Game 9

Cross Out Singles

Recommended Grades 3–5
Time Instruction: 30–45 minutes
Independent Play: 20–30 minutes

TEACHING TIP

Quiet Dice

Rolling dice can create lots of noise. To lessen the noise, consider using foam dice or pad students' workspaces with foam or fabric placemats.

Overview

In this game, students practice addition while employing logical reasoning coupled with probability. To begin, one player rolls a die. All players write the number rolled in a square of their choice on their game board. Another player rolls the die and again all players record the number in a square of their choice on their game board. Players take turns rolling the die until all nine squares have been filled in. Players then find the sums of the number strings (the numbers in the rows, columns, and diagonal on their game board). They record the sums in the circles on the game board. Finally, players examine their sums, crossing out any sums that only appear once (hence the game's name *Cross Out Singles*). Players add up the sums in the remaining circles. The total is each player's score for the round. The winner is the player with the highest score of all three rounds. The game includes two versions of the game board to allow for differentiated instruction.

Materials

- 1 die, 1 per pair of students
- *Cross Out Singles* Game Boards (REPRODUCIBLE 13), 1 array enlarged for class use
- *Cross Out Singles* Game Boards (REPRODUCIBLE 13), 1 copy per pair
- pencil
- Game Directions (REPRODUCIBLE G-9), 1 per pair of students

Related Games

Game 13: Fifteen-Number Cross Out

Game 10: Cross Out Sums

Key Questions

- Tell me about your strategy.
- What would be the ideal number to roll first? Why? Where would you place it?
- What is the largest/smallest sum you can achieve in this game using a 1–6 die? Explain.

Teaching Directions

Part I: The Connection

Relate the game to students' ongoing work.

Build background for the introduction to the concept of "singles" by asking students, "Have you ever heard a commercial about a fast-food restaurant having a single-, double-, or even triple-patty hamburger? What does it mean to have a single-patty burger compared to a double or triple?" Another connection might be, "Let's think about the game of baseball or kickball. Many of you play kickball at recess or have participated in, attended, or watched a game of baseball. What does it mean when a player is up to bat and they hit a single?"

Part II: The Teaching

Introduce and model the game to students.

1. Explain to students they will be learning the game *Cross Out Singles.* Ask students to help define what the word singles means. Help them understand in this game they must cross out sums that only appear on their recording sheets once; these are considered the single sums. If students offer the word alone or only, link such understanding to the game.

A CHILD'S MIND

Defining *Single*

When discussing the meaning of the word *single,* the definitions children volunteer will vary depending on their age and experiences. They might suggest *one* like a "single slice of pizza." A child might describe how a line of students moves through the hallway or the cafeteria—in a "single file" line. Students may say *single* refers to a digit 0–9—a "single digit." Still others may say a single is "one song" released by an artist or that the word means "alone" as in living by yourself. Accept all of the ideas that are a definition of *single.* Explain that a mathematician's definition of the word *single* means one.

TECHNOLOGY TIP

Using an Interactive Whiteboard

You can also use an interactive whiteboard to display the game board. To do so, create a table of three squares by three squares; the squares need to be large enough to be easily viewed by students. Draw or use the circle tool to add the seven circles to the game board. Also enable the interactive die (when tapped, it will generate a number).

TEACHING TIP

Using the Die for Modeling Purposes

For modeling purposes, consider using a demonstration-sized die or use the die on an interactive whiteboard. This ensures that every student has access to the number rolled.

TEACHING TIP

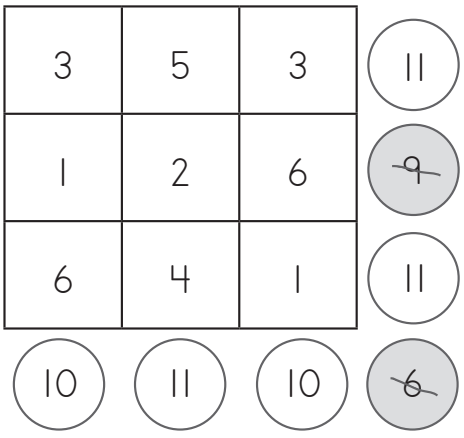
Encouraging Talk

When finding sums of the number strings (the rows, columns, and diagonal), encourage students to talk about their computation. It is important for students to be able to articulate how they combine the numbers (adding left to right, doubling, combining ones, combining tens, etc.). It is equally valuable for other students to see and hear how a classmate is computing. As students explain their thinking, record each student's thinking by writing the number string and noting how they are combining the numbers. For example, in the number string 3 + 5 + 3 = 11, a student might explain her addition processes as, "I know my doubles and three plus three is six. Five and six is eleven." You would then record:

