

# 素数遊

## **So-Soo-Yoo** **Rulebook**

**Version 1.11, 30 December 2012**

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*For Hugo, my inspiration*

## How to Play

The goal is to move back and forth around the board and collect six rings. The first player to collect all the rings of one color or a "rainbow" of one of each color wins.

Having young people say the numbers on each space they land on (or else lose a turn) will help them learn the multiplication tables and other number facts. See *Notes to Parents and Teachers* on page 11.

### Getting Started

1. Each player chooses a player piece.
2. Decide who goes first by rolling the six-sided die.
3. Roll the 20-sided and 10-sided dice to place each player's piece on the board.
4. Roll the 20-sided and 10-sided dice to place one ring of each color on the board.
5. If a ring lands on a player piece, place the ring on the player piece and roll again to place another ring of that color.
6. Keep all the unplaced rings together off of the board in the *unplaced ring pile* (the "bone yard").

### Moving & Scoring

1. Roll the six-sided die for the number of moves in each turn. It helps to leave the die with the number up so you don't forget how many moves you have.

2. In each move, you may make a simple move, a jump, or a warp. See *How to Move Around the Board* on page 8.
3. It helps to count the number of moves made on the fingers of one hand.
4. When you land on a ring, put it onto your player piece. Select a ring of the same color from the unplaced ring pile and roll the 20-sided and 10-sided dice to place it on the board. If the ring lands on a player piece, put it onto the player piece and roll again to place another ring.
5. If you land on another player's piece, you must bump it to another space, remove one ring from it and place the ring in the unplaced ring pile. See *Bumping* under *Rules of Play* on page 4.
6. Your turn ends when you have made the number of moves on the 6-sided die.
7. At the end of your turn, you may, if you choose, either swap one ring with one other player or discard one ring from your player piece to the unplaced ring pile. See *Swapping Rings* and *Discarding Rings* under *Rules of Play* on pages 5-6.

## **Winning the Game**

The first player to collect six rings of one color or a rainbow of all six colors wins the game.

## Rules of Play

**Placing Pieces and Rings on the Board** Use the 20-sided and the 10-sided dice together to get a number between zero and 199 (read the 20-sided die first and the 10-sided die last to get the number). For example, if the 20-sided die reads two and the 10-sided die reads one, it's the number twenty-one. If the 20-sided reads seventeen and the 10-sided reads three, it's the number 173.

Roll these two dice at the start of the game to place player pieces and rings on the board and every time a ring is collected and a new one needs to be placed.

**Rolling Double Zero** There is no zero space on the board. If at any time you roll a double zero on the 20-sided and 10-sided dice, you lose a ring from your player piece. If you have no rings on your player piece, do nothing, otherwise the player whose turn is next chooses the ring to be removed and places it in the unplaced ring pile.

**Bumping** When you land on another player's piece you must "bump" the piece (move it) to another space. You may bump in either direction. When you bump another player piece, immediately remove a ring from the bumped piece and place it in the unplaced ring pile. You get to choose which ring to take off. If there are no rings on the piece, do nothing.

You can move the other player's piece to any space that would be a legal move from the space it is on. In other words, you may bump it by one space (simple move), or

through a jump or a warp. You may also roll the 10- and 20-sided dice to choose the space, which is a *random bump*. If you roll double zero or the number of the current space, you lose a ring, chosen by the bumped player, and you roll again. You may bump more than once in a single turn. You may "follow" the piece you bumped to the space you bumped it to and bump it again. If you bump one player's piece into a third player's piece, bump the third piece as well (and remove a ring from it). You also get to decide to which space the third player's piece gets bumped. Remove one ring from each player piece you bump. Do not remove more than one ring from any one piece in a single turn, even if you bump it more than once.

**Say-The-Numbers** So-Soo-Yoo can teach the multiplication tables. To maximize learning, enforce the Say-The-Numbers Rule which requires all players to say all of the bubble numbers on each space they land on or lose the rest of their turn. See *Notes to Parents and Teachers* on page 11.

**Rainbows** You can win by collecting one ring of each color. This is called a "rainbow". Other players can block you from completing a rainbow by collecting rings of your color and swapping theirs for yours. See *Swapping Rings*.

**“Popsicle”** (All one color) You can win by getting six rings all of one color. If you go for your own color, other players cannot steal your rings by swapping. See *Swapping Rings*.

