

Hwa Chong Institution

Written Report

The Tents And Trees Puzzle

Group: 8-23

Ng Wah Kong (20)

Hng Khai Siang (9)

Lee En Hao (11)

Lee Wenxi (12)

Mentored by
Mr Zong Li Xing

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1. Introduction

1.1 Description of the puzzle

1.1.1 History of the Game

The idea that we have been working on is a puzzle called tents and trees.

This game is a well-known game in the past and comes from Frozas Games. It's an old concept from at least 1989. It first appeared in a Dutch puzzle magazine called Breinbrekers. Leon Balmaekers was the inventor.



1.1.2 Rules of the puzzle

There are only 2 different rules that the player has to abide by. One of which is making sure that the numbers at the side of the grid (which indicate the number of tents there should be) corresponds with the number of tents there are in the grid.

Below is an example of how it should look like if rule number one is being followed:

1	(tent)	(tree)	(blank)
2	(tent)	(tree)	(tent)
0	(tree)	(tree)	(tent)
	1	1	2

The second rule that a player has to abide by is that no 2 tents share 1 tree. It is shown below how it would look like if not abide by and how it would look like if followed:

	Incorrect				Correct	
1	(tent)	(tree)		1	(tent)	(tree)
1	(no tree)	(tent)		1	(tree)	(tent)
	1	1			1	1

1.2 Rationale

We found out that many people use incorrect methods to solve this puzzle (e.g trial and error). This puzzle is supposed to be a logic puzzle that requires logical reasoning instead of brute force or guessing. However, and most unfortunately, sometimes, a player has to wreck his or her brains and waste their precious time just to find out that the puzzle has no solution to it. This has made us decide on different ways to tell if the puzzle is impossible to solve or not before solving it. In addition, using these

1.3 Objectives

Firstly, we want to try to create and develop the best possible strategy which minimises the probability of the need to use trial and error. Secondly, we want to find out what are the criteria which makes a puzzle impossible. Thirdly, we also want to create challenging puzzles to satisfy the needs of experts in the game. Lastly, we are eager to create some puzzles with other unique shapes so that people would have more options when playing the game.

1.4 Scope of study

We have currently only researched the different types of possible puzzles, the methods to solve it and what makes it impossible.

2. Literature review

<http://syndicate.yoogi.com/treetent/treetent-solved.htm>

This website briefly explains about the game tents and trees. In this website, there are step by step tutorials about how to play the game. The website also provides rules and the strategy of playing the game.

3. Research Questions

1. What is the strategy to win this game without too many attempts?
2. What are the starting setups that make the puzzle impossible to solve?
3. What other shapes can we make for this puzzle?

3.1. Research Question 1

What is the most efficient strategy to win this puzzle.

The strategy is a 3-stepped strategy.

1. Cross out zeros
 - 1.1. We can cross these types of boxes :
 1. Boxes in rows or columns with zeros.
 2. Boxes which have no tree next to it.
 3. Boxes touching a box with a confirmed tent in it.
2. Try to fit in as many boxes in the rows with the larger numbers
3. Repeat steps 1 and 2

3.2. Research Question 2

What are the starting setups that make the puzzle impossible to solve?

Whenever there are 3 or more consecutive rows or columns with zeros there should not be a single tree in any of these rows or columns other than the side ones. Otherwise, the puzzle would be impossible to solve. This is because if there is a tree, there would be no spaces to allocate the tents, thus making the puzzle impossible to solve. If the sum of the numbers of the left and bottom of the puzzle are not equal, the puzzle is also impossible to solve. Lastly, If the number of trees are not equivalent to the sum of the numbers on the left or the bottom side, the puzzle is impossible to complete too.

3.3. Research Question 3

What other shapes can we make for this puzzle?

We found out that shapes like pentagons and heptagons cannot make puzzles as they are not tessellatable, thus overlapping one another. On the other hand, shapes like square, triangle and hexagon can be made into puzzles since they can be tessellated and will not overlap each other in the process.

