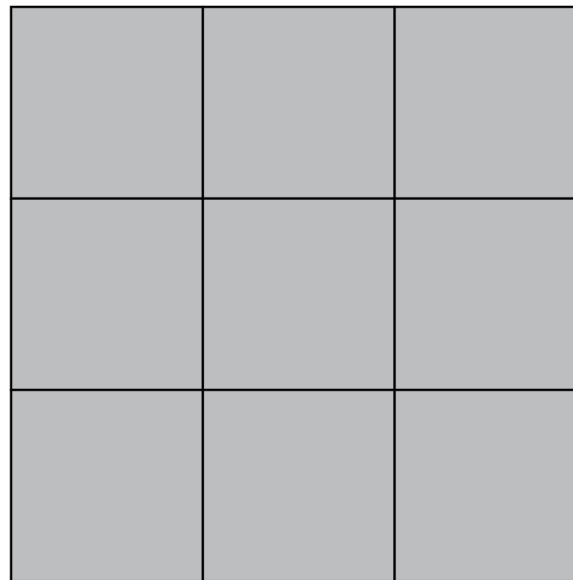
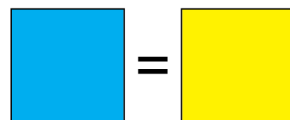
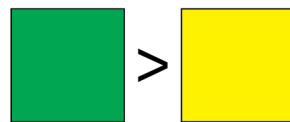


Mosaics Tasks

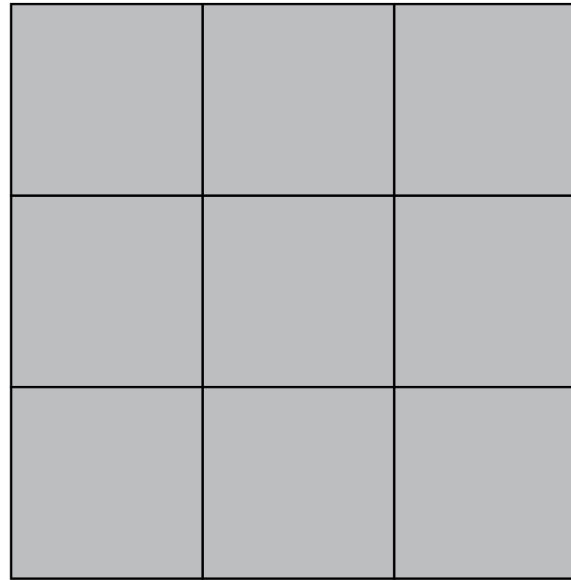
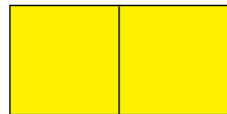
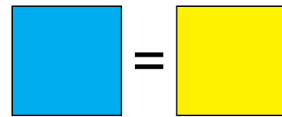
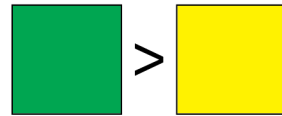
Puzzle 11



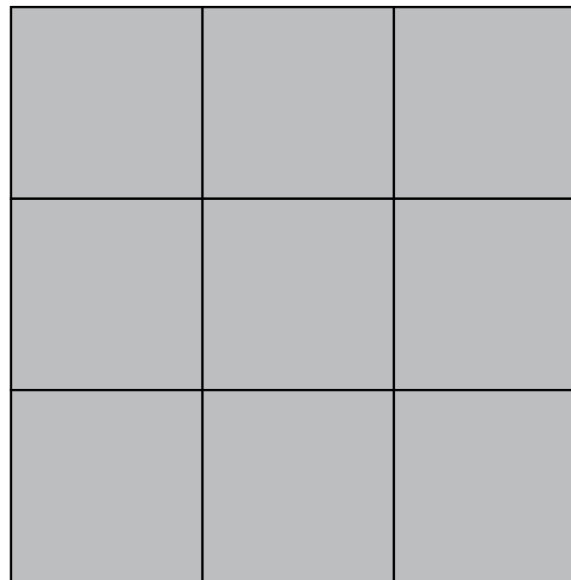
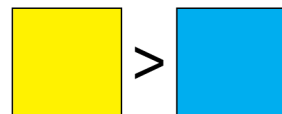
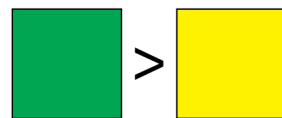
Puzzle 12



