

4 Win-Win Math Games

by Marilyn Burns



PHOTOS: BOB ADLER

Games can motivate students, capture their interest, and are a great way to get in that paper-and-pencil practice.

Using games to support students' math learning has long been a standard feature in my teaching. Games help to lift math off the textbook pages, and they support students' learning about Numbers and Operations. They are also ideal for students when they have extra time. All four games presented here are easy

to teach and rely on few materials other than paper and pencil. The key to making games a successful, integral part of your classroom is how you introduce them, and the classroom management you use to make the time truly valuable.

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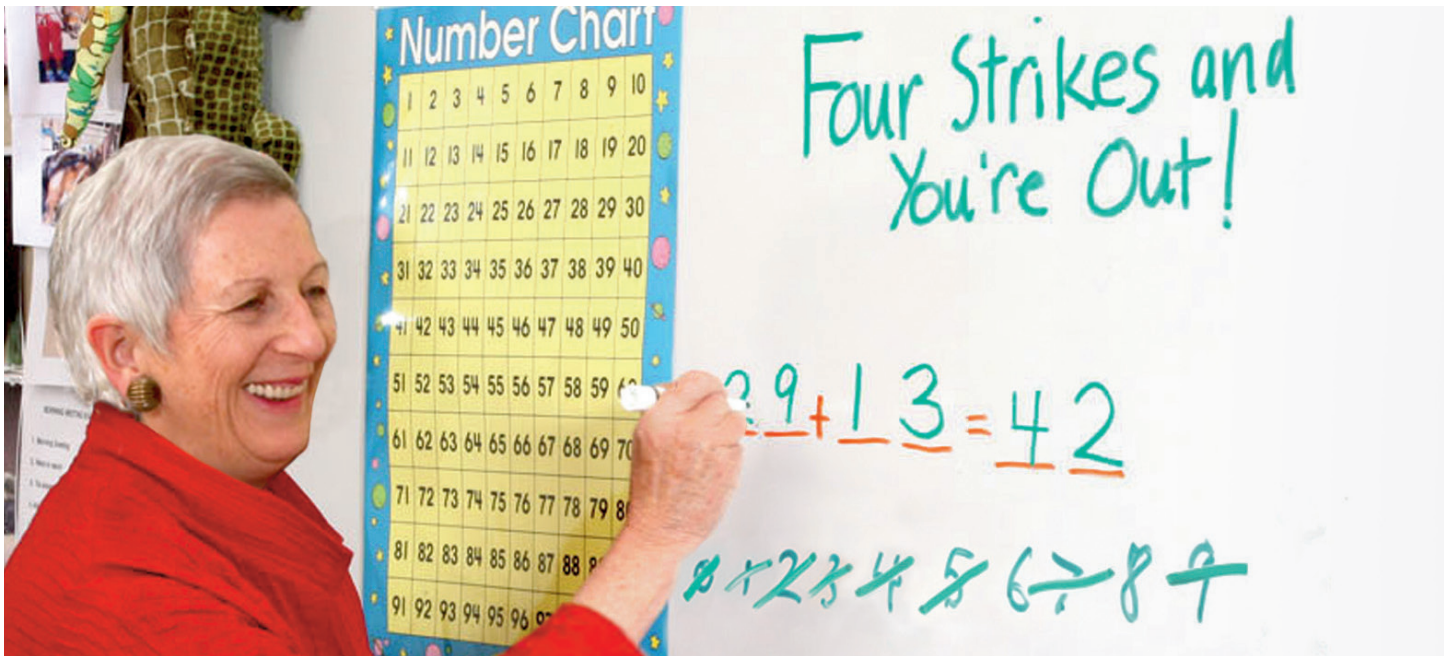
FOUR STRIKES AND YOU'RE OUT

Recently, I shared Four Strikes, from *Teaching Arithmetic: Lessons for Addition and Subtraction*, with a class of second and third graders. I wrote on the board:

$$\begin{array}{cccccccccc} _ & _ & + & _ & _ & = & _ & _ & _ & _ \\ 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \end{array}$$

"You have to figure out the number for each blank in the problem," I explained. I showed the children a folded piece of paper and told them that inside was the problem they were to guess. (I didn't reveal the problem: $35 + 10 = 45$.) "If you guess a number that's in my problem," I explained, "I'll write it in all the places it belongs. If you guess a number that's not in the problem, you get a strike. To win, you have to figure out all of the numbers before you get four strikes."

A few children were confused. I've found that the best way to resolve confusion is to



move forward. “First you just have to guess,” I said. “But after I write some numbers, you’ll have some clues.”

Natalia made the first guess. “Three,” she said. I referred to my “cheat sheet,” wrote 3 where it belonged, and crossed it off the number list.

$$\begin{array}{cccccccccc} \underline{3} & _ & _ & _ & _ & _ & _ & _ & _ & _ \\ 0 & 1 & 2 & \cancel{3} & 4 & 5 & 6 & 7 & 8 & 9 \end{array}$$

“Two,” Jude guessed next. I referred to my cheat sheet and said, “No, there’s no two. That’s a strike.” I crossed out the 2 and made an X next to the title.