**Swapping Rings** At the end of your turn, if another player

has a ring of the same color as your player piece and you have a ring of the same color as their player piece, you have the option of swapping these rings (only one pair per turn). You may only do a swap at the end of your turn, and you may not refuse a swap from another player. You win the game immediately if a swap gets you the last ring you need to win. Swapping can also prevent other players from winning by removing rings they need.

**Discarding Rings** To win the game you must either have six rings of one color or a rainbow of six colors. You cannot have extra rings. At the end of your turn, you may select a ring to discard from your player piece and place it into the unplaced ring pile.

You may only collect up to ten rings. If you collect more than ten rings, you must immediately discard one.

Otherwise, you may only discard one ring per turn, at the end of your turn.

If a ring lands on your player piece when it is not your turn and you already have ten rings, immediately place the ring in the unplaced ring pile. In other words, you cannot collect it.

**Winning** You may only win the game if it is your turn. In other words, if another player makes a swap with you or you collect a ring because it lands on your player piece, you do not win until your turn comes up.

After doing a swap or a discard at the end of your turn, if you have six rings of one color or a rainbow of six colors,

you win.

If all you need to do to win is to discard or swap a ring, do not roll the six-sided die, just make the discard or swap and you win.

If you need to collect one more ring to win, even if it is to make a swap or a discard, you must land on the last space (with the ring) by *exact count*. In other words, you must use up all of the moves on the six-sided die to get to the last space and collect the ring. If you cannot use all of your moves to get the last ring, you must replace the ring and then wait until your next turn to win.

**Running Out of Rings** If all rings of a given color are collected, play continues without that color until a player is bumped or discards that color, and then it is immediately placed on the board.

## Parts of the Game

### The Board

The board has 199 spaces starting with the number one in the middle circling out to the last space numbered 199.

The round spaces are *prime numbers*, and the square spaces are *composite numbers*. The composite number spaces all have two or more *prime factors* in "bubbles". These are the numbers that multiply together to make the composite number.

Don't panic! You don't need to know what a prime number

or a composite number is in order to play So-Soo-Yoo, but you will learn all about these as you play.

### **The Dice**

There are three dice: a 20-sided die, a 10-sided die, and a six-sided die.

### **The Player Pieces**

There are six player pieces each with a different color: Red, Orange, Yellow, Green, Blue, and Purple.

### **The Rings**

For every player piece, there are ten (10) rings of the same color (Red, Orange, Yellow, Green, Blue, or Purple). The rings fit onto the player pieces.

## **How to Move around the Board**

There are three basic ways to move around the board in So-Soo-Yoo. These are simple moves, or moving from one space to a space right next to it, and jumping and warping, which use the number bubbles to move to spaces further away. On each move of your turn, you can decide whether to do a simple move, a jump, or a warp.

### **Simple Moves**

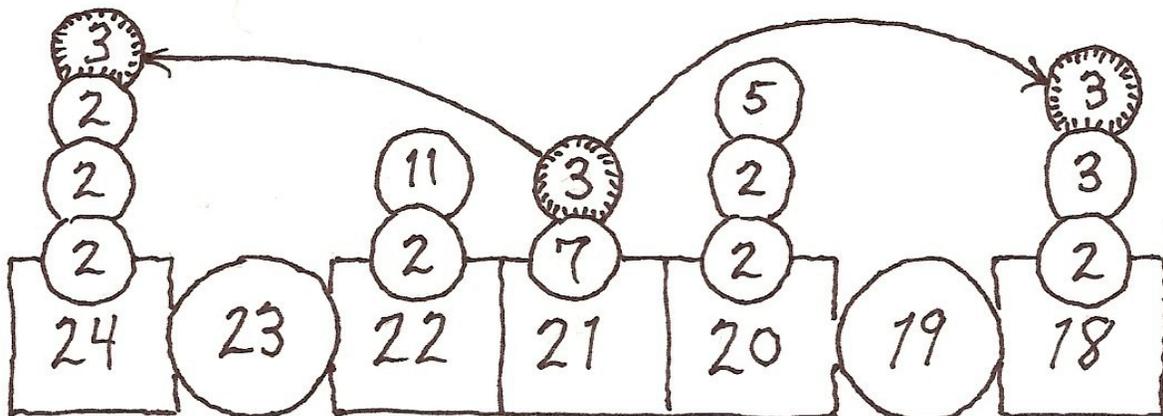
You may always move forward or backward one space (unless you are on space number one or space number 199).