Mosaics Tasks Puzzle 13

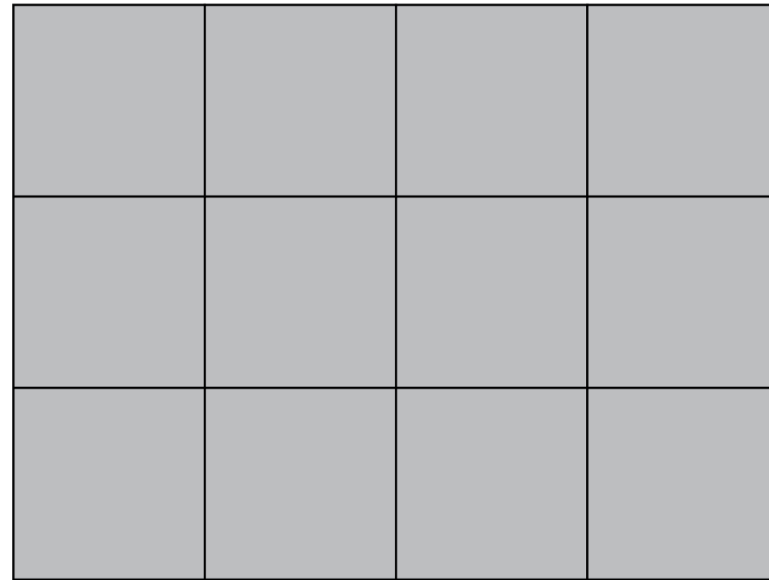
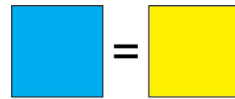
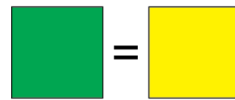


Puzzle 14

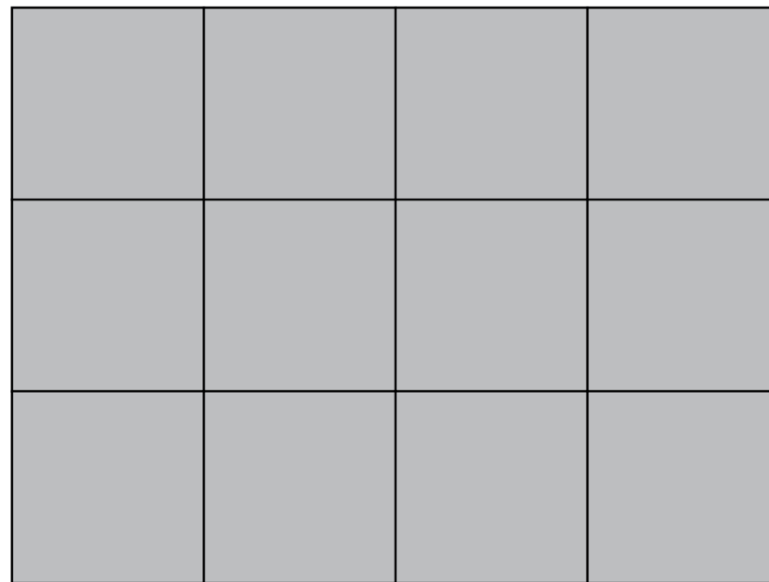
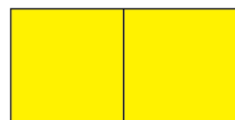