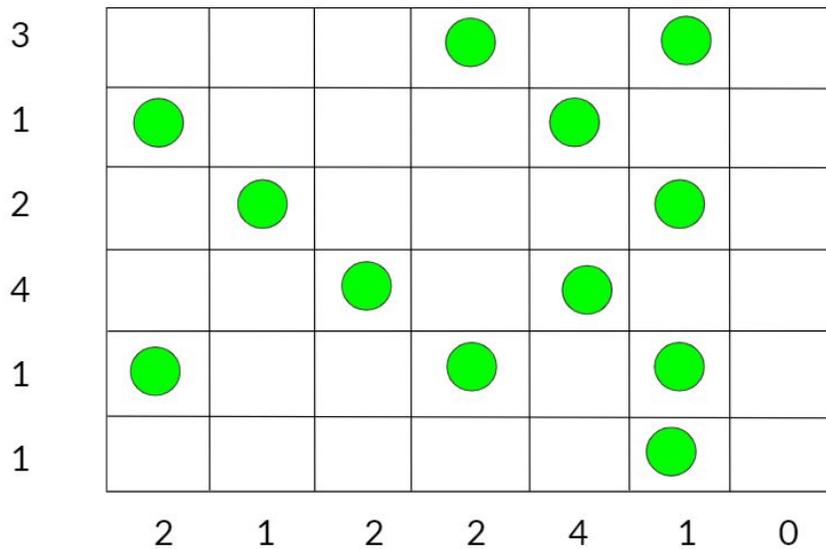
4. The study and methodology

4.1 Strategies/methods to develop our project

We have decided to use mind maps and logical reasoning to solve the puzzle. Logical reasoning allows us to solve the puzzle strategically and makes us solve it faster. Mind maps can help us to see what possibilities are there in solving, which allows us to make our thinking more organised. It also makes it easier and more efficient for us to solve the problems by eliminating the impossible cases which exist. Therefore, with logical reasoning and mind maps, we can solve this puzzle very efficiently.

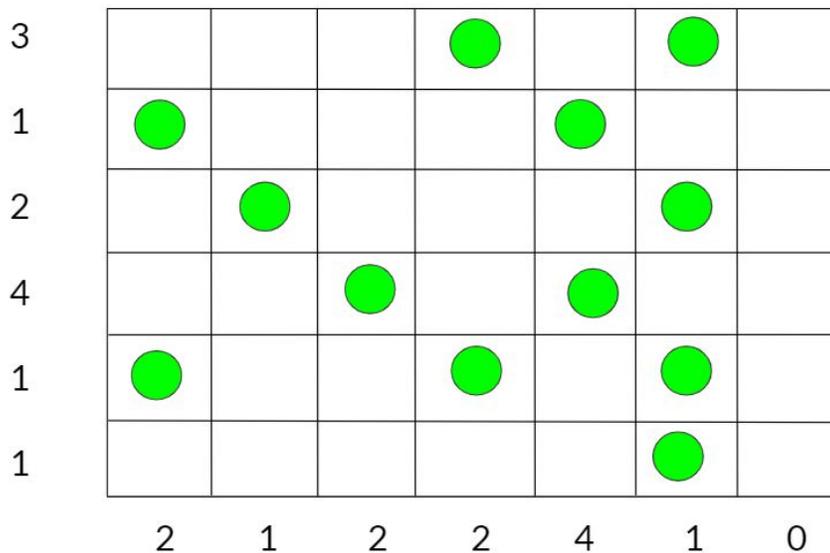
4.2 Example 1 (rectangle puzzle)

Puzzle 1:



Where should the tents be?
(rectangle puzzle, medium)

Puzzle 1:



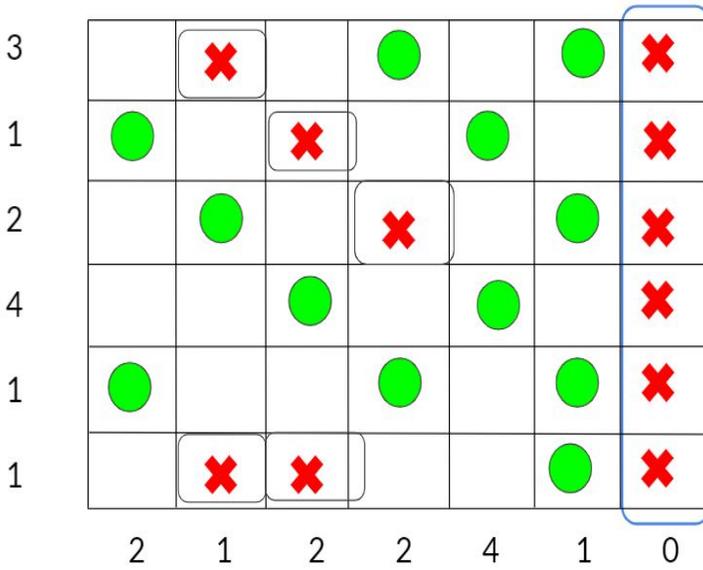
Where should the tents be?
(rectangle puzzle, medium)

This is an example of an ordinary rectangle puzzle

We can use the methods mentioned earlier to solve this puzzle

4.2.1 Solution to example 1

Solution for
Puzzle 1:

