



## The Game of Tens and Ones A Lesson for Second Graders

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*This game gives children practice with adding and subtracting ones and tens. Using a special die, two 0–99 charts, and two markers, children play in pairs. During the course of a game, they calculate between 20 and 30 addition and subtraction problems. The Game of Tens and Ones appears in Maryann Wickett and Marilyn Burns's Teaching Arithmetic: Lessons for Introducing Place Value, Grade 2 (Math Solutions Publications, 2002).*

"Today we're going to use a zero to ninety-nine chart to play a game," I began.

"You'll need a partner, a special die, two zero to ninety-nine charts, and two markers. You'll each use your own chart and place your marker on zero," I explained.

I then told the children about the special dice. "The number on these dice are different from the numbers on regular dice," I said. "The faces of these dice aren't labeled one through six. Three of the faces are labeled 'plus ten,' one face is labeled 'plus one,' one face is labeled 'minus one,' and the last face is labeled 'minus ten.' The plus and minus signs tell you something about how you move your marker on your chart. What do you suppose they could tell you?"

Ellie said, "The plus means you go forward and the minus means you go backward. The number probably means how many you go forward or backward."

"That's it," I said. "But if you can't move the way the die tells you, then you must pass and give the die to your partner. If I rolled a minus one for my first turn, with my marker on zero, could I move it?"

"It would go off the chart," Dalton said.

"That's right. I'd have to stay where I was, on zero, and pass the die to my partner. DeAndre and I are going to play so you can see how the game goes," I said. I had the children gather around a large table so all could see us play.

DeAndre and I each put our markers on zero on each of our charts.

DeAndre chose to have me go first. "I rolled a minus one," I said. "What now?"

"You lose your turn because you'd have to move off the chart and you can't," Abby said.

"That means I have to pass the die to DeAndre," I said.

DeAndre rolled +10 and he moved his marker ten squares on his chart, landing on 10.

"What's a number sentence that I could write that would show what DeAndre did?" I asked.

"You could write zero plus ten equals ten," Angie said.

I recorded on the board:

$$0 + 10 = 10$$

“Explain why your number sentence tells about DeAndre’s turn,” I said.

“The zero tells where DeAndre started,” Angie explained. “Then he rolled plus ten and that’s the ‘plus ten’ part, and when he counted up ten boxes, his marker was on ten and that’s the ‘equals ten’ part.”

I rolled +1. “I’m starting on zero,” I said. “The die is telling me to move forward one on my chart, so now I’m on one. What number sentence would tell the story of my turn?”

“Zero plus one equals one,” Samuel said. I wrote on the board:

$$0 + 1 = 1$$

“To show I’m all finished with my turn, I’m handing the die to DeAndre,” I said. DeAndre rolled –1. “I’ll be on nine now,” he said as he moved his marker back one on his chart.

Maya told the number sentence: “Ten minus one equals nine.” I recorded:

$$10 - 1 = 9$$

“DeAndre’s at nine and I’m at one. How many boxes would I have to move to catch up to DeAndre?” I asked.

Most hands were up immediately.

“I just counted the squares beginning with two and went to nine, and there were eight,” Allie explained.

I recorded on the board:

*start with 2: 3, 4, 5, 6, 7, 8, 9 eight squares*

“Who has a different way to figure how many boxes I have to move to catch up?”

Angie said, “I thought, ‘One plus something is nine. What’s the something? Well, one plus eight is nine,’ so I knew it must be eight boxes.”

I recorded Angie’s idea:

$$1 + \square = 9$$

$$\square = 8$$

Ramon volunteered, “I knew that to go from zero to ten it was ten spaces. So Mrs. Wickett moved one space, so that was only nine, and then DeAndre had to move one back, so that was eight.”

I recorded Ramon's idea on the board:

$$0 + 10 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

The students were eager to get started. "There's one last rule you need to know. When it gets close to the end of the game, remember that you can't go off the board. That means you must use all of the number you roll and land on ninety-nine, or pass the die to your partner." The students returned to their seats and I explained that their partner would be the person sitting next to them. I reviewed the rules with them and showed them where they could get the 0–99 charts, dice, and markers.

**The Game of Tens and Ones**

You need:

- a partner
- 2 0—99 charts
- 2 markers
- 1 die with faces labeled +10, +10, +10, –10, +1, –1

Rules

1. Each player places a marker on the zero on his or her own 0—99 chart. Players take turns rolling the die.
2. Player 1 rolls the die and moves a marker according to the roll on his or her own 0—99 chart.
3. Player 1 checks that Player 2 agrees and then hands the die to Player 2.
4. Player 2 follows the same steps as Player 1, using his or her own chart.
5. The winner is the first player to move his or her marker to 99. To win, a player must land on 99 exactly. For example, if a player lands on 90 and rolls a +10 on the next turn, the player must pass, as there are only nine boxes from 90 to 99. Players may not move their markers past 99 and off the chart.

The students cooperated by checking each other's moves and passing the die rather than grabbing it. I noticed that a few students knew that if they rolled +10 or –10, they could just move

their marker down or up one space; however, most of the students had to count out ten spaces. As the games progressed, a few more students started using this strategy.

I watched as Ellie and Antonio played. I noticed that Antonio easily and accurately moved up and down the chart when he rolled  $+10$  or  $-10$ , while Ellie needed to count each box. I then observed Conner and Bonnie. Conner could move down the chart easily when he rolled  $+10$ , but when he rolled  $-10$ , he had to carefully count back one by one. I decided to interrupt their game.

"Conner, I notice that you seem to know what to do when you roll a plus ten," I said.

"That's easy," he explained. "You just go down a row. It works because when you add ten, you don't do anything to the ones; you just add another ten. Like, in this column, all the numbers end with eight, so I just knew they were ten apart."

"I also noticed that minus ten did not seem so easy. Why?" I probed.

"Because I have to count back by ones and it takes longer," Conner explained.

I took another marker and laid it on 25 on Conner's chart. "Where will my marker be if I add ten?" I asked.

"Thirty-five!" Conner replied. I moved the marker to 35.

"Now I want to move back ten. Where will my marker be?" I asked.

"That's hard," Conner said. "Can I use the chart to count?"

"See if you can figure it out without counting on the chart first," I said. After a few moments I could see his frustration building. "Go ahead and use the chart to help you," I said. He counted back ten boxes and landed on 25. "What happened?" I asked.

"I'm back to where I started," Conner said. "I went forward ten and then when I went back ten, I was in the same spot again." I left him to think about this and continue playing the game.

As I continued to ask partners about the difference between their markers or how many more boxes were needed for one player to finish the game, I was surprised at how many students had to count by ones to figure the answers to these questions. A few students did count down the chart by tens to figure the tens and then across to figure the ones, but most had to count by ones. These students had had previous experience counting by tens beginning with any number and I had expected them to apply this prior information to this new situation. This reminded me that I must be careful about assumptions I make about students' understanding and when and how they might apply it.