Mosaics Tasks

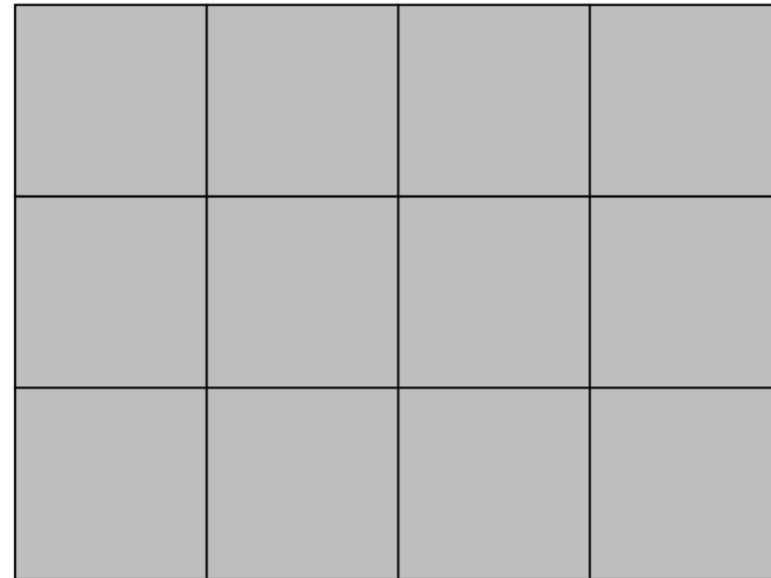
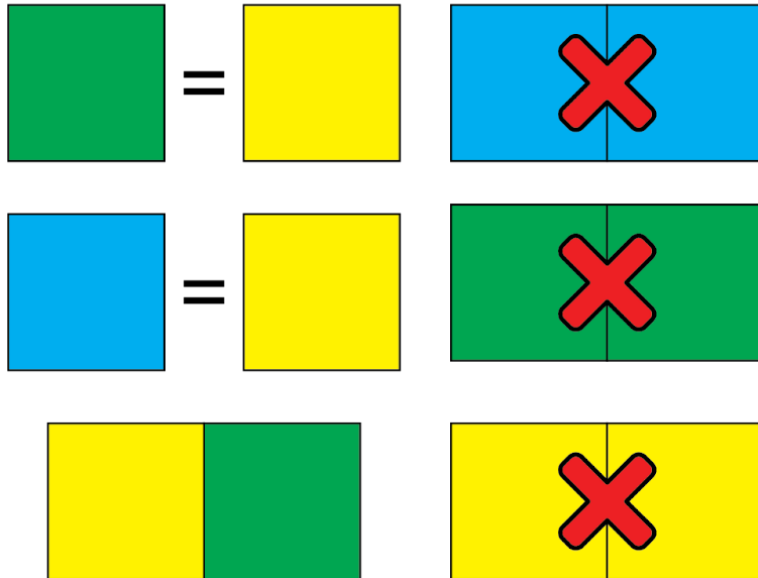
Puzzle 15



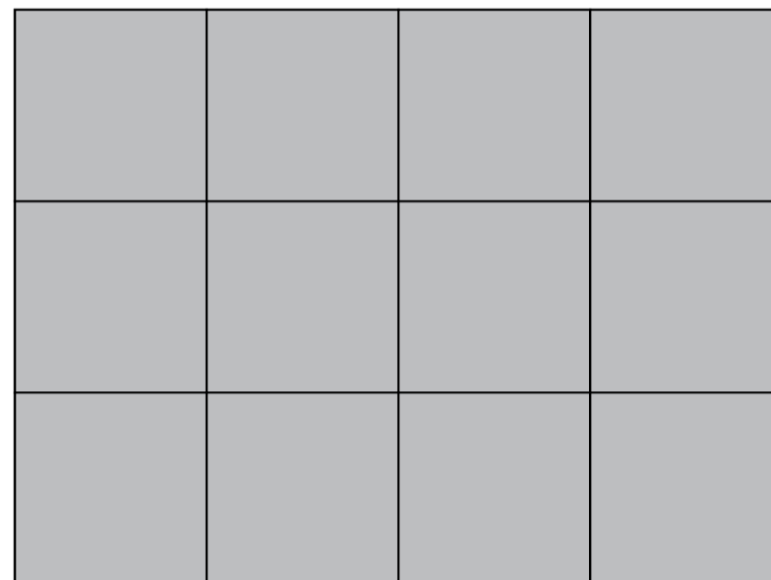
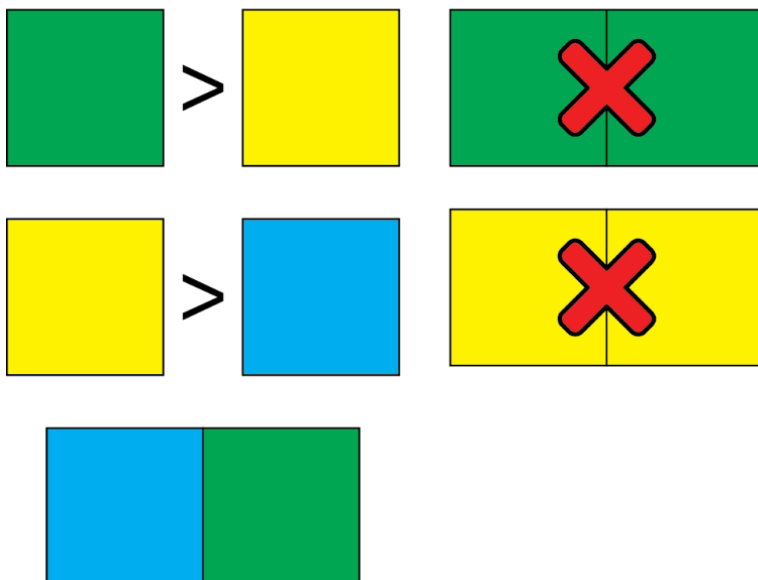
Puzzle 16