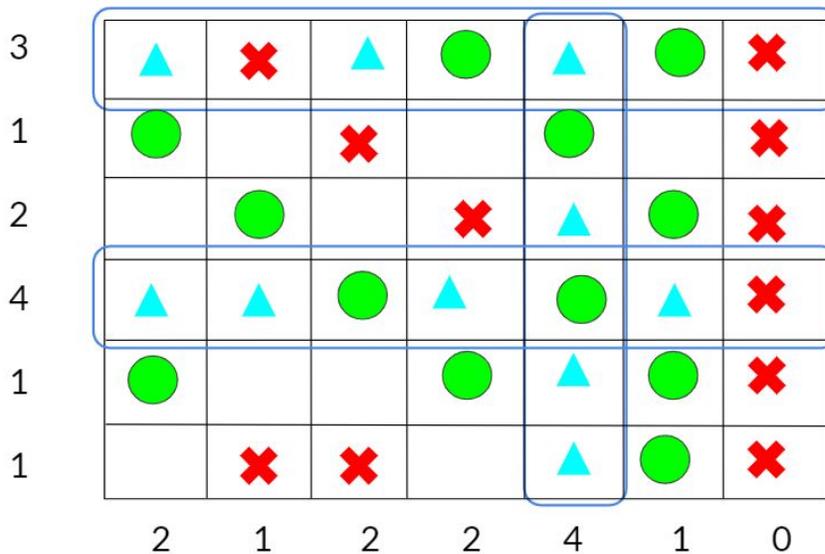


Step 1: Cross out the lines with zeros and boxes that are not next to trees

*

The first step is to cross out impossible boxes[^]

Solution for
Puzzle 1:



Step 2: For rows 1 and 4 and column 5, fill up all of the remaining boxes as they are the same number as the numbers on the side.

Then, we fit in as many tents as possible in the rows with larger numbers[^]

Solution for
Puzzle 1:

3	▲	✘	▲	●	▲	●	✘
1	●	✘	✘		●	✘	✘
2	✘	●		✘	▲	●	✘
4	▲	▲	●	▲	●	▲	✘
1	●	✘	✘	●	▲	●	✘
1	✘	✘	✘	✘	▲	●	✘
	2	1	2	2	4	1	0

Step 3: Cross out the spaces in the rows that have enough tents

Then, we repeat by crossing out impossible tents again^

Solution for
Puzzle 1:

3	▲	✘	▲	●	▲	●	✘
1	●	✘	✘	▲	●	✘	✘
2	✘	●	▲	✘	▲	●	✘
4	▲	▲	●	▲	●	▲	✘
1	●	✘	✘	●	▲	●	✘
1	✘	✘	✘	✘	▲	●	✘
	2	1	2	2	4	1	0

Step 4: Repeat step 2 and 3 until you finish the puzzle

The remaining steps are just repeating the first 2 main steps^

Solution for
Puzzle 1:

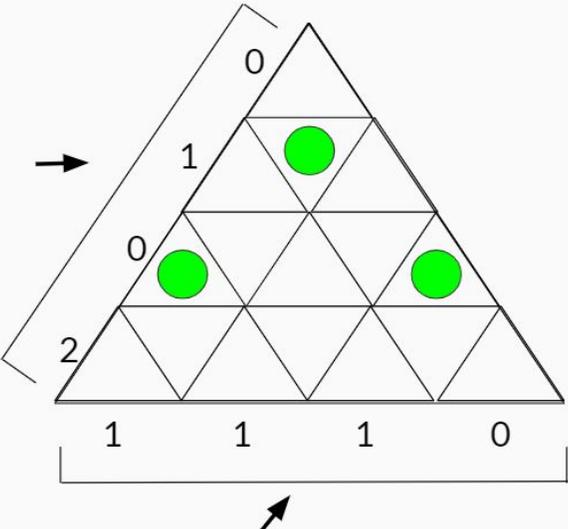
3	▲	×	▲	●	▲	●	×
1	●	×	×	▲	●	×	×
2	×	●	▲	×	▲	●	×
4	▲	▲	●	▲	●	▲	×
1	●	×	×	●	▲	●	×
1	×	×	×	×	▲	●	×
	2	1	2	2	4	1	0

Step 5: You Are Done! (Do remember to check)

Repeat until the entire grid is completed, but you might want to check for any careless mistakes^