$$3 + 5 + 3 = 11$$
$$\diagdown \quad \diagup$$
$$6$$

$$5 + 6 = 11$$

2. Next, place an enlargement of one of the game boards (REPRODUCIBLE 13) where everyone can see it. Tell students this will be their game board. The objective will be to record addends in the squares, add the number strings (both as rows, columns, and diagonal), and record the sums in the circles.
3. Model how the recording is done. First have a student roll a die. Have another student or group of students decide which square on the array should be used to record the number on the die. Record the number in the selected square.
4. Repeat Step 3 eight more times. Involve various students in the rolling of the die and the placement of the number. Emphasize that once a number is recorded on the array, it may not be moved to another square.
5. After all nine squares are filled, ask students to find the sums of the number strings: the numbers in the rows, columns, and diagonal. Work together to record the sums in the corresponding circles.
6. Now ask students to look at the array and identify any sums that are not repeated in the circles. Sums listed only once (the number appears in only one circle) are considered "singles." Cross out these sums.
7. Ask students, "How many circles are left?" Have students total the sums in the circles that remain. This total is their score. For example:



$11 + 11 + 10 + 11 + 10 = 53$

The player's score for this round is 53.

8. Point out that in this game, the player with the highest score after three rounds is considered the winner.
9. Play another round of the game as a whole class (repeat Steps 2–8). This time you might find that students are more carefully considering in which squares to record the numbers rolled. Refrain from discussing student strategies until the summarizing part of this lesson.

Part III: Active Engagement

Engage students to ensure they understand how to play the game.

10. Now give students an opportunity to explore the game in pairs. Distribute one copy of the *Cross Out Singles* Game Boards (Reproducible 13) to each pair of students. Remind students that this is their game board.
11. Roll the die. Give pairs of students time to record the number rolled in one of the squares on their *Cross Out Singles* Game Board.
12. Repeat Step 11 eight more times. Remind students that once a number is recorded in a square, it may not be erased or moved to another square.
13. After all nine squares are filled, ask students to work in pairs to find the sums of the number strings (the rows, columns, and diagonal). Make sure they record the sums in the corresponding circles on their game boards.
14. Ask students to cross out any sums that appear only once in the circles (the "singles").
15. Have students work in pairs to total the sums in the circles remaining.
16. Now give time for students to compare their game boards. Ideas for comparing include:
    - Pairs find another pair of students who share the same grand total. Compare game

A CHILD'S MIND

Placing the Number

As students become more familiar with the game, do not be surprised if some students have strategies and opinions about "good" placement and "poor" placement of numbers on the array. Refrain from discussing such during this part of teaching the lesson. Tell students they will have an opportunity to share their strategies and thinking later in the week, giving everyone ample time to play the game and develop their own ideas.

TEACHING TIP

Pairing Students

Pairing students with someone of like ability or similar strategies may help level the playing field in this game. Ultimately, this game involves skill, strategy, and luck; overdesigning your pairings of students will not influence the success or failure of students playing the game. If you find that students are reluctant to explore this game in pairs, you might need to model another round (repeat Steps 2–8).

boards; are the nine numbers placed in the same squares? How are the game boards similar or different?

- Pairs trade game boards with another pair of students. They check the mathematics and then compare their rounds.

Part IV: The Link

Students independently play the game.

17. Set students up for independent practice with the game. Each student should be given one copy of the *Cross Out Singles* Game Boards (REPRODUCIBLE 13). Each pair or group of students should also have one die. Also distribute the Game Directions (REPRODUCIBLE G-9) as needed.
18. Determine how many rounds students should complete. The recording sheet is set up for three consecutive rounds. However, if time is limited this could be modified. When observing and talking with students as they play, ask key questions such as:
    - Tell me about your strategy.
    - What would be the ideal number to roll first? Why? Where would you place it?
    - What is the largest/smallest sum you can achieve in this game using a 1–6 die? Explain.

DIFFERENTIATING YOUR INSTRUCTION

There are several ways to modify the game according to the levels and needs of your students. To provide more challenge, instead of using a three-by-three array, use a four-by-four array. **REPRODUCIBLE 14** is provided for this purpose. If using this game board, students need to add four addends and record sums in nine circles.

MATH WORKSHOP AND SUMMARIZING THE EXPERIENCE

Teach this game at the beginning of the week to the whole class, then make it an integral part of your math workshop (for more on math workshops, see Chapter 5 in *From Reading to Math* by Maggie Sienna). Build in time to observe students playing the game. Note their individual skill level and the strategies being utilized. Have students cut out and post their best round on a classroom chart. Give students time to think about the chart. Which round is the winning round? Continue with a friendly discussion around the highest score.