Mosaics Tasks Puzzle 17

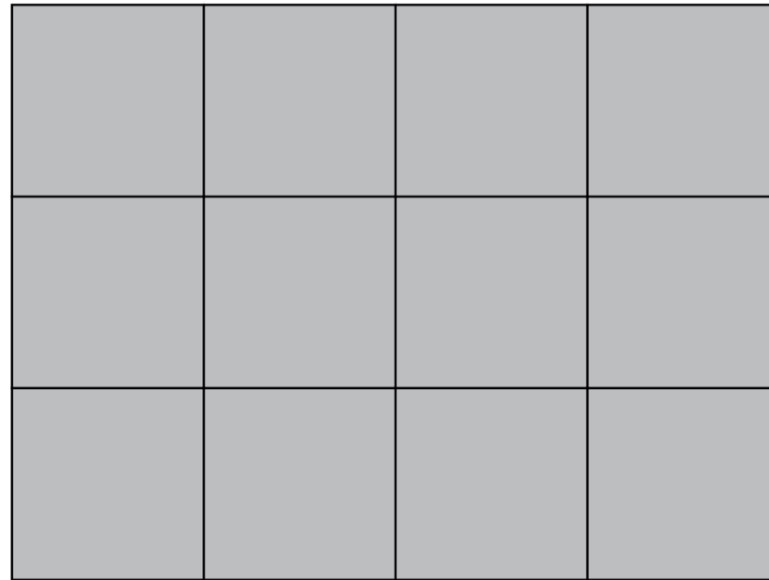
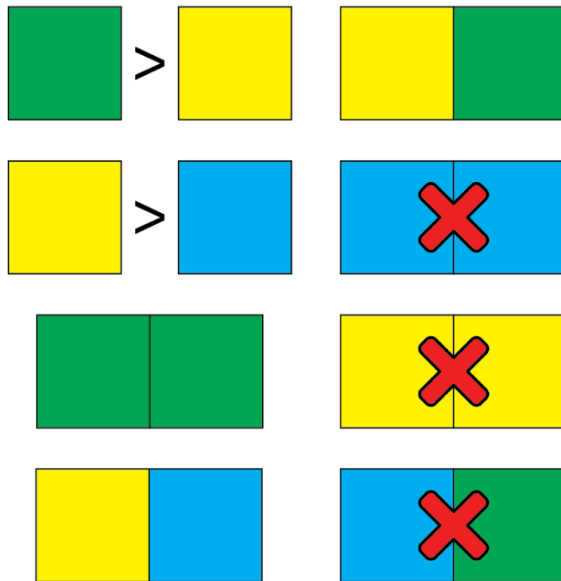


