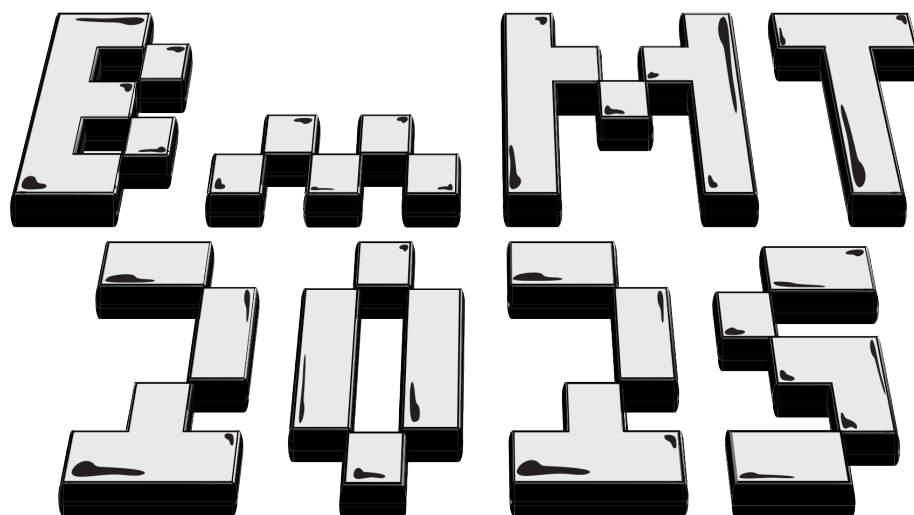


Berkeley mini Math Tournament 2025

Puzzle Round Rules



April 12, 2025

Time limit: 15 minutes for reading; 60 minutes for solving.

Instructions: For this test, you work in teams of up to five to solve a set of puzzles. You will have 15 minutes to read the rules of the Puzzle Round and to strategize. Afterwards, you will have 60 minutes to solve the puzzles. Only submit the set of answer sheets for grading.

No calculators.

Introduction

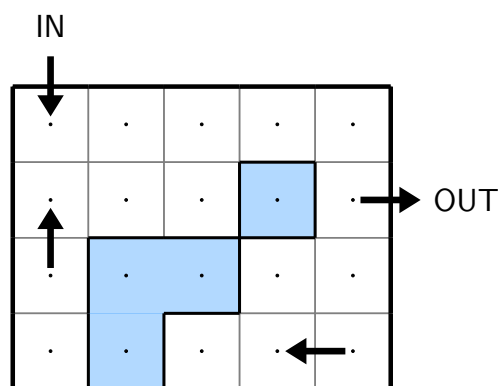
Welcome to the BmMT 2025 Puzzle Round! This companion document will be available to you throughout the entire duration of the round. It's highly recommended that everyone on your team work through all provided examples. Remember to submit your team's solutions on the provided answer sheet.

A reminder about difficulty: Puzzles are arranged in increasing difficulty only within their variants. Feel free to skip to different sections, where puzzles may be easier. Solutions to puzzles must be unique, so if you find multiple solutions, check to make sure that you've understood the rules fully. In addition, **there is a selection of challenging puzzles at the end of the test. We recommend only attempting these puzzles once you fully understand the relevant variant and have solved the other puzzles in that variant.**

Basic Icebarn

Reading the Puzzle

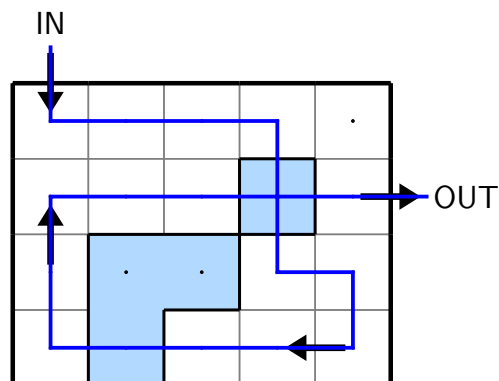
A blank Icebarn puzzle will look something like this:



In this puzzle you will draw a path from “IN” to “OUT” which conforms to the following rules:

