Math children are practicing:

- Recognizing written numerals 1-6 (possibly up to 12)
- Number order
- Using one-to-one correspondence when counting
- Subitizing: Recognizing how many immediately
- Composing and decomposing numbers: Identifying the new number created when numbers are combined or separated
- Number-before and number-after: Recognizing the number that comes before and after other numbers

Materials

- 4 sets of Two Numbers cards with numeral and dice pattern (0 to 12)
- 4 game boards (double-sided):
  - 1-6 cards on one side
  - 1-12 cards on one side
- 2 regular six-sided dice
- 2 dot cubes with dots 1, 2, and 3

Picture Book: Fish Eyes by Lois Ehlert

This counting book is a pleasure to read aloud with beautiful, vivid illustrations. The narrator imagines she has turned into fish to “flip down rivers and splash in the sea.” One each page, children can count the fish 1 to 10. The little narrator fish includes a simple addition problem on each page such as, “4 striped fish plus me makes 5.” Children enjoy counting the fish, or sometimes the fish eyes as you read the book. For a challenge, they can try the “plus one” problem on each page.

- Circle time: This book is great for talking about the “number-after” because every page has the little fish who says “…plus me makes…”. As you read this book, see if children can pick up on the pattern. Perhaps by the second reading they’ll be able to fill in the “4 striped fish plus me makes… FIVE” without you prompting.
- Art table: Have children make their own illustration of fish to count. They could glue bits of colored paper on to their page or use crayons, markers, or paint. Children enjoy narrating their own picture and having you write down what they say.
# Games for Young Mathematicians

## Session 3: Two Numbers

### For session 3:

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<td>Explore Number Order</td>
<td>Cards 1 to 5 to start. Add higher numbers as children gain experience.</td>
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<td>Roll One (Two Numbers with One Die)</td>
<td>1 to 6 cards, 1 regular six-sided die</td>
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<td>What’s the Missing Card?</td>
<td>Cards 1 to 5 to start. Add higher numbers as children gain experience.</td>
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<td>Hidden Card (X-Ray Vision)</td>
<td>Cards 1 to 5 to start. Add higher numbers as children gain experience.</td>
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<td>Roll Two (Two Numbers 1 to 6)</td>
<td>1 to 6 cards, two dice with 1 to 3 dots</td>
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<tr>
<td></td>
<td>Roll Two (Two Numbers 1 to 12)</td>
<td>1 to 12 cards, 2 regular six-sided dice</td>
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<tr>
<td></td>
<td>*Roll Two (Two Numbers 0 to 12)</td>
<td>1 to 12 cards, 2 regular six-sided dice</td>
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</table>

*Few preschoolers will be ready to play 0-12 with subtraction, but this is an option for those who are.

### Tips from the classroom:

- If you have children who have a hard time with a lot of materials on the table, use the game board instead of the cards. They won’t get to practice putting the cards in the correct order, but they will benefit from playing the game.
- Often it’s really hard to roll the last few numbers you need to turn over all the cards. If children are getting frustrated you can agree to alter the rules so if you roll a 1, it’s wild and can be any number. Or you could play that you’re allowed to add one or subtract one from any roll. Or you can agree to stop after a certain number of tries.

### Questions to ask:

- What numbers do we still need to cover?
- What could we roll to cover that number?
- How many more do we need to cover?”
- I want to roll a… so I can turn this cards? What number(s) do you want to roll?
### Explore Number Order

<table>
<thead>
<tr>
<th>Skills practiced: counting, numeral recognition, number order, knowing the number after (successor principle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials: two numbers cards</td>
</tr>
<tr>
<td>1 player</td>
</tr>
</tbody>
</table>

1. Give each child the 1-6 cards in random order. (Remove the 7-12 and 0 cards for now).

2. Ask the children what they notice about the cards. Do they recognize the numerals? Do they count the number of dots?

3. Ask the children to put the cards in order from 1 to 6 (or smallest to biggest). Ask children to check to see if they have all the numbers 1 to 6.

**Variation:** For kids who are ready for more challenge give the cards 1-10, or even 1-12 or 0 to 12.

### Things to notice as children play.

This is a first step for playing the game. It can help you figure out the "just right" level of difficulty for each child. If a child isn’t ready to order cards 1 to 6 then only use the cards 1 to 3. If a child easily orders the cards, add more number cards or move onto the next game. As child explore, do they recognize the numerals and associate them with the number of dots? Do they associate both the numeral and the number of dots with the number word (3, “three”, 3 dots).

