

Juice Jumble



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Mathematics
Festival**



App

jrmf.org



Goal:

- Arrange the six different juices in rainbow (numerical) order followed by the empty cup.

Rules:

- You may only pour a filled cup into an empty cup.
- You may not switch the positions of any cups.
- The empty cup must end up on the right.

Example:

In the puzzle below, the empty cup is on the left and the red and yellow juices are in the wrong cups.

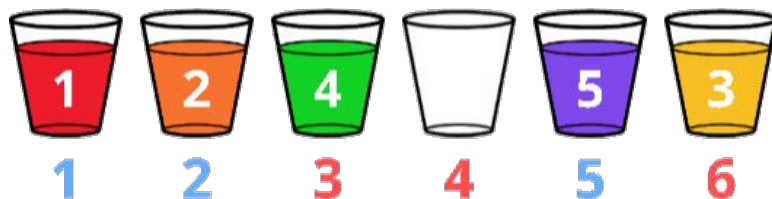


To fix this, we could first pour cup 3 into cup 1 and then cup 6 into cup 3:

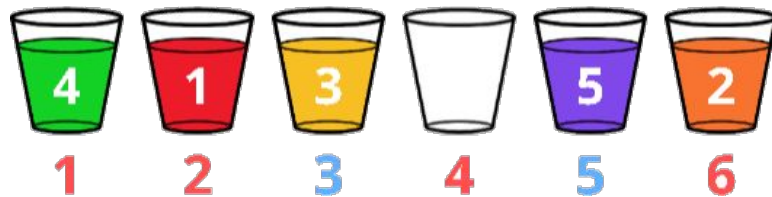


Pouring Predicaments

1. Solve the Juice Jumble puzzle below:



2. What was your first pour? Are there other first pours that could work? Are there any pours that wouldn't be helpful?
3. How many pours did it take to solve the puzzle? Could you have solved it in fewer?
4. Try this second puzzle:



5. How many pours did it take to solve it? What's the least number of pours it takes?

Pouring Predicaments

6. Predict the number of pours it will take to solve the following puzzle and then see if you can solve it with your predicted number of pours:



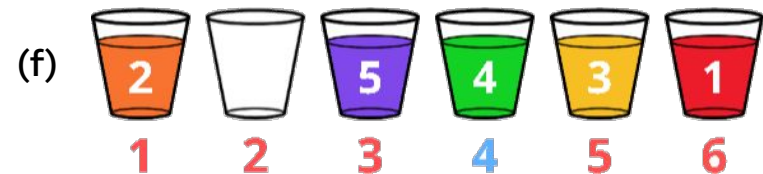
7. Try a similar prediction before you solve the puzzle below:



8. What's your strategy for solving these puzzles? Could you describe it to a friend?
9. Do you think you could guess how many pours it will take to solve a puzzle just by looking at it? What do you look for when making your prediction?

Pouring Predicaments

10. Solve the following puzzles, predicting the number of pours it will take and comparing to how many it actually takes:



11. Did any of these puzzles take more pours to solve than you predicted? What happens when solving those puzzles that doesn't happen in the others?

1. Is it always possible to solve a 6-cup (5 filled, 1 empty) puzzle? Why or why not?
2. What's the largest number of pours a puzzle has taken to solve so far? Can you design a 6-cup puzzle that takes more pours to solve?
3. What is the greatest number of pours it could possibly take to solve a 6-cup puzzle? Design a puzzle that takes that number of pours.
4. Design a 7-cup (6 filled, 1 empty) puzzle that takes the greatest number of pours to solve.
5. Repeat this for 8, 9, and 10 cups.
6. Can you find a pattern to the greatest number of pours it could take to solve a puzzle based on the number of cups?



- In grids, like the one below, you can only pour juices into the empty cup if the filled cup is in the same row or column as the empty cup. Can you solve the puzzle below so that the cups are in increasing order from left to right and top to bottom (like in the “Goal”)?

Puzzle



Goal



- Can you create your own 3x3 Juice Jumble puzzle that needs more pours to solve than the puzzle above?
- What is the largest number of pours that you need to solve any 3x3 Juice Jumble puzzle?
- What about 4x4 Juice Jumble puzzles? 5x5 puzzles? Larger puzzles?