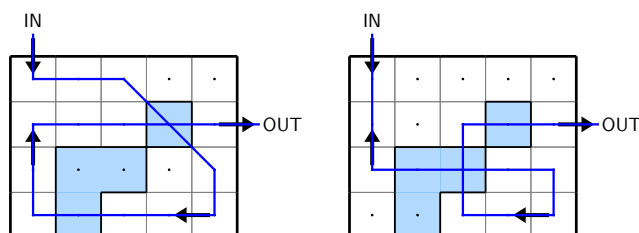
- The path may only move horizontally and vertically, passing through the center of a cell it enters. You may turn only in the center of a cell.
- The path must go through all arrows in the correct direction (that is, the arrow points toward the end of the path).
- A shaded square is an “ice square”. The path cannot change direction while on an ice square.
- Orthogonally adjacent ice squares (squares that share an edge) form an “ice patch”. The path must enter every ice patch at least once, and cannot turn while on an ice patch. An isolated ice square forms its own ice patch.
- The path may not cross itself, or enter a cell more than once, when not on an ice patch. The path may cross itself on ice squares.
- The path does not need to go through all cells, unless directly specified by a variant.

Try solving the example puzzle before turning the page!

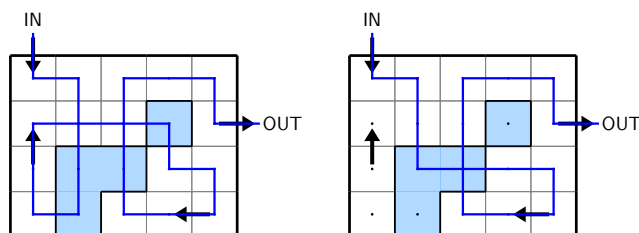


Here is the correct solution to this example puzzle.

Here are some incorrect solutions to the example puzzle.

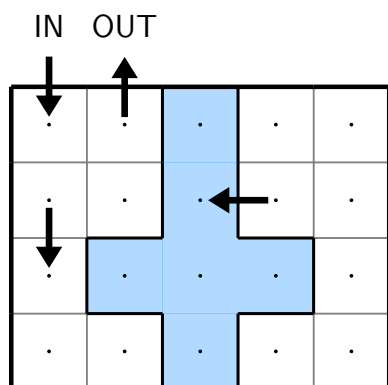


In the first incorrect solution, the path moves diagonally, which is not allowed. In the second incorrect solution, the path passes through the left arrow in the wrong direction.



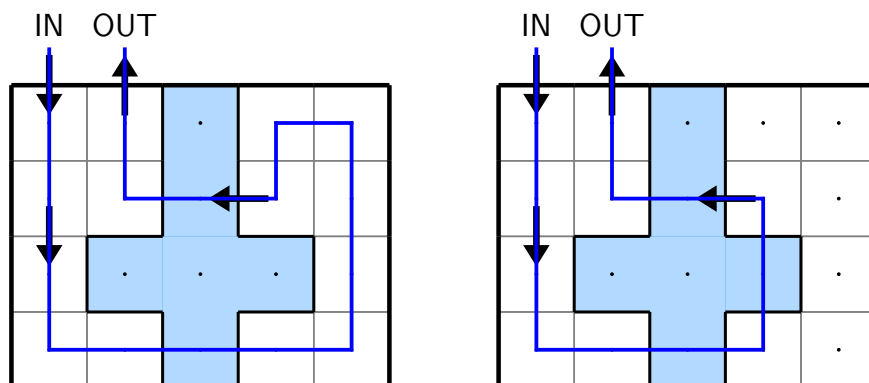
In the third incorrect solution, the path crosses itself when not in an ice patch. In addition, the path makes a turn on ice. In the fourth incorrect solution, the path does not pass through every arrow, nor every ice patch.

Variant 1: World Tour



A World Tour Icebarn puzzle looks identical to the Basic variant.

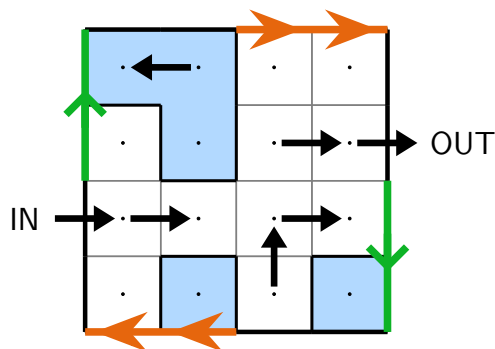
This variant follows all rules found in the Basic puzzles, with the additional rule that the path must visit all white squares. **Give this puzzle a try before turning the page!**



The left solution is correct. It passes through all white squares, while following all rules found in the Basic puzzles. The right solution is incorrect, since some white squares are not visited.

