

Overview

- A problem is simply a “problem” because there is no immediate, known solution. Problem solving activities in mathematics extend well beyond traditional word problems. You can provide your student with activities that promote application of math skills while “busting boredom” at the same time! Puzzles and riddles, patterns, and logic problems can all be valuable exercises for students at all levels of mathematics. By engaging in short, fun activities like these, you can help your student become a more skillful, resilient, and successful problem solver.

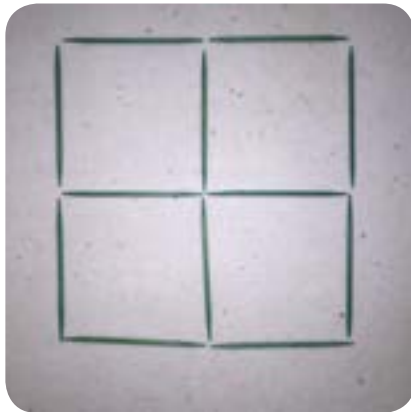
When practicing problem solving skills, be certain to give your student time to explore a problem on her own to see how she might get started. Then discuss her approach together. It is important to support her through the problem solving process by valuing her ideas and helping her to see that mistakes can be useful. You can do this by asking open-ended questions to help her gain a starting point, focus on a particular strategy, or help see a pattern or relationship. Questions such as, “What have you done before like this?”, “What can be made from ...?” or “What might happen if you change...?” may serve as prompts when she needs inspiration. Try some of the activities below to help strengthen your problem solving skills together.

Toothpick Puzzles

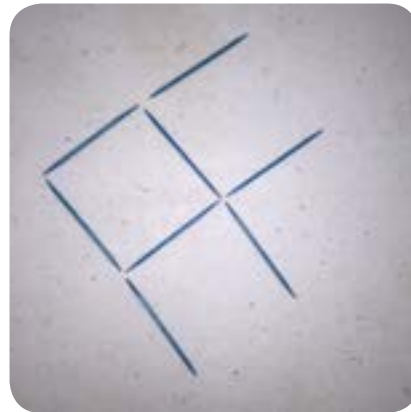
- Toothpick puzzles (also referred to as matchstick puzzles) provide students a visualization challenge by applying their knowledge of basic geometric shapes and orientations. The only supplies you need are a box of toothpicks, a workspace, and a puzzle to solve. The goal is for students to transform given geometric figures into others by adding, moving, or removing toothpicks. These puzzles range in complexity and can be found online or in math puzzle books. As an extension, challenge your student to create his own puzzle for someone else to solve.

- **Sample toothpick puzzles of varying difficulty:**

- Remove two toothpicks to leave only two squares



- Make the fish swim in the opposite direction by moving three toothpicks



- Move four toothpicks to leave only three equilateral triangles



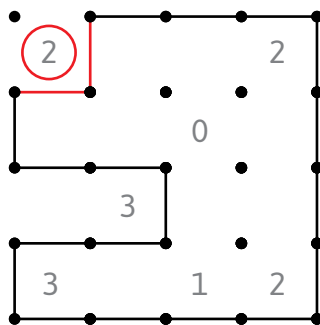
Fencing Numbers

- The goal of this activity is to create a border or “fence” around each numeral by connecting dots horizontally and vertically so that each digit is bordered by the correct number of line segments.

Print out the attached sheet of dot paper, pencils, and scissors (to cut the size grid you want to use). This game can be modified for abilities by adjusting the size of the grid and amount of numerals written. For example, a beginning student might begin with a grid that is 5 x 5 dots with a total of four numerals, while a more advanced student might increase the grid to 7 x 7 dots with six to eight numerals.

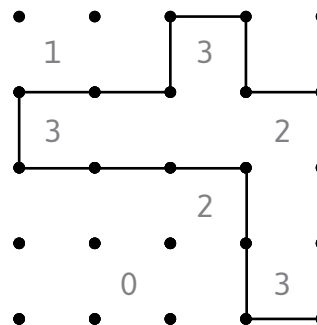
Begin by writing the digits 0, 1, 2, and 3 spread repeatedly in between “squares” on the dot paper. Each digit represents the number of line segments that will surround that square. For instance, a square that contains a 3 would have line segments on three sides, and a square that contains a 2 would have line segments on two sides, and so on. See the example boards and solutions for a 5 x 5 grid below.