Talk to children about how they are putting the cards in order. Some children might recognize the written numerals. Others might use the dots to order them, fewest to most dots. If children need help guide them in using the number of dots on the cards, and point out number charts in your classroom that they can reference.
### Roll One (Two Numbers with One Die)

<table>
<thead>
<tr>
<th>Skills practiced: connect quantity, numerals, and number names</th>
</tr>
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<tbody>
<tr>
<td>Materials: two number cards</td>
</tr>
<tr>
<td>1-4 players</td>
</tr>
</tbody>
</table>

1. Give each child a set of cards, 1 to 6, in random order.  
2. Ask children to put them in order (as in Explore Number Order activity).  
3. Taking turns, children roll one die and turn over the card that matches the number rolled. If a child rolls a ♦️, they turn over their 3 card.  
4. When a child’s roll doesn’t match any of their remaining cards, they pass the die and await their next turn. (Or, children can keep rolling until they’re able to turn over a card.)  
5. Play continues until all the cards have been turned over.  

### Things to notice as children play.  

Some children may match the dot pattern on the card with the dot pattern they roll on the die. They are matching the dot pattern and the quantity. In this case, make sure to give the quantity a number name and point to the written numeral. With practice, children will connect the quantity with the number name and the written numeral.

This game can be played individually, competitively in pairs or small group, or cooperatively in a pairs or a small group. To play cooperatively, children can take turns rolling the die and turn over the cards that match on each roll.
### What’s the Missing Card?

**Skills practiced:** counting, numeral recognition, number order, knowing the number after (successor principle)

**Materials:** Cards 1 to 5 to start; add higher numbers as children gain experience

<table>
<thead>
<tr>
<th>1-4 players</th>
<th>5-10 minutes</th>
<th>Ages 4+</th>
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</table>

1. Ask children to put the cards in order (as with the Explore Number Order activity).
2. Say, “Close your eyes, I’m going to take one away and see if you know the missing card!”
3. Remove one card once children’s eyes are closed.
4. Ask, “What’s the missing card?”
5. Notice what strategies children use to identify the missing card. This will tell you a lot about what they know and what they are ready to learn.
6. Say, “Yes, it was 4! Four comes after 3!”
7. Replace the card and play again!

**Things to notice as children play.**

This game extends the learning from Explore Number Order and Roll One by asking children to identify the card that is missing. Some children count from 1 up to the missing card. Other children might know right away because they know that 4 comes after 3. You can encourage children to notice the number-after by pointing it out to them each time you play.

### Hidden Card (X-ray Vision Game)*

| Skills practiced: counting with one-to-one correspondence, executive functions |
| Materials: Cards 1 to 5 to start; add higher numbers as children gain experience |
| 1-4 players | 5-10 minutes | Ages 4+ |

1. Ask children to put the cards in order (as with the Explore Number Order activity).
2. While children are watching, carefully turn the cards facedown.
3. Ask, “Can you point to a card?”
4. Say, “I’m can tell you what number is on the card using my special x-ray vision! It is 3! Turn it over and check!”
5. Replace the card on the table facedown. Ask, “Are you ready to use your x-ray vision?.”
6. Continue to play with the child taking over the roll of identifying the cards when they are ready.

Variation: You can leave the cards face-up once they have been identified and encourage children to use the card they can see to help identify the hidden card. Once children gain practice and are ready, they can play this game in pairs.

### Things to notice as children play.

Notice what strategies the child uses to identify the hidden card. If they are unsure what to do, you can encourage them to count from one to the card you selected, touching each card as they count. As you add more cards, leave the ones already identified face-up and encourage children to use the face-up cards to continue counting on from that number. For example, if the “4” card is face up, and you point to the face-down 7 card, children could count “5, 6, …7!” rather than starting at 1. Counting on is an important early mathematics skill to practice.

This game incorporates executive function skills such as self-regulation (inhibitory control), working memory, and attention shifting. Children have to inhibit themselves from just guessing which number the teacher is pointing to instead use strategies to figure it out. Children use working memory to sort the cards into the correct number order and to remember that number order once they are facedown. Children use attention shifting when they change from the role of the selector to the roll of the identifier.