### **Jumping**

Jumping lets you move to the next closest space that has *one*

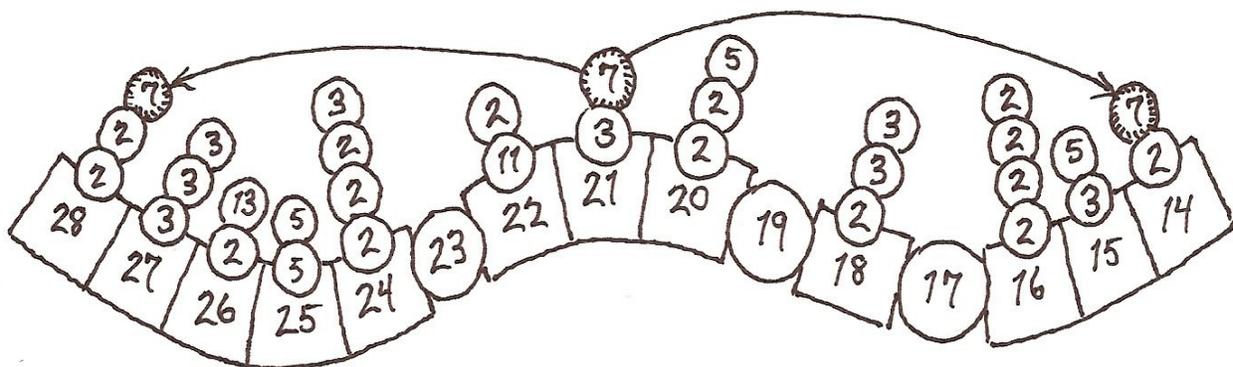
of the same bubbles as the space you are on.

Look at the number twenty-one (21) space on the board. It has an orange three (3) bubble and a green seven (7) bubble. You can use the three bubble to jump backwards to the eighteen (18) space or forwards to the twenty-four (24) space...



*Jumping by three from 21*

...or the seven bubble to jump backwards to the fourteen (14) space or forwards to the twenty-eight (28) space.



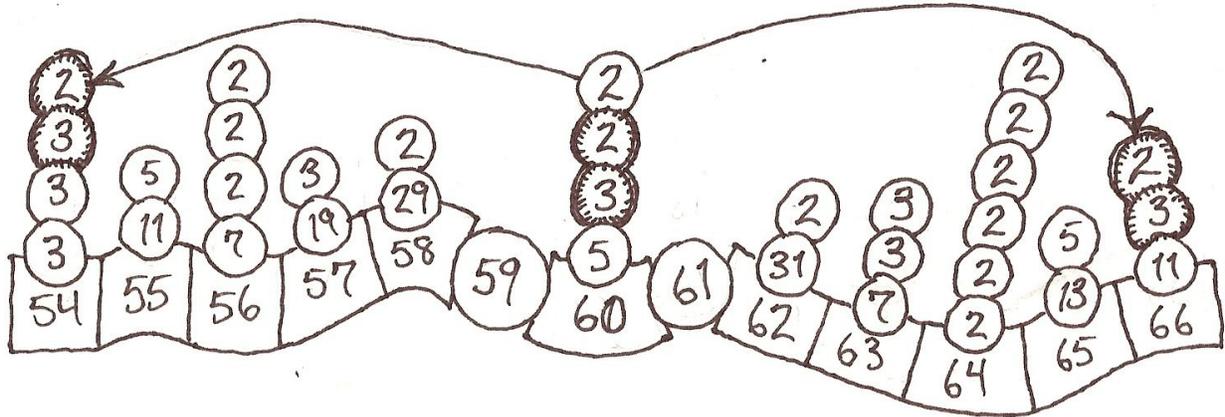
*Jumping by seven from 21*

## Warping

Warping is like jumping except that you use *more than one bubble* to make your move. You can move to the next