1.

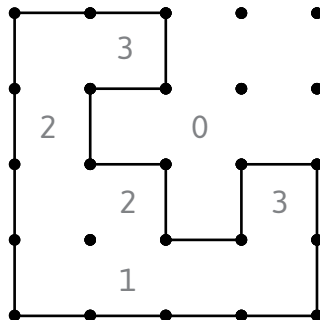


EXAMPLE: The number 2 is bordered by two line segments.

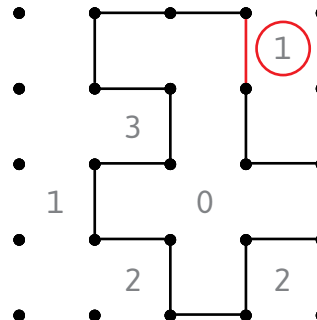
2.



3.



4.

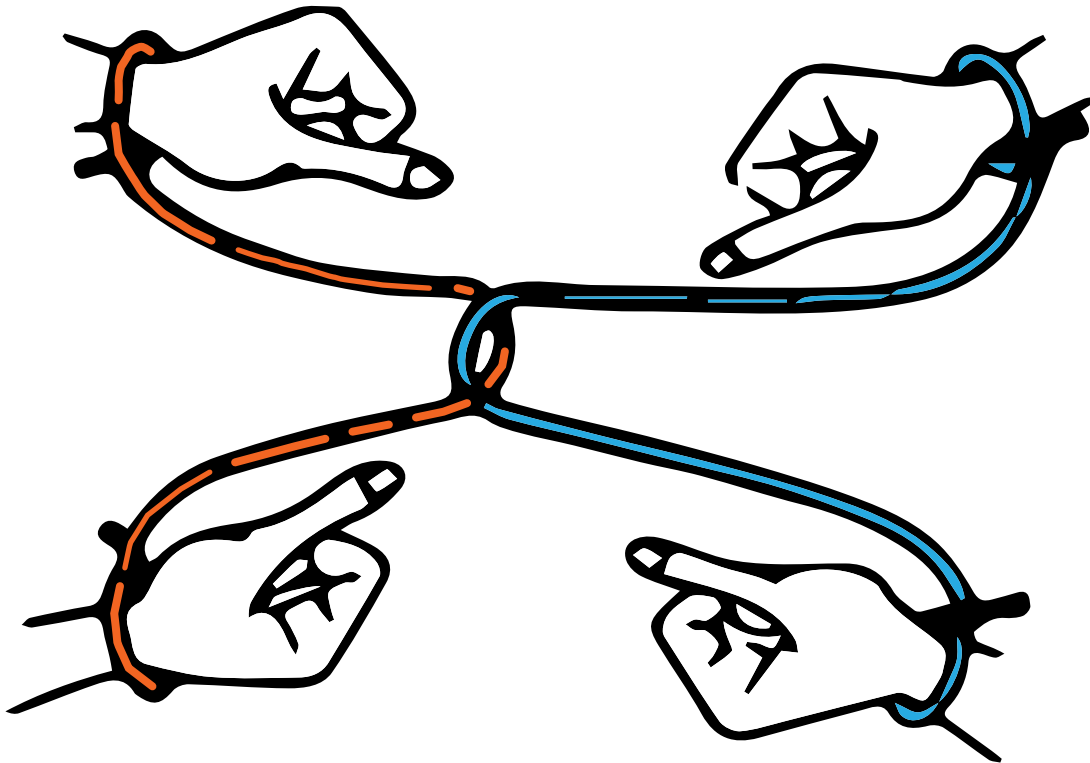


EXAMPLE: The number 1 is bordered by one line segment.