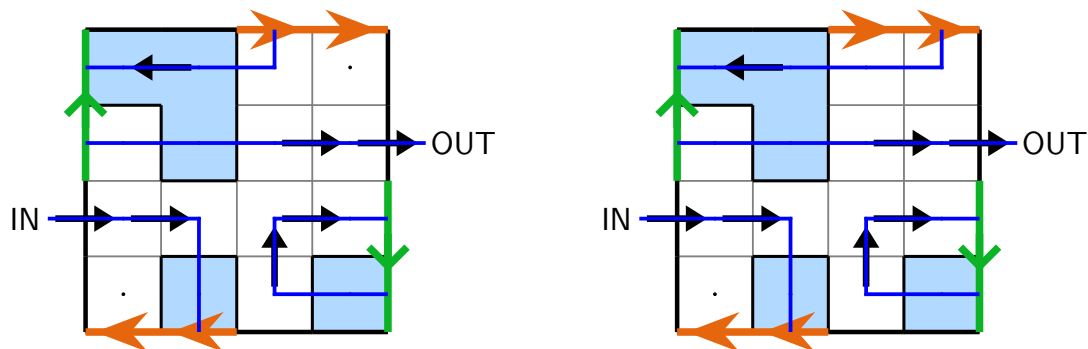
Variant 2: Drive-Thru

This variant follows all rules found in the Basic puzzles, with some additional rules. Some edges of the grid are bolded and marked with one or several arrows (“”), as shown.



- Pairs of edges labeled with the same type and number of arrows act as “portals”, from one to the other. **Note that there are two different types of arrows, and the shape of the arrows on two portals must be the same for the portals to correspond.**
- The path may enter the portal on one side and exit from the corresponding square on the other side, as shown in the solution to this puzzle on the next page.
- The path may enter the same portal multiple times.
- The markers indicate the orientation of the portal. Squares in the same place on each side of the portal, as determined by their positions relative to the marker, are corresponding squares.
- Ice patches can pass through portals: if two corresponding squares of a portal are ice squares, they are part of the same ice patch.

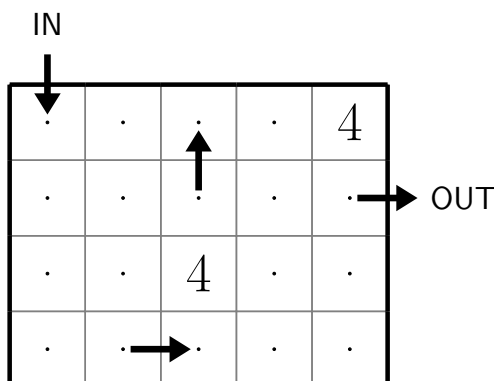
Give the above example puzzle a try before turning the page!



The left solution is correct. While following all Basic puzzle rules, the path enters and exits the portal at the corresponding squares. In the right solution, the path enters the portal at a different position than it exits.

Variant 3: Black Ice

This variant follows all rules found in the Basic puzzles, with some additional rules. In this variant, the ice patches are hidden, and you are given some additional clues to determine where the ice is. A Black Ice puzzle will look like this:



- All arrows start in an ice square, possibly excluding the “IN” and “OUT” arrows.
- An arrow is “contained” in an ice patch if the arrow *starts* in the ice patch. Every ice patch contains at least one arrow.
- Each number is in an ice square.
- The numbers in the grid denote the number of ice squares that touch the numbered square, including itself. Squares touch orthogonally and diagonally, so a square must share an edge or a corner with the numbered square to be counted.
- All ice squares are counted by at least one number. That is, if a square does not touch a number, it will not be an ice square.

Give the above example puzzle a try before turning the page!

In the following example solution, ice patches are shaded for your convenience. While we highly recommend shading in ice to assist in solving the puzzle, it is not necessary. You are only required to submit the correct path from “IN” to “OUT”.

