**Geometry Project**

**Fences**

**Description**

 Fences is a puzzle that requires logic to solve.

 For this project you will learn to solve fences puzzles, and then create your own fences puzzle.

 Finally, based on the logic rules and process used to complete a puzzle, the same pattern will be applied to completing geometry proofs

 Each student will complete this project individually.

**Points**

This project is worth 10 points.

**Due Date**

Monday May 15, 2017

The best created fences puzzles will be compiled for other students to see and solve.

**Fences**

**Rules**

* Connect dots with horizontal or vertical sections in one continuous loop, or fence.
* Each number inside a square represents the number of fence segments that border that particular square

**Example**



 This small example puzzle can be solved using logic patterns based on the simple rules of the game. For instance, the one in the upper left hand region cannot have a segment on its left, because then the fence would need to continue to the right, and that would violate the number one. Likewise it cannot have a fence segment on the top for the same reason. It also cannot have a fence segment on its right, because that segment would need to continue on the top to its right, and ultimately it would violate the number zero in the third tile to the right. Based on this logical reasoning, the only location for a fence for the upper right square is on its bottom. Continuing with the logical flow, the left side of the fence would need to continue straight down. So, now two fence segments have been completed.

 A complete answer to this puzzle can be found on the next page.

**Logic Hints**

 Look for patterns that help to solve the puzzles. Many of the patterns develop for the lowest numbers, the highest numbers, or where the displayed numbers are clustered together.

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**Continue solving puzzles**

To best understand these puzzles, two more puzzles are included for you to practice with. While completing these puzzles, keep track of the logic tricks or patterns that you pick up on, because you will use those to create your own puzzle.

**Creating your own puzzle**

Unlike other word or sudoku puzzles, fences puzzles are not as hard to make. Here are the steps to create your own puzzle, you may see the correlation to geometry here, as the puzzles start with the end, and work backwards, much like some geometry proofs.

1. Decide on the size of the puzzle you will create
2. Make a dotted grid to match the size of your puzzle
3. Create your fence loop
4. Fill the numbers in each of the squares
5. Determine which numbers can be excluded from your puzzle. Be careful to not eliminate too many
6. Draw the final puzzle with only the dots and the required numbers

Below is an example of a 7X7 puzzle with the diagrams numbered to match the above steps.

**Instructions**

 Solve the two fences puzzles included in this packet

 Create your own fences puzzle, of size at least 8 x 8

**Fences Puzzles that must be solved**

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**Bonus puzzle, for those who really enjoy a good puzzle ( this one is difficult)**

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