

Counting Fluency and Number Lines

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Research

- Verbal counting is a strong predictor of arithmetic fluency in future years.
- Counting on is a more advanced and challenging concept for students than counting all, and token/game piece activities can strengthen counting on.
- Benchmark strategies need to be explicitly taught, and have a positive impact on students' success with estimation.
- Counting fluency and proportional reasoning underpin mental math abilities. These skills can be visually represented and developed through the use of a number line as a concrete tool.

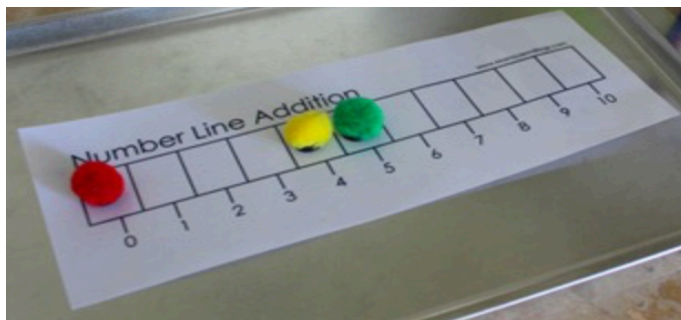
Look Fors/ Success Criteria

- Counting fluency to benchmarks, forward and backward.
- Proportions stay the same as students move along the number line.
- Using benchmarks (e.g. students show counting on by beginning at 3 and counting on to 7 saying "4,5,6,7").
- Curriculum relevant counting fluency (e.g. counting backwards by 1's from 50).

Activity Procedure:

Materials: Number line(s), unifix cubes or other game pieces, one die for each student (Game 1) or for each pair of students (Game 2).

Learning Goal: To help students strengthen their counting by using number lines and a die to count on, and eventually to further their abilities by using counting up and down from a benchmark on the number line.



In the image above, the students with the yellow and green game pieces have rolled a die to count up on the number line. The student with the red game piece has not taken a turn yet.

Activity Procedure:

Determine which of the sample number lines (<https://drive.google.com/open?id=1FhX-RKSQPru3jVyGohzcctEhqAnMGZhL>) is best suited for your students. If your students are struggling with counting on with small numbers, consider using Game 1 to have students individually practice counting on. If your students are more advanced with counting on, and can also count backward and forward without support, consider using Game 2.

- **Game 1: Individual Number lines.** This activity requires each student to have their own number line and game piece. Students may share one die.
- **Game 2: Tug-of-War.** This activity requires two students to share a number line that goes up to a minimum of 10. It also requires a die and one game piece.

Game 1: Students take turns rolling the die and move their game piece the correct number of spaces based on the number they roll. They should begin at 1. You may notice students trying to use their fingers to count up spaces, or bobbing their heads as they move their game piece the correct number of spaces. Some students may struggle with counting on the higher up they get on the number line. This game will help students become more comfortable with counting on and developing counting fluency because they will practice beginning counting with a 5 and counting up (e.g. if they roll a 3, they should say 6, 7, 8). This is a practice game and you may decide to have students race to the end, or have them repeatedly begin again at 1 to practice fluency.

Game 2: Two students play on one long (15 and over) number line. The game piece is placed in the middle of the number line, and students take turns rolling the dice to try to pull the game piece to their end. You may decide to give a student with stronger subtraction skills the task of counting backwards from the middle. The object of the game is to get the game piece to your own end of the number line by landing on the final hatch mark. The game can be repeated several times and the best out of 3 or 5 rounds is the winner.

Extension ideas:

- Use an extended number line up to 20, 50 or 100.
- Create a number line that increases in increments of 2's or 5's or 10's.
- Use the number line to represent fractions, decimals, larger digit numbers.
- Finding a point on the number line using proportional reasoning.
- Use increasingly more challenging benchmarks such as less friendly numbers like 7, 9 or 13.

Supports:

- Use a short number line (10>) with blank circles below to help students place their game piece in the correct spot.
- Have a friend help students keep track on their fingers how many spaces they have moved (may students may have difficulty with counting on fluently and keeping track of moving spaces).
- Have students use Game 1 and an individual number line rather than the tug-of-war Game 2.