

# SUPPORT NUMBER AND OPERATIONS USING A DEVELOPMENTAL PROGRESSION<sup>1</sup>

This recommendation and the supporting strategies are excerpted from the What Works Clearinghouse practice guide for *Teaching Math to Young Children*. This resource is part of a series of instructional briefs designed to help families, afterschool providers, and other caregivers support their students' early mathematics instruction while learning at home or in a hybrid learning environment.<sup>2</sup>

## Early experiences with number and operations are fundamental for acquiring more complex math concepts and skills.

Research suggests five steps to build early number knowledge, moving from basic number skills to operations. Below are examples of how to put the recommendation into practice both in the classroom and at home. With each step, children should first work with small collections of objects (one to three items), and then move to larger collections of objects.

### 1 Recognize small numbers of objects **without counting**



Correctly determining the number of objects in a small collection helps children learn more complex skills, including counting larger collections and eventually adding and subtracting.

- **Gather** any small collection of objects (one to three blocks or crayons) and **ask** children, “How many (objects) do I have (without counting)?”
- Instead of asking the child to put on his or her shoes, **say**, “Can you please put on your two shoes?”
- During mealtime, **ask** the child to quickly name—without counting—how many pieces of fruit are on the plate, or how many cups or napkins are on the table.

### 2 Practice one-to-one counting<sup>3</sup>



Learning to assign the numbers of the count sequence to a collection of objects that are being counted helps children connect numbers with quantity.

- **Model** one-to-one counting with one to three items, and **emphasize or repeat** the last number word used in the counting process. Eventually, children will learn that the last number in a set is the same as the total number without having to recount.
- **Help** children learn that counting is a way to answer the question, “How many?” Throughout the day, **ask** them to tell you “how many” there are of something (for example, when you read together, at mealtimes, or while playing).

#### Try this:

While pointing at each object, count:



“one”



“two”



(with emphasis)



“There are **three** (cylinders) here.”

1

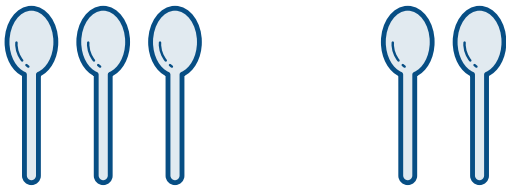
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Use number words and counting to **compare**



Understanding relational terms such as “more” and “fewer” prepares children for making meaningful, verbal comparisons of magnitudes.

- **Show** children two groups of spoons and ask, “Which group has more spoons?” You also can **provide** children with examples of “equal” by showing two groups with the same number of spoons.
- At mealtime, **ask**, “Which plate has more or fewer grapes?” After the child responds, **discuss** what “more” and “fewer” mean.



4

Label collections with number words and numerals



After children have practiced recognizing, counting, and comparing quantities, introduce numerals to children as a way to represent a quantity.

- **Ask** children to count a group of objects, such as their pencils or their collection of stuffed animals. **Write** the number for how many they counted so that children begin to learn that the numeral, objects, and spoken word represent the same thing.
- For children who do not yet recognize numerals, **use** dots next to the numeral for them to count and figure out what the numeral indicates.



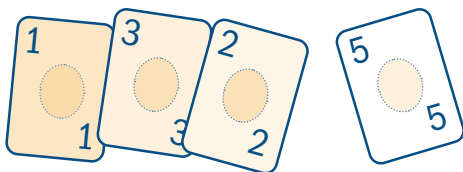
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Once children develop these fundamental number skills, encourage them to **solve basic problems**.



**Problem solving challenges children to use their math knowledge to answer and explain math-related questions and to see how they can apply counting to solve everyday problems.**

- **Provide** children with opportunities to practice adding and subtracting or to solve problems with “more” and “fewer.” Older children may especially enjoy a problem-solving game, such as *Flip the Cards*.<sup>4</sup>



- As the child eats his or her snack, **ask** the child to count how many items there are. Next, **ask**, “How many will you have after you eat one?” or “How many will you have after your friend gives you one?” This activity provides good practice for understanding comparisons of more and fewer and combining or removing objects.



2

1 See [https://ies.ed.gov/ncee/wcc/Docs/PracticeGuide/early\\_math\\_pg\\_111313.pdf#page=18](https://ies.ed.gov/ncee/wcc/Docs/PracticeGuide/early_math_pg_111313.pdf#page=18). The recommendation reflects a systematic review of the available literature along with the expertise of a panel of specialists. The supporting research provides a *moderate* level of evidence for the recommendation.

2 Some examples reflect modified versions of the examples included in <https://ies.ed.gov/ncee/edlabs/regions/central/resources/teachingearlymath/1-numbers.asp>.

3 See [https://ies.ed.gov/ncee/wcc/Docs/PracticeGuide/early\\_math\\_pg\\_111313.pdf#page=25](https://ies.ed.gov/ncee/wcc/Docs/PracticeGuide/early_math_pg_111313.pdf#page=25) (page 19) for a summary of common counting errors.

4 [https://ies.ed.gov/ncee/edlabs/regions/central/resources/teachingearlymath/materials/Rec1\\_Flip-the-Cards.pdf](https://ies.ed.gov/ncee/edlabs/regions/central/resources/teachingearlymath/materials/Rec1_Flip-the-Cards.pdf)