# Competition Section Guidelines
# "Bond: On the Guide for the Matchmaking"

## Overview of the Competition Section

In the traditional Japanese lunar calendar, the month of October (corresponding to November in the modern calendar) is known as the time when eight million gods gather in Izumo, Shimane Prefecture. In regions where the gods are absent, this month is referred to as "Kaminazuki" (the month without gods), but in Izumo, where the gods assemble, it is called "Kanzan-zuki" (the month with gods). At Izumo Taisha Shrine, the gods write their names on wooden plaques and match pairs of plaques through **divine consultations**, symbolizing the formation of fateful connections. This year's competition is based on this concept of "Enmusubi." — the binding of destinies.

Entities **represented by numbered values** are scattered across a grid-like **field**, and each has a destined partner with the same number. However, the destined partner may not necessarily be nearby.

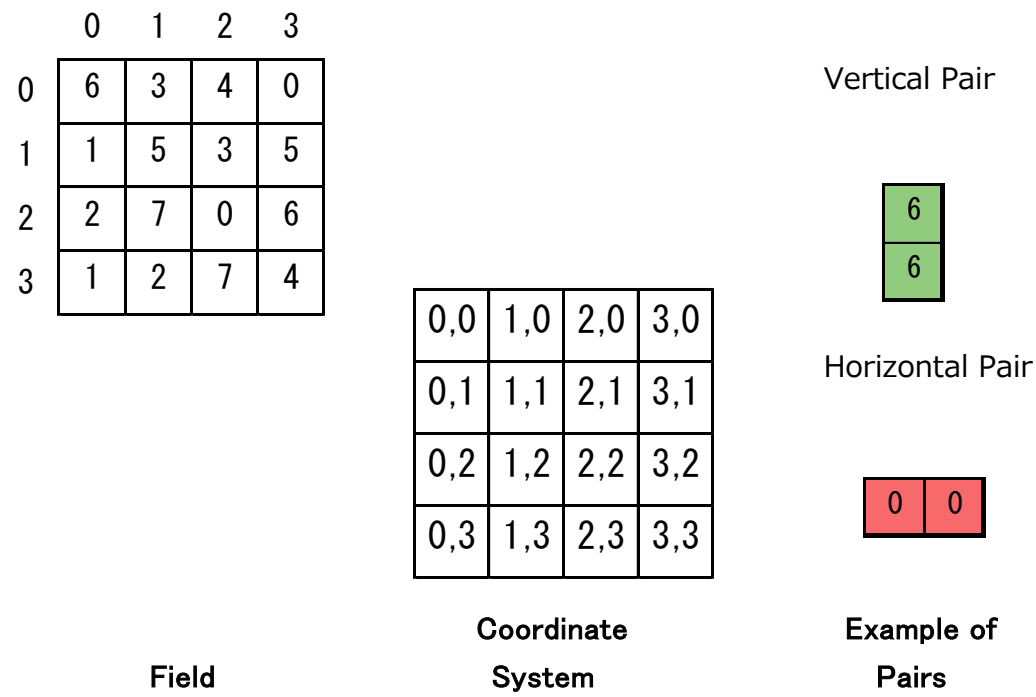
To bring them together, players can define a square region on the field known as an **En** (meaning "garden") and rotate it. Entities within this region shift positions accordingly. The goal is to strategically guide the entities so that as many matching pairs as possible become adjacent. The player who forms the most pairs through these rotations wins the game.

In this competition, you will rotate the "En" (garden) in advance of the gods' gathering in Kanzan-zuki, forming the "Enmusubi" (binding of fates) for the entities.

## Field and Entities

- The entire board is referred to as the "field," and each cell on the field contains an entity represented by an integer.
- The field has equal vertical and horizontal dimensions, which are even numbers.
- The range of entity values is from 0 to (field size / 2 − 1). For example, if the field size is 4x4 as shown in the diagram, the integer values range from 0 to 7.
- There are always exactly two entities with the same integer value on the field, neither more nor fewer.
- The coordinate system for the field is shown in the diagram. Coordinates are represented as (x, y), with (0, 0) at the top-left corner.

