

Games for Young Mathematicians
Jumping on the Lily Pads



HOW TO PLAY LILY PADS

Math children are practicing:

- Number magnitude and understanding that numbers come *before* or *after* other numbers
- Recognizing written numerals 1-5 (and possibly up to 10 or 20)
- Reciting number words in the correct order
- Using one-to-one correspondence when counting
- Identifying the number of dots without counting (subitizing)
- Composing and decomposing numbers

Materials

- 4 *Lily Pad* boards 1 to 5
- 4 *Lily Pad* boards 1 to 10
- 2 *Lily Pad* boards 11 to 20
- 2 dot cubes with dots
- 2 dot cubes with dots
- 8 frog tokens
- (optional) dice with any other combination of numbers
- (optional) dice with written numerals 1 and 2; or 1 to 3.

Suggested Plan for Guided Math Groups, please modify for your class.	
Game	Materials
Explore board and cubes	Explore <i>Lily Pad</i> board and dot cubes
1 to 5 board	1 to 5 board and dot cube
1 to 10 board	1 to 10 board and dot cube
1 to 10 board	1 to 10 board and dot cube
Go to pond and back to home on 1 to 10 board (forwards and backwards)	1 to 10 board and any dot cube
1 to 20 game	1 to 10 and 11 to 20 boards and dot cube
Counting on	Have children count on from lily pad rather than count jumps.
Land <i>exactly</i> on 5 and 10	1 to 10 board and dot cube, moving forwards <i>and backwards</i> , land exactly on 5, 10, then 5 again, and home.

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Jumping on the Lily Pads



Tips from the classroom:

- Many children will not have had experience playing a board game and will need to practice moving a piece one space at a time. Children need practice learning how to jump forward a certain number of spaces. They have to learn to count the jumps, remember the number they rolled, and then remember to stop jumping once they've taken that number of jumps. They are practicing a lot of skills.
- Children enjoy getting to jump backwards from the pond to home. As they are jumping backwards, encourage them to say the number of the lily pad that they are hopping on. This gives them practice moving backwards on the number line.
- Counting on is particularly hard for children (and teachers) to remember to do. When you try this with children, be patient with them and yourself!
- Have children say out loud what they rolled before they move their frog.

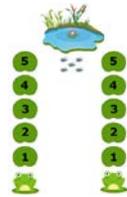
Questions to ask:

- Which number did you start on?
- Which number did you land on?
- How far are you from the pond?
- Who is closer to the pond? Who is further away? By how much?
- How far are you from home?
- Who is closer to home? Who is further away? By how much?
- What would you need to roll to land exactly on 10? On 5?
- How many flies are next to the 5? How many flies are next to the 10?

Praising the process:

- I noticed you are...
- You're working hard!
- Good idea!
- Keep trying!
- I like how you took your time and worked hard on that.

Jumping on the Lily Pads



Explore *Lily Pad* boards and cubes

1. Give children the 1 to 5 *Lily Pad* board and ask them what they notice. Do they recognize the numerals? *For kids who are ready, use the 1 to 10 board.*
2. Count with children as they point to the numerals.
3. Have the children count the number of flies and notice that there are 5 flies between the lily pads with the numeral 5 and 10 flies between the lily pads with the numeral 10.
4. Give children a frog token to hop on the lily pads. Have them hop and say the number as they hop. Have them put their frog on a number. Ask “if I hop one more towards the pond, what number will I land on? What if I hop one back toward home?”
5. Children should be familiar with the dot cubes from the game *Two Numbers*, but if they need more practice, give children the  dot cube and show them how to roll the dice. Have them informally roll the cubes and move the number of spaces on the board.

About the learning in this game. Notice if children recognize the numerals and can point to them correctly as they count. This is another step in children making the link between the number words, the written numerals, and the quantity.

The numerals on the lily pads are arranged vertically. We want children to see as they move from 1 to 5, or 1 to 10, they are moving further from the start (home), and how much further: 10 is much further away from home than 2. At this age, children are developing their understanding of number magnitude—knowing that 5 is greater than 2 and beginning to understand how much greater. Each time children jump on the lily pads one by one they are reinforcing kinesthetically that each number gets bigger by one jump. It is also helping them to understand that the distance between consecutive whole numbers is the same—10 is one bigger than 9 just as 2 is one bigger than 1.