Puzzle 18

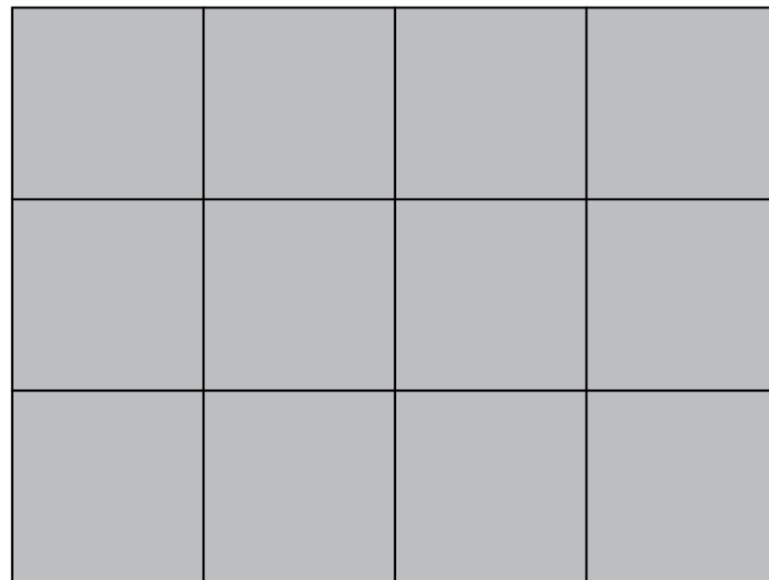
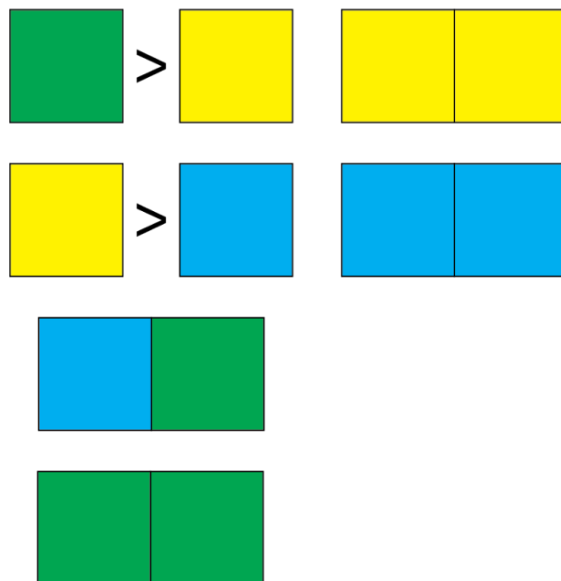


Mosaics Tasks

Puzzle 19

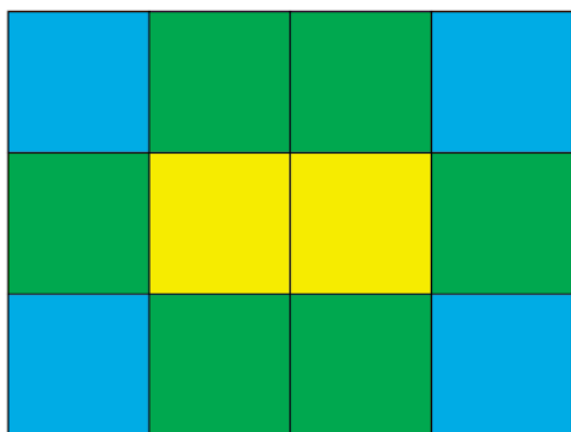


Puzzle 20





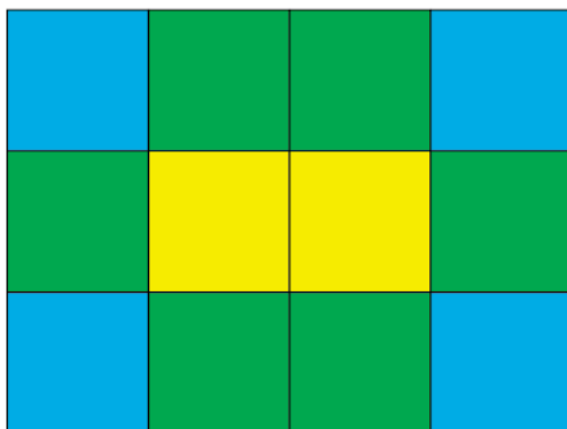
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