“Nine,” Maite guessed next. I referred to my cheat sheet and said, “No, that’s strike two.”

“Five,” Ana Sophia guessed. I again referred to my cheat sheet. (Even though I had memorized the problem, I checked to model for the students what to do when they later played the game independently.)

“That’s in my problem,” I said, recording the 5 in the two places it belonged and crossing it out on the list.

$$\begin{array}{cccccccccc} \underline{3} & \underline{5} & _ & _ & _ & _ & _ & _ & _ & _ \\ 0 & 1 & \cancel{2} & \cancel{3} & 4 & \cancel{5} & 6 & 7 & 8 & \cancel{9} \end{array} \quad \text{XX}$$

A buzz of excitement broke out as children had ideas about what to guess next. “Now that you have some clues,” I said, “talk at your tables about what might be a good next guess and raise your hand when you’re

ready.” This gave students a chance to hear and explain their reasoning. When many students had a hand raised, I called on Mika.

“There has to be a zero,” she said.

“Can you explain why?” I asked.

“Because the answer ends in five,” she explained. “So the number you add to thirty-five has to end in zero.” Others nodded in agreement. Reasoning numerically about the clues helps students develop their number sense.

“So you’re guessing zero?” I asked. Mika nodded and I recorded.

$$\begin{array}{cccccccccc} \underline{3} & \underline{5} & _ & _ & \underline{0} & _ & _ & \underline{5} & _ & _ \\ \cancel{0} & 1 & \cancel{2} & \cancel{3} & 4 & \cancel{5} & 6 & 7 & 8 & \cancel{9} \end{array} \quad \text{XX}$$

I asked, “Who wants to guess next?”

“Lucky seven,” Morgan guessed. The students groaned as I recorded a strike.

“What choices are left?” I asked. Together we read the numbers that were not crossed out—1, 4, 6, and 8. I gave the students a few moments to talk at their tables, and then called on Olena.

“One goes in the first blank,” she said.

“And the other number is four,” Stevie said. “It’s thirty-five plus ten equals forty-five.”

I recorded the numbers and said, “Let’s check the addition to be sure it’s right.” Everyone agreed.

“You figured out the problem with only three strikes,” I said. “So you win.”

I repeated the game for several more

problems ($50 + 26 = 76$ and $29 + 13 = 42$), and even varied the number of digits ($37 + 87 = 124$). Then, students played in pairs. First they made up problems of their own, which they wrote on a “cheat sheet” and folded in half. Next, they drew blanks for the problem, listed the numbers from 0 to 9, and they were off!



101 AND YOU'RE OUT

This game, from *About Teaching Mathematics*, is a favorite of mine that encourages mental computation and understanding of place value. The goal is to arrive at a sum that is as close to 100 as possible without going over. The game involves luck (numbers are generated randomly) and supports reasoning (as students decide how to use the numbers that come up). It works well competitively, cooperatively, and as an individual activity.

Teaching the Game

To play, students draw their own game boards. Model this by having them watch as you draw a sample on the board.

Explain the rules: A 1–6 number cube will be rolled six times. With each roll, students write the number that comes up on their game board. They write the first number on line 1 of their game board in either the 10s

column or 1s column; they write the second number on line 2 in either column; and they continue to play for six rolls. Once students write a number, they can't change it. After writing six numbers, they fill in any blanks in the 1s column with zeros, and then add to find the sum. The winner is the player with the sum that is closest to 100 without going over.

Model playing a round as a class activity. Give the number cube to a student to roll and call out the number that comes up. Then have students discuss where they think it

10s	1s
1	
2	
3	
4	
5	
6	
TOTAL	

would be best to write the number on line 1. After hearing from students, have a student record the number on the board. Give the number cube to another student and repeat for line 2. Continue for six rolls, and then model for students writing zeroes in any empty spaces in the 1s column. Give students time to figure the sum.

The second time you play, instead of hav-

ing a class discussion about where to write each number, ask students to decide for themselves and record on their individual game boards. When the number cube is rolled a second time, it helps to remind students to write the number that comes up on line 2. As play continues, check to see that students are writing numbers correctly. After six rolls, ask them to write zeroes in empty spaces in the 1s column and then find the total. As students finish, have them exchange papers to check each other's addition. (This gives time for students who need more time to complete the addition.) Then find the sum that came closest to 100 without going over. Post the winning game board and have the others check the addition. With a whole class, it's likely that more than one student will get the same winning sum.

Playing Competitively

Once students understand the rules for playing, have them play in groups of two, three, or four players. Organize students and give a number cube to each group. Circulate to observe and troubleshoot any confusion.

Working Together

To encourage communication among students as they reason numerically, organize students into pairs and have each team play against another pair. On each turn, partners have to agree where to write the number that comes up. Even though both players on

each team will have the same results, have them each record numbers on their own game boards. This gives all students adding practice and gives partners a way to check their total.



