

## Starter Kit

Starter AIs are available in the Starter Kit. They can help you get started with your own bot.

Introductory video by Mathis Hammel: <https://youtu.be/MyHjWftmMfQ>

### The Goal

Protect your base from monster attacks and outlive your opponent.

### Rules

Both players controls a team of **3 heroes**. The teams start out at opposite corners of the map, near their **base**. Throughout the game **monsters** will appear regularly on the edges of the map. If a **monster** reaches your base, it will deal **damage**. If your base takes too much damage, you lose.

Thankfully, your **heroes** can kill **monsters**.

## The map

The game is played on a rectangular map where the coordinate **X=0, Y=0** is the top-left pixel and **X=17630, Y=9000** is the bottom-right pixel.

Fog makes it impossible to know the positions of all **monsters** and rival **heroes**. You need to have them within **2200** units from one of your **heroes** or **6000** from your **base**.

Each **base** can take a maximum of **3** points of damage before being destroyed.

Multiple **entities** (heroes & monsters) can occupy the same coordinates, there is no collision.

## Heroes

Every turn, you must provide a command for each **hero**. They may perform any of the following commands:

- **WAIT**, the hero remains where they are.
- **MOVE**, followed by map coordinates will make the hero advance towards that point by a maximum of **800** units.
- **SPELL**, followed by a spell action, as detailed in the Spells section further below.

**Heroes** cannot be killed and cannot leave the map.

After a **hero's** move phase, any **monsters** within **800** units will suffer **2** points of damage.

## Monsters

Every **monster** appears with a given amount of **health**. If at the end of a turn, a monster's **health** has dropped to zero or below, the **monster** is removed from the game.

**Monsters** will appear randomly, but symmetrically from the map edges outside of the player's bases. They appear with a random moving direction.

**Monsters** will always advance in a straight line at a speed of **400** units per turn.

If a **monster** comes within **5000** units of a **base** at the end of a turn, it will **target** that base.

When **targeting** a base, a monster will move **directly towards** that **base** and can no longer leave the map.

If a **monster** is **pushed** (with a **WIND** command) outside the radius of a **targeted** base, it will stop targeting and start moving in a randomly selected direction.

If a **monster** comes within **300** units of a **base** at the end of a turn, as long as it has not been killed on this turn, it will disappear and deal the **base 1** point of damage.

Each subsequent **monster** may have slightly more starting health than any previous **monster**.

## Spells

Your team will also acquire **1** point of **mana** per damage dealt to a monster, even from monsters with no health left.

Mana is shared across the team and heroes can spend **10** mana points to cast a **spell**.

A spell command has **parameters**, which you must separate with a space.

command	parameters	effect	range
<b>WIND</b>	<x> <y>	All entities (except your own heroes) within <b>1280</b> units are <b>pushed 2200</b> units in the direction from the spellcaster to x,y.	<b>1280</b>
<b>SHIELD</b>	<entityId>	The target entity cannot be targeted by spells for the next <b>12</b> rounds.	<b>2200</b>
<b>CONTROL</b>	<entityId> <x> <y>	Override the target's next action with a step towards the given coordinates.	<b>2200</b>

A hero may only cast a spell on entities that are within the spell's range from the hero.

### WIND Example

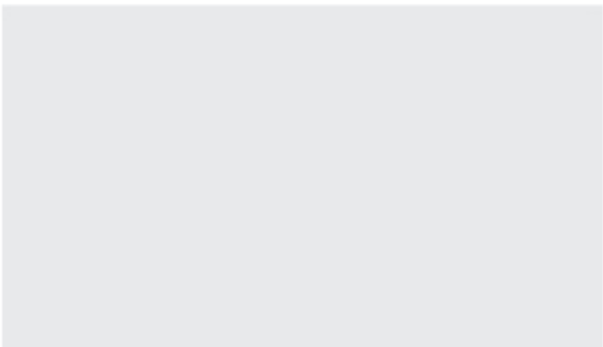
A hero uses WIND at position **(6000, 6000)** towards **(6000, 5000)**.



There are **2** monsters within **1280** units around the hero.



**SPELL WIND 6000 5000**  
The vector **(0, -1)** describes the direction between the hero and the target point.





The monsters all move **2200** in the direction defined by the vector.