ASSESSMENT TIP

Writing Prompt

Have students pick what they feel is their best round in a game of *Cross Out Singles*. Do they think skill or luck played a part in this being the best round? Ask them to write about their strategies in their journals.

TEACHING TIP

Common Strategies That Students Use

One common strategy students often use is placing the first number, no matter what it is, in the middle of their game board and the next number in one of the corners. In interviewing students, I have learned they are using logical reasoning. They recognize that those same numbers are likely to be rolled again in the next six rolls. Once the middle addend has been determined, placing same numerals in the corners will result in the same sum. This is an example of the commutative property. This might lead to a lesson on this mathematical law, which states that the order of the digits doesn't affect the sum. This strategy and others will assist students in moving forward in their thinking and/or serve as a revisit of content and concepts learned.

Game 9: Cross Out Singles

Objective

In this game, players fill in the nine squares on their game boards with the numbers rolled. Once all squares are complete, players find the sums of the number strings (the rows, columns, and diagonal). They cross out any sums that appear only once, then total the remaining sums. This is their score. The objective is to be the player with the highest score out of three rounds.

Materials

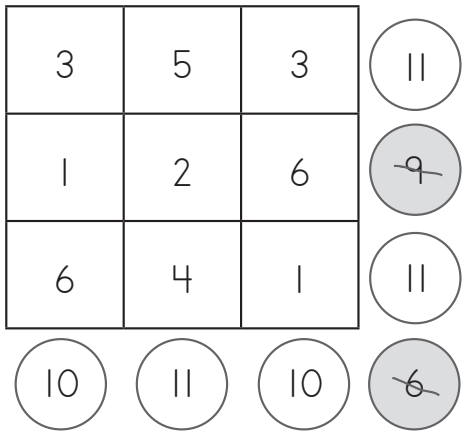
- 1 die
- *Cross Out Singles* Game Boards (REPRODUCIBLE 13), 1 per pair

Players

1 or more

Directions

1. Player 1 rolls the die. All players record the number in a square on the first array of their recording sheet. Remember, once a number is written it may not be changed.
2. Another player rolls the dice. All players record the number in a square on the first array of their recording sheet.
3. Repeat Step 3 until all nine squares on players' arrays have been filled.
4. Players then find the sums of the number strings (the rows, columns, and diagonal) and write the sums in the corresponding circles.
5. All players examine their sums. They cross out the sums that appear only once (in only one circle).
6. The total of the sums not crossed out is the player's score for that round. For example:



$11 + 11 + 10 + 11 + 10 = 53$

The player's score for this round is 53.

7. Repeat Steps 1–6. After three rounds are completed, players review their scores. The player with the highest score after three rounds is declared the winner.