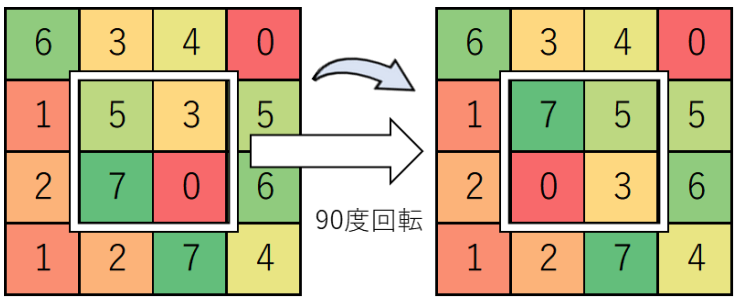
- Entities with the same integer value that are adjacent in any of the four cardinal directions (up, down, left, right) form a "pair." The pairs can either be arranged vertically or horizontally, as shown in the example.



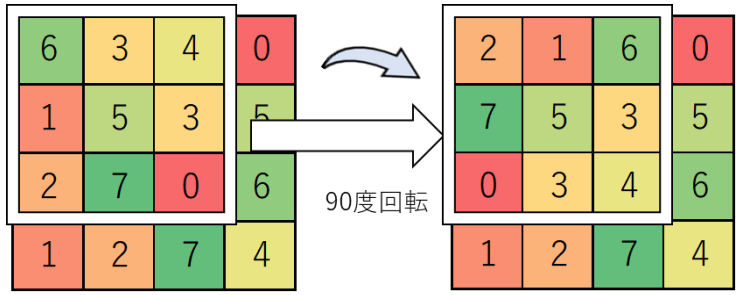

**Field** **Coordinate System** **Example of Pairs**

**Guidance and En (Garden)**

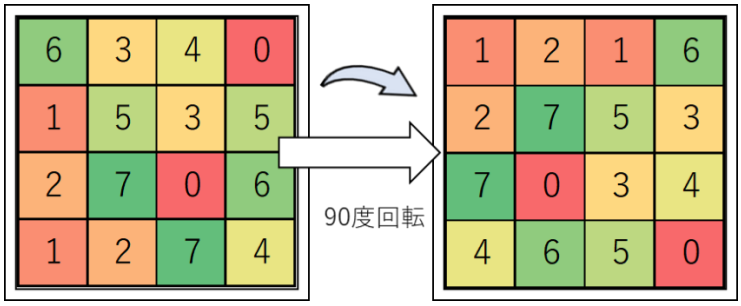
- The act of moving entities on the field to create pairs is referred to as "guidance," and each guidance action is counted as one "move."
- The area where the guidance takes place is called "En." When guiding, you specify a square region of size n × n on the field.
- By rotating the "En" by 90 degrees clockwise, entities within that square are moved accordingly.
- The example in the diagram shows how the field changes when guidance is applied to various areas.




**Guiding with 2×2 Rotation**




**Guiding with 3×3 Rotation**




**Guiding with 4×4 Rotation**

Figure 2: Example of Field Changes Due to Guidance

### Guidance Steps

1. Choose the position where the top-left corner of the square "En" will be placed.
2. Decide the size of the "En."

The "En" can be applied to any position on the field, but it must not extend beyond the borders of the field.

### Problem

- The field size can range from 4 to 24 for both the vertical and horizontal dimensions. The maximum size for the "En" is the same as the field width, and the minimum size is 2×2.

### Problem Format

The problem is provided in the following JSON format. An example of the field data for the 4×4 field is shown below.

- "startsAt" represents the UNIX time for the start of the match. In the example, it is set to 2025/4/1 15:30:20. If the exact match start time is not confirmed, it will be 0.
- "problem" holds the problem information, which is null before the match starts, but becomes valid after the match begins.