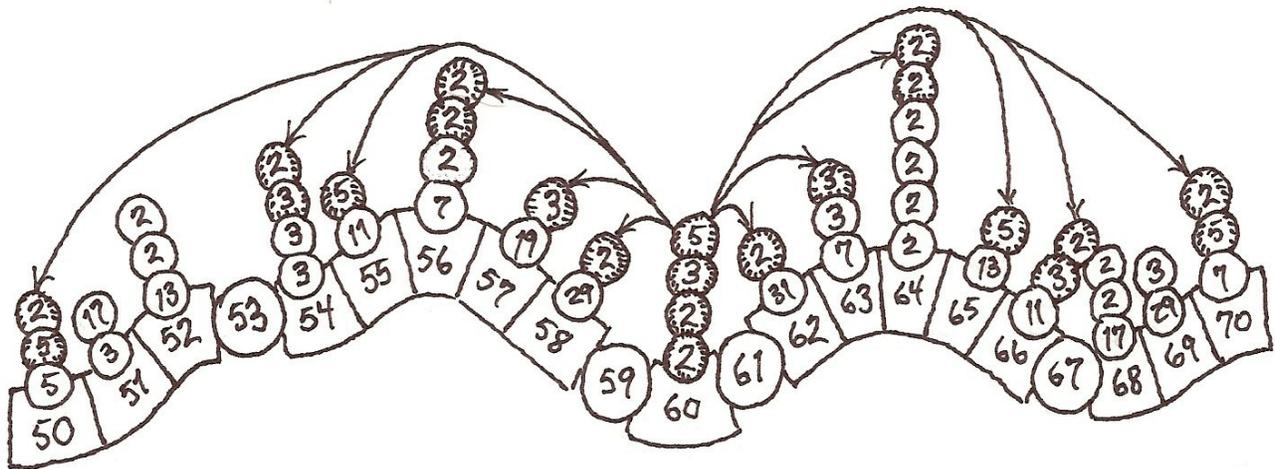
closest space that has two or more bubbles in common with the space your player piece is on.

For example, if you were on space sixty (60), and chose to use one of the red two bubbles and the orange three bubbles, you could warp directly to space fifty-four (54) or space sixty-six (66), which are the closest two spaces which also have a two and a three.



*Warping from 60 by two and three (six)*

Here's a look at more of the spaces you could warp to from sixty, using various combinations of bubbles.



*Warping from 60*

Often a player will first look at where on the board they wish to go, and then consider which bubbles they may use to warp

to as close to the desired space as possible.

## Notes to Teachers & Parents

As a teaching tool, the object for young children playing So-Soo-Yoo is to move around the board as much as possible, become familiar with its layout, and to say the factor numbers (bubbles) on the number line. This will teach everything in the multiplication tables and also about prime numbers and other principles of number theory, all by unconscious, right-brain association.

Enforce the **Say-the-numbers Rule**. Every time you move to a new space, say the number and all of the numbers in the bubbles, or *lose the rest of your turn*. For example, if you land on the sixty (60) space, you would say, "two times two times three times five is sixty."

You may name the bubbles in any order, and you may combine the bubbles into bigger numbers, for example, "six (two times three) times ten (two times five) is sixty." For example, four red two bubbles is "two times two times two times two is sixteen," so on other spaces which also have four red two bubbles you could just say "sixteen times..." instead of "two time two time two times two times..." There will always be a space lower down on the board that has some of the same bubbles as higher spaces, so you can look at these to learn the combinations.

Encouraging children to think about the different ways they can do the say-the-numbers rule will make the game more

interesting and help them to learn more.

Children can learn a lot about numbers just by looking at the board, which may be used as a teaching tool, for example, to illustrate which numbers are prime.

The board may be used to visually illustrate mathematical calculations, such as division. For example, to divide the number 52 by six, place a player piece on space number 52, and then place a ring on every number that is divisible by six (has both a two and a three bubble) between 52 and 1, namely 48, 42, 36, 30, 24, 18, 12, and 6. There are seven rings on the board, and four spaces after the last one, visually demonstrating the answer of "fifty-two divided by six is seven remainder four," as well as the algorithm for long division, making it easier when the time comes to teach the notation.

By playing, young people learn the connections between numbers by repetition. Most all numbers are found on more than one, sometimes many, multiplication tables, and by playing So-Soo-Yoo, making all of the different jumps and warps, these connections are shown again and again until they are familiar, like a map.

The human brain is very good at making connections and solving problems when information is organized in this way – like a map. The brain is very bad at memorizing lists of information, which is how the multiplication tables are often presented.

## For More Information

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For information or comments about So-Soo-Yoo write to [info@teruen.com](mailto:info@teruen.com), or the address below. To purchase a copy of So-Soo-Yoo, go to [Teruen.com](http://Teruen.com), or send \$29.95 plus \$4 shipping and handling (\$10 for international) to:

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## Product Warning

**Choking Hazard** This game is hand-made from craft store materials, including spray paint. Paint is non-toxic once dry. Small children should not play without adult supervision. If pieces are swallowed, contact a doctor or hospital.