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| **Synopsis of task:**Students play the game, “Take 2 or 1” with a partner. While they are playing against one another, their real task is to figure out if there is a strategy to winning the game and what that strategy is. **Anticipated student time spent on task:** 45-50 minutes**Student task structure(s):** Partner work  |
| [**Math Content Standards and Practices**](http://www.doe.mass.edu/frameworks/math/2017-06.pdf)**:****4.OA.C.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.**SMP1** Make sense of problems and persevere in solving them.**SMP3** Construct viable arguments and critique the reasoning of others.**SMP7** Look for and make use of structure |
| **Prior Knowledge:** **1.OA.B** - Understand apply properties of operations and the relationship between addition and subtraction.**2.OA.B** - Add and subtract within 20.**2.MD.B.6** - Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram. |
| **Connections to the real-world:**This game will require children’s knowledge of game theory, strategy, and patterns. |
| **Mastery Goals:****Learning Objective:**Students will be able to develop a mathematical model which shows why their strategy will result in a win.**Language Objective:**Students will be able to describe their strategy as it relates to multiples and pattern of multiples. |
| **Teacher instructions****Instructional Tips/Strategies/Suggestions:**1. Hand out “Rules for Take Away 2 or 1”, extra scrap paper, and colored pencils.
* Explain the rules out loud.
* Demonstrate the game with a student at the board.
* Emphasize that while students are playing against their partner, they are ultimately working together to figure out if there is a strategy to always winning the game and if there is what that strategy is as a team.
* As you walk around, ask students if there seems to be a magic number or magic numbers which allow you to win.
1. After students have played several rounds, come together and brainstorm some strategies. Let kids have 10-15 minutes to test strategies (try to “break” it; in other words, one kid plays using the strategy, other student tries to beat them).

Strategies they might see: As students work together, they will figure out the strategy is land on multiples of 3. From there, students can change the rules (some suggestions would be → What if it was take away 3, 2, or 1? What if three people were playing?).1. Come back together, talk about magic numbers. For homework- Take Away 2 or 1 Follow Up. What ways can you show that 3, 6, 9… are magic numbers for this game?
2. Hand out “Take Away 2 or 1 Follow Up” for homework.
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| **Instructional Materials/Resources/Tools:** * Hand out “Take Away 2 or 1” sheet
* Extra scrap paper
* Colored pencils
* Take Away 2 or 1 Follow Up. What ways can you show that 3, 6, 9… are magic numbers for this game?
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| **Accessibility and Supports:** **Potential sentence starters:*** One magic number I could get so that I know I win is \_\_\_ because \_\_\_\_”
* Since \_\_\_\_ is a magic number, the next magic number letting me get to this number is \_\_\_ because \_\_\_”

**Key academic vocabulary:** Multiples, odd, even, sequence, subtract, pattern, set of numbers |

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| Name: Period:  **Assignment: Take Away 2 or 1**Directions: * Play three rounds with your neighbor
* Each player uses different color pencil
* Player 1 picks a number between 20-40
* Player 2 takes away 2 or 1, write the result under the original number.
* Player 1 takes away 2 or 1 from the new number and writes the result underneath.]
* Play continues until one player gets to ZERO. This player is the winner.
* Play at least three games.

Question: You and your partner are working together to figure out, is there a strategy? If so, what is it?Game 1 Game 2 Game 3**Back →** 1. Are there any “magic” numbers that you know you’ve won if you land on them?
2. Describe the strategy in words.
3. SHOW why this works with a picture or diagram.

**Sample Student Work:****Student work. Three games of Take 2 or 1 were played.****Student work. A child explains the strategy.****Student work. Three games of Take 2 or 1 were played.** **Student work. The student explains the strategy.** |