### Victory Conditions

- Your opponent's base health has dropped to zero.
- You have more base health points than your opponent after **220 turns**.
- In case of a tie, you have gained the highest amount of **wild mana**: mana gained outside the radius of your **base**.

### Defeat Conditions

- Your base's health reaches zero.
- Your program does not provide a valid command in time.

### Debugging tips

- Hover over an entity to see extra information about it
- Append text after any command and that text will appear above your hero
- Press the gear icon on the viewer to access extra display options
- Use the keyboard to control the action: space to play/pause, arrows to step 1 frame at a time

### Technical Details



- After an entity moves towards a point, its coordinates are **truncated** (when below halfway across the map) or **rounded up** (when above halfway across the map), only then are distance-based calculations performed (such as monster damage).
- Spells are cast in the order of the received output. This means a spell may be **cancelled** if another hero spent the necessary mana earlier in the turn.
- If an entity is being moved via a **CONTROL** from multiple sources at once, it will move to the average of all computed destinations.
- If an entity is being moved via a **WIND** from multiple sources at once, it will move to the sum of all given directions.
- **SHIELD** also protects entities from receiving a new **SHIELD**.
- Using a spell against a shielded entity still costs mana.
- Players are not given the coordinates of monsters outside the map.
- A monster can be pushed outside of the map, unless it is within a base radius, in which case it will be moved no further than the border.
- In case of a tie, the player who gained the highest amount of **mana** outside the radius of their **base** will win. this is called *wild mana*.
- The source code of this game is available [on this GitHub repo](#).

### Action order for one turn

1. Wait for **both** players to output **3** commands.
2. **CONTROL** spells are applied to the targets and will only be effective on the next turn, after the next batch of commands.
3. **SHIELD** spells are applied to the targets and will only be effective on the next turn, after the next batch of commands. Does **not** protect from a spell from this same turn.
4. **MOVE** all heroes.
5. Heroes attack monsters in range and produce mana for each hit.
6. **WIND** spells are applied to entities in range.
7. **MOVE** all monsters according to their current speed, unless they were **pushed** by a wind on this turn.
8. **SHIELD** countdowns are decremented.
9. New monsters appear. Dead monsters are removed.

## Game Input/Output

### Initialization Input

**Line 1:** two integers **baseX** and **baseY** for the coordinates of your base. The enemy base will be at the opposite side of the map.

**Line 2:** the integer **heroesPerPlayer** which is always **3**.

### Input for One Game Turn

**First 2 lines:** two integers **baseHealth** and **mana** for the remaining health and mana for both players. Your data is always given first.

**Next line:** **entityCount** for the amount of game entities currently visible to you.

**Next **entityCount** lines:** 11 integers to describe each entity:

- **id** : entity's unique id.
- **type** :
  - **0** : a monster
  - **1** : one of your heroes
  - **2** : one of your opponent's heroes
- **x** & **y** : the entity's position.
- **shieldLife** : the number of rounds left until entity's shield is no longer active. **0** when no shield is active.
- **isControlled** : **1** if this entity is under a **CONTROL** spell, **0** otherwise.

The next 5 integers only apply to monsters (will be **-1** for heroes).

- **health** : monster's remaining health points.
- **vx** & **vy** : monster's current speed vector, they will add this to their position for their next movement.
- **nearBase** : **1** : if monster is **targeting** a base, **0** otherwise.
- **threatFor** :
  - With the monster's current trajectory — if **nearBase** is **0** :
    - **0** : it will never reach a base.
    - **1** : it will eventually reach your base.
    - **2** : it will eventually reach your opponent's base.
  - If **nearBase** is **1** : **1** if this monster is **targeting** your base, **2** otherwise.

## Output for One Game Turn

**3 lines**, one for each hero, containing one of the following actions:

- **WAIT** : the hero does nothing.
- **MOVE** followed by two integers (x,y): the hero moves **800** towards the given point.
- **SPELL** followed by a spell command: the hero attempts to cast the given spell.

You may append text to a command to have it displayed in the viewer above your hero.

Examples:

- **MOVE 8000 4500**
- **SPELL WIND 80 40 casting a wind spell!**
- **SPELL SHIELD 1**
- **WAIT nothing to do...**

You must provide a valid command to all heroes each turn, even if they are being controlled by your opponent.

## Constraints

Response time per turn  $\leq$  **50** ms

Response time for the first turn  $\leq$  **1000** ms