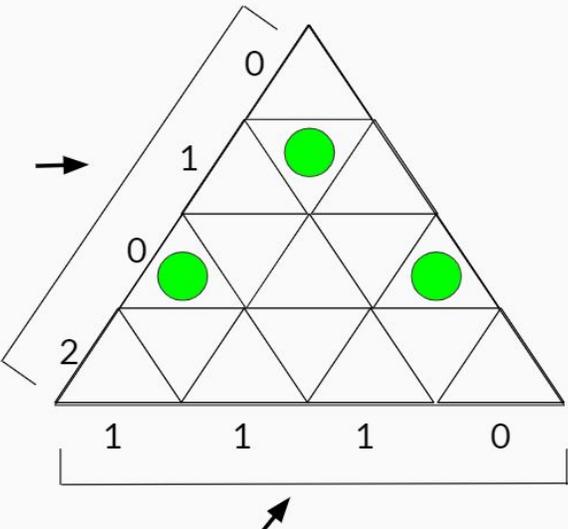
4.3 Example 2 (triangle puzzle)

Puzzle 2:



Where should the tents, ▲, go?
(Example of a triangular puzzle)

Puzzle 2:



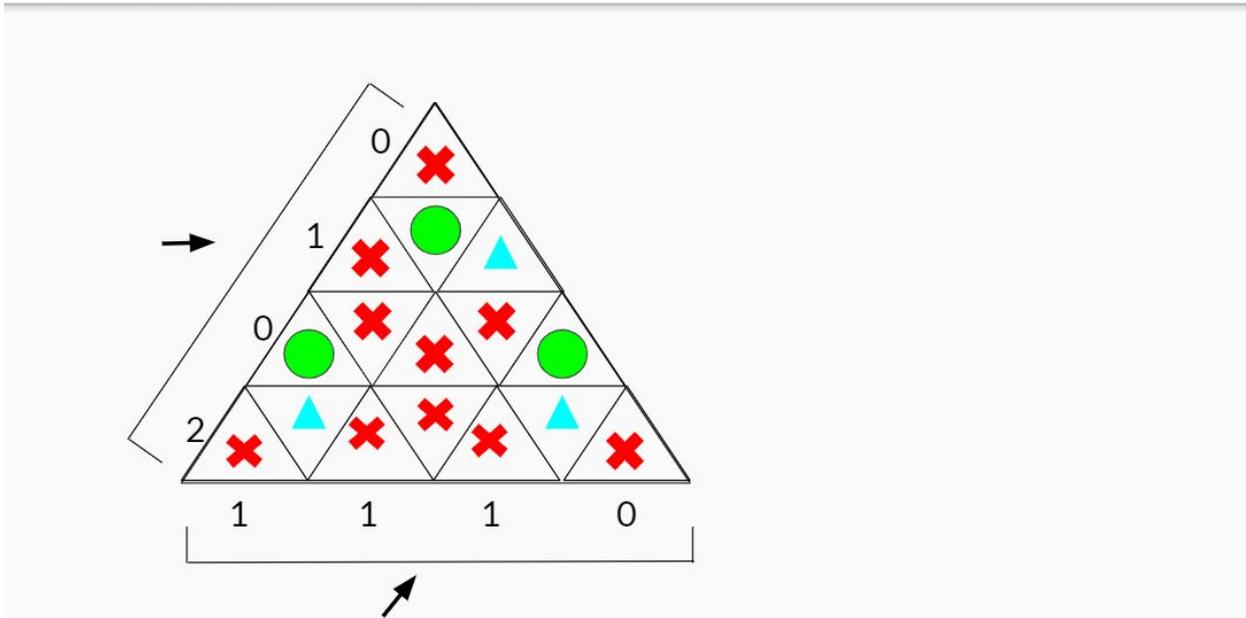
Where should the tents, ▲, go?
(Example of a triangular puzzle)

Above is an example of an easy triangle puzzle

The methods used to complete the rectangle puzzle can also be used to complete the triangle puzzle

4.3.1 Solution to example 2

By using the strategies mentioned before, we can solve the puzzle as shown below.



Just like before, cross out wrong boxes, fill in rows which require more tents and repeat.

Those steps would have already helped you complete the puzzle. But don't forget to check!

5. Conclusion

- Outcomes, Analysis & Discussions

We found a simple strategy to let beginners use in order to complete the puzzle more efficiently and thus, they can move on to tougher levels. We also found a few criteria which makes a puzzle impossible, giving a few tips that puzzle makers should avoid. Lastly, we also recreated this puzzle with different shapes to give players more options when playing the puzzle.

- Implications and Recommendations

We recommend that next time, people should make more shapes which suit the puzzle as we only used the hexagon. In addition, they could also find more criteria which makes the puzzle unsolvable.

- Possibility of project extension

If we would be given an extension, we would probably have created some puzzles ourselves to try and challenge the professionals in this game.