Additional Tips

- Increase the challenge by using a 0–9 spinner to increase the range of possible numbers that can be generated.
- If you need to make the addition easier for younger students, change the game so there are only four lines on the game board.
- For individual practice, students first play the game by themselves, following the same rules. Then they draw another game board and use the same numbers they rolled to try and figure out the best way to arrange the numbers to get a total as close to 100 as possible.



SEVEN UP

It is essential for students to develop fluency with combinations of 10. Seven Up, a game from Scholastic's Do The Math intervention program, gives students the practice they need. A deck of 40 cards is required—four each of cards numbered 1 to 10. (A deck of playing cards with the face cards removed works well.) To play, students deal seven cards face up in a row. They remove all 10s, either individual cards with 10 on them or pairs of cards that add to 10. Each time players remove cards, they



Playing Seven Up: Having students play together in small groups encourages communication while they learn about the numbers that add to 10.

replace them with cards from the remaining pack. When it's not possible to remove any more cards, they deal a new row of seven cards on top of the ones that are there. The game ends when it's no longer possible to make 10s or all of the cards are used up.

I modeled the game for a group of first graders. "One person deals the cards and the other keeps the cards that we remove," I explained. "Then you switch jobs for the next game." Students can play in pairs or small groups, or unlike Four Strikes and You're Out, students can also play Seven Up as a

CINDY	JULIE
6X10=60	5X10=50
1X10=10	3X10=30
70	80
5X10=50	6X10=60
120	140
6X10=60	5X10=50
180	190
1X50=50	2X50=100
230	290
4X20=80	2X10= 20
310	310

game of solitaire. The solitaire feature is useful when a student doesn't have a partner to play with.

Both Seven Up and Four Strikes and You're Out are games that are suitable for playing multiple times. Not unlike the games kids play over and over again and know well—checkers, Monopoly, solitaire, Sorry, and others—this repetition effectively encourages learning. Students may lose interest in a game after a while but return to it later, enjoying the comfort of their familiarity with how to play.



TARGET 300

Target 300, a game from *Teaching Arithmetic: Lessons for Extending Multiplication*, gives students the opportunity to practice multiplying by 10 and multiples of 10. It also supports mental computation and develops students' numbers sense. Although the game's focus is multiplication, students also practice their addition and subtraction. The object of the game is to be the player whose total is closest to 300 after six rolls of a 1–6 number cube. The total can be greater or less than 300, or exactly 300, but players must use all six turns. As with other games, I teach students how to draw their own recording

MATH GAME TIPS

- CHOOSE GAMES THAT ARE ACCESSIBLE TO ALL STUDENTS. With Four Strikes and You're Out, for example, I used addition problems that I knew all of the children could solve. When the math is accessible, students can focus on learning how to play.
- PLAY COOPERATIVELY AND COMPETITIVELY. Cooperative games foster communication and classroom unity. Competitive games help students test their skills, take risks, and learn to be graceful winners and losers.
- CHOOSE GAMES THAT REQUIRE REASONING AND CHANCE. Games that combine strategic thinking with an element of chance are especially effective for providing practice and promoting thinking, reasoning, and

problem-solving. The chance aspect—rolling a number cube or using a spinner—helps level the playing field and makes it possible for students of varying abilities to enjoy playing together.

- TEACH THE GAME TO THE ENTIRE CLASS AT THE SAME TIME. Play sample games as many times as needed to resolve any confusion before expecting students to be successful independently.
- START A MATH GAMES CHART. Add the name of each game as you teach it. This creates a repertoire of independent math activities that you have approved and that are accessible to all. When students have extra time, direct them to the chart for an activity.

sheets: in this case, two columns each with a player's name at the top. Here's a game between Cindy and Julie that ended in a tie.

Cindy rolled the number cube and got a 6. She then decided whether to multiply the number by 10, 20, 30, 40, or 50. She chose to multiply 6 by 10. Players record the rolls and calculations of both players as a way to keep track of what is happening. For example, on Julie's first turn she rolled a 5 and multiplied it by 10, so both players record $5 \times 10 = 50$. Players keep a running total of their scores. After each takes six turns, they record who won and how far each player's total was from 300. For example:

CINDY AND JULIE TIED.
CINDY WAS 10 POINTS AWAY FROM 300.
JULIE WAS 10 POINTS AWAY FROM 300.

Using these and other math games in your classroom can really help with differentiat-

ing instruction. For example, to serve the various needs of students, I change Target 300 to Target 200 for some struggling students and to Target 600 for those who need more of a challenge. (Alternatively, using a 0–9 spinner will increase the challenge by giving students a wider range of numbers to work with.)

It's common in class for some students to finish assignments quickly while others are still working. Games are ideal for answering the "What do I do now?" question. Also, having students share games with their families is an effective way to send home information about the math being done in school. When I choose a game for students to play at home, I'm always sure that they have had enough experience to be thoroughly familiar with how to play. ■

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