*For more information see Clements & Sarama (2019).*
Roll Two (Two Numbers 1 to 6)

Skills practiced: counting, subitizing, cardinality, written numbers, and composing numbers

Materials: 1 to 6 cards, two dice with 1 to 3 dots

<table>
<thead>
<tr>
<th>1-4 players</th>
<th>5-10 minutes</th>
<th>Ages 4+</th>
</tr>
</thead>
</table>

1. Ask children to put the cards in order (as with the Explore Number Order activity).

2. Taking turns, children roll two dice and turn over the cards, based on the roll. If a child rolls 2 and 3, they can turn over the 2 and 3 cards, or their sum—the 5 card.

3. When no more cards can be turned over, the child passes the dice and awaits their next turn. (Or, children keep rolling until they can turn over a card.)

4. Play can continue until all the cards are turned over.

Tip: Having a choice side is really helpful. You can see if children use this choice wisely, i.e. if they pick a number that would otherwise be hard to get. It also speeds up the game a bit.

Things to notice as children play.

Some children may count each dot, one by one, to reach the total number they rolled, while others may add the numbers quickly. Some children may require support to count accurately, looking to you to count with them. This game helps children practice combine two numbers—what they roll on each die—to make a new number. We start with a small set of numbers, within 6, so that children can have a strong understanding of small numbers and how to break apart and put together small numbers before they move onto the next game.
Roll Two (Two Numbers 1 to 12)

Skills practiced: counting, subitizing, cardinality, written numbers, and composing numbers

Materials: 1 to 12 cards, 2 regular six-sided dice

1-4 players | 5-10 minutes | Ages 5+

1. Ask children to put the cards in order (as with the Explore Number Order activity).
2. Taking turns, children roll two dice and turn over the cards, based on the roll. If a child rolls 2 and 3, they can turn over the 2 and 3 cards, or their sum—the 5 card.
3. When no more cards can be turned over, the child passes the dice and awaits their next turn. (Or, children keep rolling until they can turn over a card.)
4. Play can continue until all the cards are turned over.

Tip: Having a choice side is really helpful. You can see if children use this choice wisely, i.e. if they pick a number that would otherwise be hard to get. It also speeds up the game a bit.

Things to notice as children play.

As children gain more experience, encourage them to “count on” from the larger number. That is, if they roll 2, they start from 4 and count on: 5, 6. Counting on from a larger number is an important skill that will later help them add numbers.

Once children are comfortable with the game, they can play in pairs without the teacher and see who can turn over all their cards first. For this game, you will want to pair children with fairly similar skills. Playing to see who can turn over all their cards first encourages children to think about strategy. Their rolls and the moves they make will vary which encourages them to think about different numbers and strategies. Children can also play on their own. This allows for flexibility and accommodates different children’s interest—they can play at their own level.

You may want to decide that if a player rolls doubles or even just 2, that it’s like a “wild card”—they can choose any number they want to turn over. This might make the game easier as you get towards the end.
Games for Young Mathematicians
Session 3: Two Numbers

*Roll Two (Two Numbers 0 to 12)

<table>
<thead>
<tr>
<th>Skills practiced: counting, subitizing, cardinality, written numbers, and composing numbers</th>
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<tbody>
<tr>
<td>Materials: 0 to 12 cards, 2 regular six-sided dice</td>
</tr>
<tr>
<td>1-4 players 5-10 minutes Ages 5+</td>
</tr>
</tbody>
</table>

1. The game play is the same as the Roll Two game above. There are several variations you can make for children who are ready for kindergarten and first grade mathematics.

**Subtraction:** Children can turn over the numbers they see, turn over the sum of the two dice, or they can subtract and turn over the difference. For example, if a player roll doubles—a 4 and a 4—they can subtract and turn over the 0 card.

**Use three dice:** Children can add 2+2+4 and turn over the 8; or turn over the 2, then add 2+4 and turn over the 6.

**Things to notice as children play.**

These variations may be appropriate for older siblings or children who are ready for kindergarten or first grade mathematics. This game is versatile. As long as all players agree, you can add new rules and new ways to play!

*These are variation that extend this game into kindergarten and first grade mathematics.