Jumping on the Lily Pads



Play game using 1 to 5 (or 1 to 10) *Lily Pad* board and  dot cube

1. Give each pair of children the 1 to 5 (or 1 to 10) *Lily Pad* board and one  dot cube. Each child gets one frog token.
2. Place the frog token on the picture of the frog below the number 1 (home). Taking turns, children roll the cube and jump that number of lily pads.
3. Tips:
 - Have children say (or count) the number of dots that they roll. Then count as they jump on the lily pads.
 - Ask children which number lily pad they started on and which they landed on.
 - Note that beginners often start their counting *on* the pad they are sitting on, not on the first *move* from that pad. For making sense of the result, they need to count *hops*, not lily pads.
4. Play continues until children's frogs land on 5 (or 10) or go past 5 (or 10) into the pond. Then the frogs swim in the pond.

About the learning in this game. This game asks children to integrate many of the skills they have been practicing for the last few months. Children roll a dot cube and subitize or count to know how many spaces to move. Children have to hold that number in their head (working memory) and then jump that number of spaces and stop jumping when they reach that number (a form of counting out). To practice reading written numerals, you can ask children which number they started on and which number they landed on. This is a complex set of skills to integrate and it may take many attempts before children are comfortable with the whole process. You can help them learn to *describe* what they've done by summarizing it yourself: "You started on four, hopped two steps, and landed on six." When you think they can, you can ask them to describe their move. This, too, asks children to keep a lot in their heads!

At this age, children are still learning how to play games and practicing skills like taking turns, moving pieces, using dice, and counting out spaces. These skills are important in and of themselves because they allow children to access other opportunities for game board play. Many board games have mathematical elements including counting, counting on, numeral recognition, logic, strategy, and classification that are worthwhile and can extend children's learning outside of school. For most children, the game playing skills take time and patient and explicit support to develop.

Jumping on the Lily Pads



Play game using 1 to 10 board and dot cube

1. This game is just like the previous game but children use the  dot cube. Children can move more quickly across the board.

About the learning in this game. Using the  dot cube adds a bit more complexity to the game and children are jumping further each time. It gets them ready for the more advanced game below.

Go to pond and back to home on 1 to 10 board (forwards and backwards)

Instead of ending the game when children get to the pond, have them roll the die to hop all the way back home.

About the learning. Children enjoy getting to hop backwards from the pond to home. As they are hopping backwards, encourage them to say the number of the lily pad that they are hopping on. This gives them practice moving backwards on the number line.

Play game from 1 to 20

Use masking tape or velcro to attach the 1 to 10 board to the 11 to 20 board. Have children play the game hopping their frog from 1 to 20. Children can use any variation of the rules that they would like.

About the learning. Pay particular attention to helping children say the teen numbers. Remind them that 15 is 10 and 5; 16 is 10 and 6. While we write 15 with a 1 and a 5, in the teen numbers, the 1 represents 10. Help them see the pattern of 0-9 that starts in the ones, continues into the teen numbers and beyond.

Counting on

Instead of counting out the number of jumps, have students 'count on' from the space that their frog was on. If the frog is on 2, and a child rolls , the child counts "3, 4" as they jump—saying the names of the numerals they are jumping on.

About the learning. Several research studies have shown that children gain more mathematical skills by counting on from their starting number on a game board than by counting moves. Children gain skills in number estimation, number magnitude, and are better prepared to use the counting on strategy when they get to addition in elementary school.

Land exactly on 5 and 10

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1. This game is similar to the previous versions but children can move forwards or backwards on *each* turn.
2. Children roll to land exactly on the 5—and their frog can eat the 5 flies. If they go past the 5 on one turn, they must move backwards on their next turn until they land exactly on the 5. Then, they move on, trying to land exactly on 10 to eat the 10 flies.
3. **Counting-on Challenge:** Instead of rolling a  and counting “1, 2, 3” as they jump, ask children to count on from the number their token is on. For example, if the frog is on 4, children count “5, 6, 7” as they jump—saying the names of the numerals they are jumping on. Practicing counting on like this helps get them ready for using that strategy for addition in elementary school.

About the learning in this game. This advanced game requires children to hold several goals in mind at once (land on 5, land on 10, go back to land on 5, go back to home) as well as think strategically about how to accomplish those goals. They may be on 4 and roll a  and have to decide whether to hop on to 7, or hop back to 1. This gives them great practice moving forwards and backwards on a number path but is challenging, especially for children who are easily frustrated. Feel free to make modifications that the children suggest. For example, you could have each child roll two two-dot cubes and they could pick whichever number they prefer. This incorporates more strategic thinking into the game.