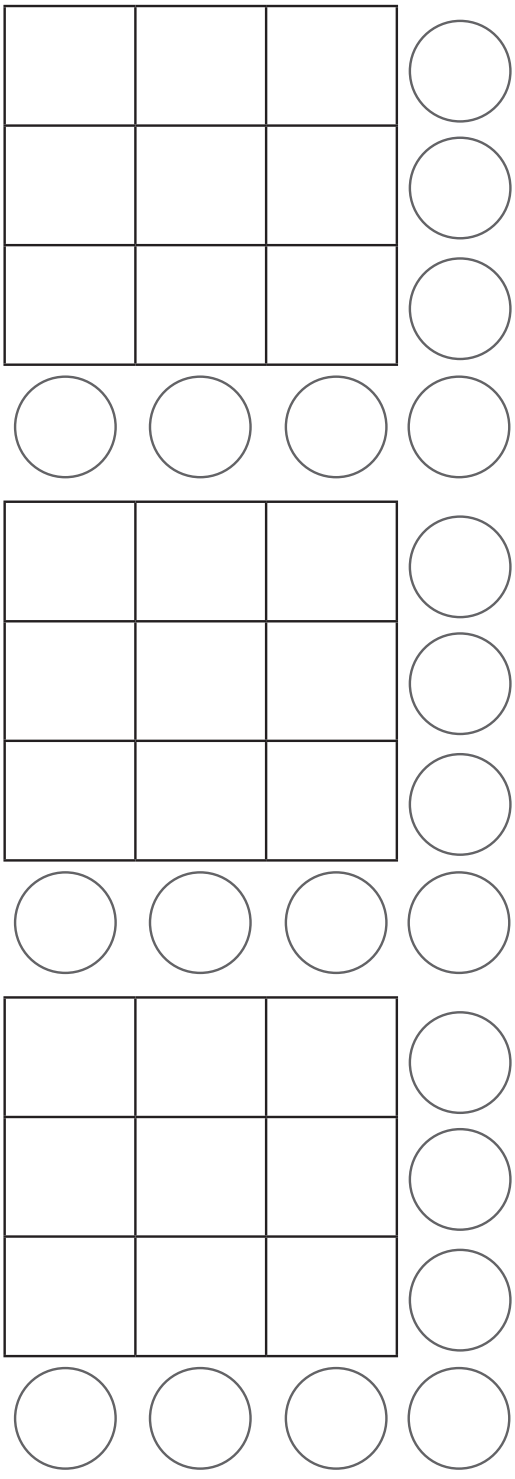
CROSS OUT SINGLES GAME BOARDS

Reproducible 13

Version 1 (3 x 3 Array)

Copy the game boards as needed to play the game (each pair should have one sheet for three rounds of play).