- "field" contains the field information.
- "size" represents the field size (4 to 24).
- "entities" holds the entity information in a 2D array.

```
{
  "startsAt": 1743489020,
  "problem": {
    "field": {
      "size": 4,
      "entities": [
        [6, 3, 4, 0],
        [1, 5, 3, 5],
        [2, 7, 0, 6],
        [1, 2, 7, 4]
      ]
    }
  }
}
```

**Answer Format**

The response should follow this JSON format:

- "ops" is an array of guidance operations.
- "x" and "y" represent the coordinates of the top-left corner of the "En."
- "n" is the side length of the "En."

If any invalid guidance is included in the response, the entire submission will be considered invalid.

**Example of Response:**

Guiding with 2 × 2 at (0,0) and 2 × 2 at (2,2).

```
{
  "ops": [
    {"x": 0, "y": 0, "n": 2},
    {"x": 2, "y": 2, "n": 2}
  ]
}
```

### Match Progress

1. Each match will involve multiple teams. The number of teams will vary depending on the matchups.
2. The number of teams per match will be communicated separately.
3. Each match will have a time limit, typically around 5 minutes.
4. The field size will be communicated before the match starts.
5. The problem will be provided via network as soon as the match begins.
6. Each team must solve the problem within the time limit and submit their answer over the network.
7. Once an answer is received, the server will return feedback on whether the answer was successfully accepted or invalid (due to format errors).
8. Resubmissions are allowed within the time limit, but each team may submit a maximum of 30 times. The 31st submission or any subsequent ones will be rejected.
9. The final valid submission will be considered as the answer.

### Winner Determination

The winner will be determined based on the following priorities:

1. The team with the most pairs on the field wins.
2. The team with the fewest moves wins.
3. The team that submits their final answer first wins.
4. In case of a tie, the winner will be determined by a dice roll or declared a draw.

### Communication

- Teams will connect their PCs to the provided wired LAN at the competition booth and use HTTP POST/GET methods to send and receive data.

### Notes:

- The computers and devices allowed to be brought into the competition must be portable and programmable, limited to a maximum of three devices. At least one device must have an RJ45 wired LAN port supporting 10BASE-T/100BASE-TX/1000BASE-T and be capable of TCP/IP connection, used for submitting answers.
- Each team will be provided with at least four power outlets in the competition booth. Please ensure that the total power consumption does not exceed 500W.
- Each team will be provided with one LAN cable to connect to the competition network, and three IP addresses will be assigned via DHCP. If multiple computers need to be connected to the competition network, each team should bring a switching hub or similar equipment.

- Wireless communication via Bluetooth or similar technologies between devices brought into the competition is allowed, but Wi-Fi communication is not permitted.
- During the competition, exchanging information within the team is allowed, but communication with teams outside the competition is prohibited. Additionally, communication with devices other than the ones brought into the competition is not allowed.
- Actions that interfere with the server or the progress of other teams' matches are not allowed. If an act of interference, disruption of the match, or any prohibited behavior is determined, disqualification may occur.
- Sending data in a quantity or frequency that disrupts the progress of the match may be regarded as interference, resulting in disqualification.
- In case of any technical issues with the system on the organizer's side, the competition may proceed offline. In this case, the match schedule may be subject to change.
- If the organizers experience any issues, alternative problems may be provided for a re-match.
- The data used in the competition, as well as data submitted by each team to the server, may be published on the official Procon website after the competition. Additionally, some of the answer information may be displayed on the competition visualizer during the event.
- During the competition, players and the items on their desks (such as computer screens, operations, and notes on the desk) may be filmed or recorded with video cameras and displayed on screens.
- During the competition, judges may review the player and the items on the desk (such as computer screens, operations, and notes) for evaluation purposes.
- Additional information may be obtained by accessing the problem server that will be publicly available on the official website.