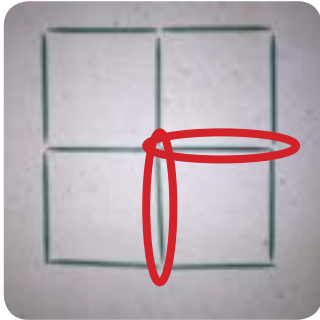
- Beware; there may be multiple solutions for the same problem! Thus, encourage your student to replicate the same problem grid multiple times and look for different solutions. A more advanced student can be challenged to create his own problem. Can he make a grid with only one solution? Can he make a problem with four or more possible solutions?

It's Knot a Problem!

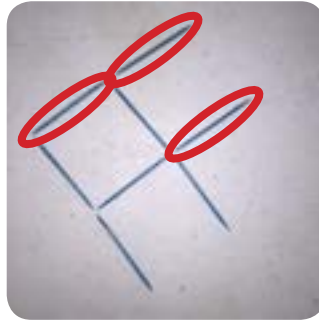
- Exercise lateral thinking skills-- solving a problem through an indirect and creative approach that is not immediately obvious. You need two people, 2 pieces of string (or yarn) about one meter long each (or long enough so the person who will wear it can easily step over it), and some empty space to move around. If possible, use two different colored pieces of string. Each person needs a piece of string with a loop tied in both ends so it can be worn like "handcuffs". Before tying off the loop on the second wrist, the participants loop the string around each other so they are hooked together. The figure below illustrates how the strings should appear when completed.



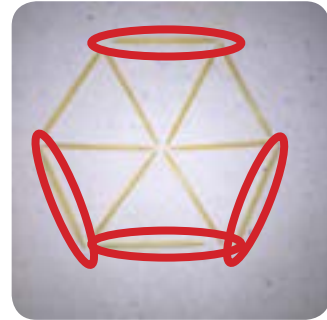
- The goal is to unhook the strings while following these guidelines: 1) The string must remain tied and may not be removed from either participant's wrists. 2) The string cannot be broken, cut, or damaged in any way. Caution! This activity not only tests your problem solving skills, but it also promotes positive communication, teamwork, and persistence.
- When your student learns how to effectively solve problems, he increases his understanding of the world around him and equips himself with the tools he needs to live a productive and fulfilling life. Problem-solving skills are not always taught directly but often learned indirectly through experience and practice. Incorporating fun activities like these from time to time foster creative and flexible thinking and can help your student transfer problem solving skills to other areas of life. By providing guidance and helping your student to see a problem from different perspectives, you will help foster a positive disposition towards problem solving.

Toothpick Puzzles


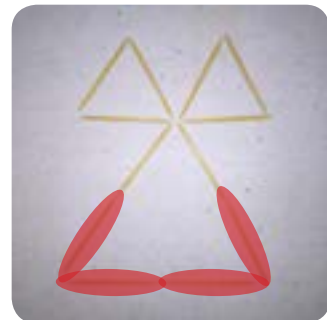
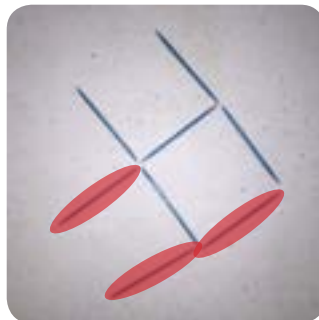
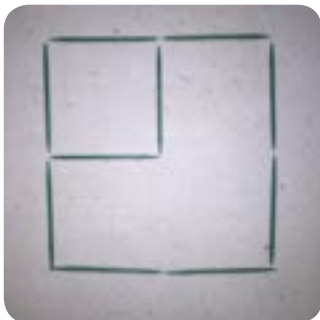
➤ Remove the two circled toothpicks.



➤ Remove the 3 circled toothpicks and rearrange them as shown by the toothpicks highlighted in red.



➤ Remove the 4 circled toothpicks and rearrange them as shown by the toothpicks highlighted in red.


It's Knot a Problem!

1. Face one another.
2. Pinch your partner's string in the center.
3. Pass this pinched portion of the string under either of your wrist loops so that the piece of your partner's string is closest to your fingers.
4. Pull this piece through and open it to the size that will accommodate your hand.
5. Pass the piece of your partner's string over your hand.
6. Pull the string down and through the wrist loop.
7. You did it!