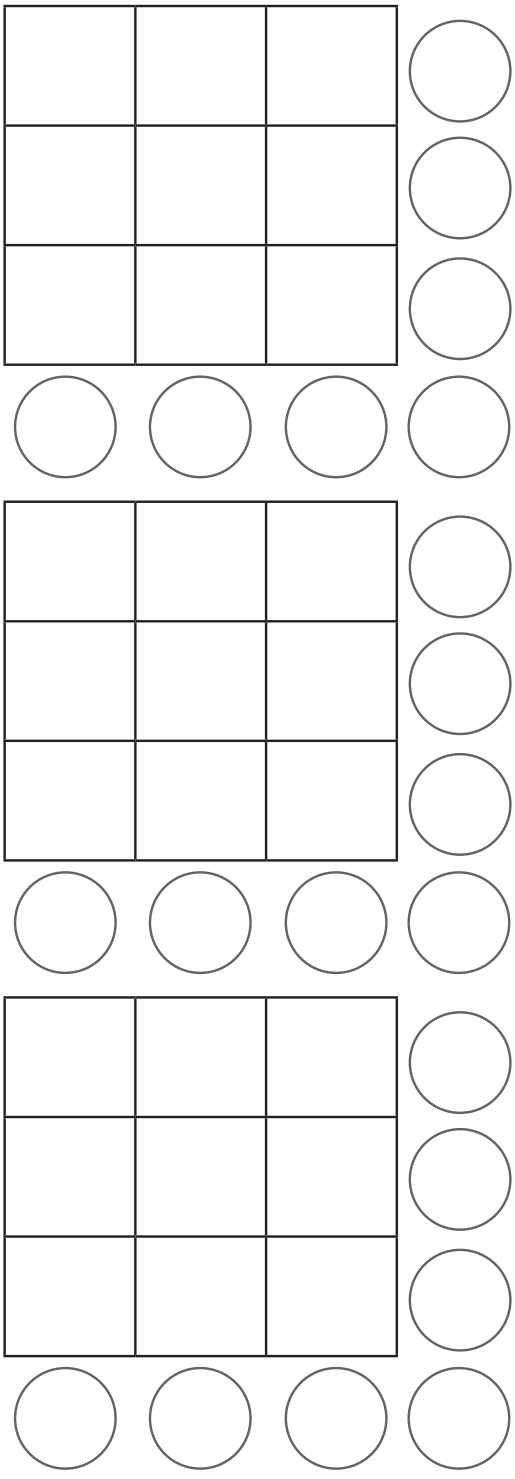
NAME _____



1 _____ 2 _____ 3 _____

Total _____

NAME _____



1 _____ 2 _____ 3 _____

Total _____

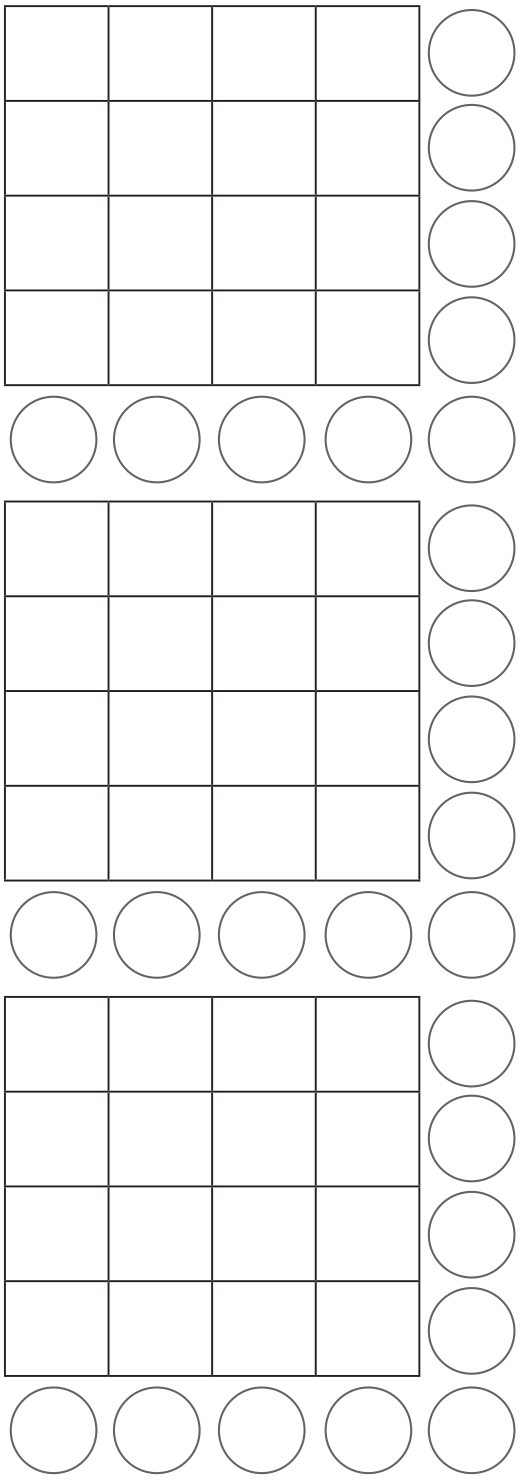
CROSS OUT SINGLES GAME BOARDS

Reproducible 14

Version 2 (4 x 4 Array)

Copy the game boards as needed to play the game (each pair should have one sheet for six rounds of play).

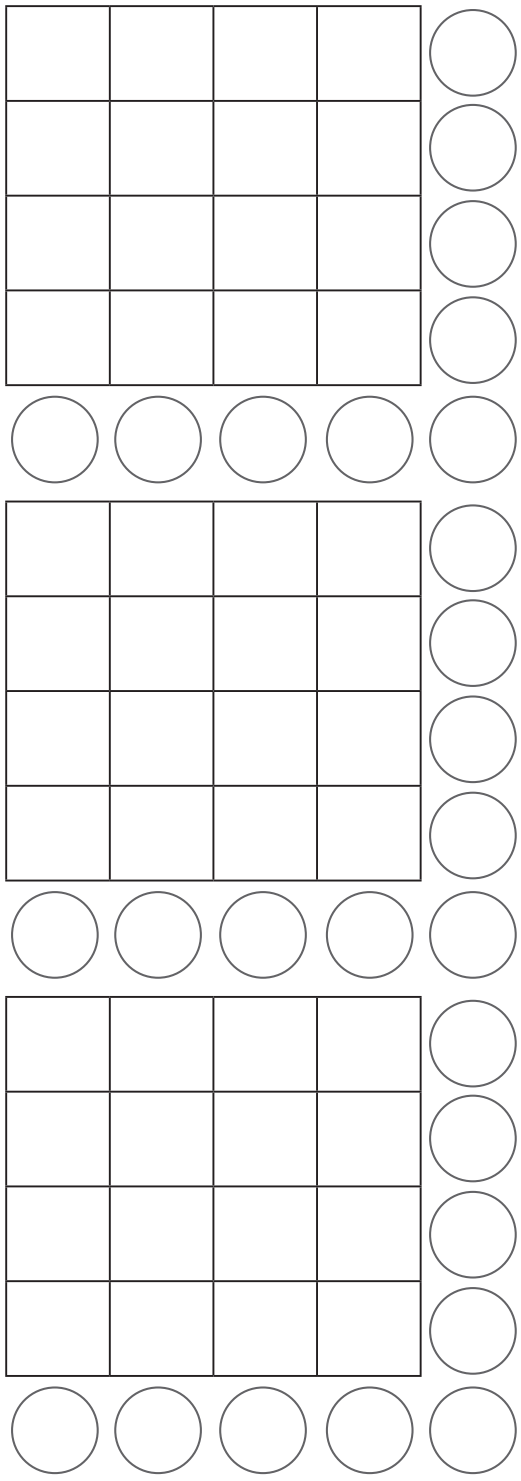
NAME _____



1 _____ 2 _____ 3 _____

Total _____

NAME _____



1 _____ 2 _____ 3 _____

Total _____