



Math Perspectives

Teacher Development Center

Linking Assessment to instruction

2: Changing Numbers Assessment

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The following charts outline suggested activities for each instructional level of the *Changing Numbers* assessments. They refer to particular activities from the *Developing Number Concepts* (DNC) series of books. The DNC series includes both teacher-directed and independent activities specifically designed to meet the varied needs of your students. The suggested activities are coded for easy access. For example, “1:2-23” refers to DNC Book 1, Chapter 2, Activity Number 23.

Please note – these charts provide a quick-overview of activities for instruction. For complete background information, please refer to these helpful resources:

Math Time: The Learning Environment by Kathy Richardson

Developing Number Concepts by Kathy Richardson

For Professional Development Opportunities

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Suggested Reading

For additional information that will support your instruction, read the following sections from *Developing Number Concepts Book One: Counting, Comparing and Pattern*:

- What You Need to Know About Beginning Number Concepts (p. 2-4)
- Goals for Children’s Learning (p. 6-7)
- Meeting the Range of Needs (p. 8-11)
- Classroom Scenes (p. 12-21)

Providing Appropriate Instruction

When helping children develop proficiency with counting objects, it is important to recognize that competency develops over time. Present a variety of activities, allowing children to experience counting in many ways over several weeks. This will help them make generalizations and integrate their ideas about counting. Let their responses dictate the amount of time you spend before moving on.

Teacher-Directed Small-Group Work

Choose 3 or 4 activities and present them in a 10-15 minute small-group session to provide the children with a variety of experiences. Do the same tasks for several days. Occasionally replace one of the tasks with a new one. Adjust the size of the numbers according to the children's responses. Usually work with just one group a day so you have time to interact with the children while they work at the Independent Stations.

Independent Station Work

Give children opportunities to choose from among several activities. These choices should be available for several weeks. During this time, the children will be developing proficiency and moving to larger numbers, as they are able. Interact with the children as they work, supporting them and challenging them as needed.

CHANGING NUMBERS

Looking for relationships should be a part of children's work with counting. A focus on relationships will help children go beyond counting to developing meaning for the numbers they work with. When numbers are meaningful, children have a sense of their relative size. They know, for example, that when they are counting out 7 crackers, they are almost there when they have 5. They know that they have quite a few more to count if they want to end up with 10 crackers. In order to see the relationships between numbers, the child needs to see that one number is contained within another larger number.

In this assessment, two levels of understanding are assessed at the same time. One is the ability to change one number to another (Method for Changing Number) and the other is the ability to describe how many were added or taken away to make the new number (Describes Relationship).

Level 1: Method for Changing Number (to 6, to 10 and to 20)

The child is asked to change a number to another number 3 times, sometimes changing to a larger number and sometimes changing to a smaller number.

The purpose of Level 1 is to find out whether children understand that one number is contained in another number. There are two ways that children can demonstrate this level of thinking. One way is to add on or take off the appropriate number of objects. So, for example, a child would change 5 to 8 by getting 3 counters and adding them on, or she would change 8 to 6 by taking 2 counters away. Another way children can show an understanding of this concept is by counting on (or counting back) – but only if they are aware of the number added on or removed. To understand that one number is part of another number, the child must "see" both numbers when they are combined or separated. When a child counts on (or back) but is **not** aware of the number added on or taken away, from the child's point of view, the first number has merged into the other number and has "disappeared." This reveals that the child is not yet fully cognizant of the parts that make up numbers.

Needs Prerequisite (N)

(N) – Unable to change the number 2 or 3 (out of 3) times—usually makes a new pile or adds the number asked for onto the original pile.

Children who make a new pile or add the number asked for onto the original pile do not see that one number is contained within another number. They think of each number as separate and unrelated to other numbers.

To get more information about what these students understand about counting, assess using *Assessing Math Concepts: Counting Objects*. This will help you determine whether they have the necessary foundation in counting.

Focus on counting activities where there is the potential for noticing relationships using numbers the children can count to easily.

TEACHER-DIRECTED ACTIVITIES	
1:1-8	<i>Grow and Shrink</i>
1:1-15	<i>Tall and Short</i>
1:1-10	<i>Hunt for It</i>
1:1-16	<i>One More/One Less</i>

INDEPENDENT ACTIVITIES	
1:1-40	<i>Sorting Shape Puzzles</i>
1:1-41	<i>Sorting Line Puzzles</i>

Needs Instruction (I)

(I) – Counts all 2 or 3 (out of 3) times. Changes the number correctly at least 2 (out of 3) times but needs to count all (starting with one) in order to do it.

At this stage, when asked to make a larger number, children understand that they need to add on to the pile, but they have to count the whole pile in order to do so. When asked to make a smaller number, they count to the number asked for and remove the extras, usually not paying attention to the particular number removed. Focus on asking them ahead of time whether they need to get some more or take some off to make another number to engage them in thinking about the relationships.

TEACHER-DIRECTED ACTIVITIES			
		To 6	To 10
1:1-8	<i>Grow and Shrink</i>	•	•
1:1-10	<i>Hunt for It</i>	•	•
1:1-15	<i>Tall and Short</i>	•	•
1:1-16	<i>One More/One Less</i>	•	•
1:3-8	<i>More-or-Less Counting Stories</i>	•	•
1:3-9	<i>Build a Stack</i>	•	•

INDEPENDENT ACTIVITIES			
		To 6	To 10
1:1-41	<i>Sorting Shape Puzzles</i>	•	•
1:1-41	<i>Sorting Line Puzzles</i>	•	•
1:3-22	<i>Counting Boards: Changing Numbers</i>	•	•

Needs Practice (P-, P, P+)

(P-) – Adds some, checks and fixes 2 or 3 (out of 3) times.

The children try to add on or take away without counting all the counters, but since they don't know how many to add on or take away, they "guess" an amount they think it might be and then check and fix it.

(P) – Counts on or back 2 or 3 (out of 3) times but does not know how many were added or taken away 2 or more times.

When children count on or back but are unaware of how many they added or took away, they need more practice – using smaller differences first and then moving to larger differences as they are able.

(P+) – Adds on a group; or counts on and says how many added 2 (out of 3) times.

Focus on identifying the number added or taken away when changing the number to another number.

TEACHER-DIRECTED ACTIVITIES	
1:1-8	<i>Grow and Shrink</i>
1:1-15	<i>Tall and Short</i>
1:1-16	<i>One More/One Less</i>
1:1-17	<i>Give and Take</i>
1:1-20	<i>Towers, Towers, Towers</i>

INDEPENDENT ACTIVITIES	
1:3-22	<i>Counting Boards: Changing Numbers</i>
1:1-35	<i>Give-and-Take Station</i>
1:1-38	<i>Sorting Colors</i>
1:1-39	<i>Sorting Collections</i>

Ready to Apply (A)

(A) – Adds on (or removes) a group with no errors; **or** counts on (or back) and says how many added (or removed) with no errors.

Level 2: Describing the Difference

When children first learn to change one number to another, they are focused on getting to the number and not on the quantity they needed to add or take away. Once the children are able to count on, count back, or count up, they should be asked to think about what they did to change the number. Most will need to actually change the number before they can tell you the difference.

Needs Prerequisite (N)

(N) – Unable to tell how many added or taken away, **or** makes 3 errors.

At this stage, the children's attention is on the number they are trying to make and not on the difference between the numbers. Continue with the activities described above until changing the number is easy enough for them and they begin to think about the difference between the two numbers.

Needs Instruction (I)

(I) – Is able to say the number added or taken away 1 time only, **or** makes 2 errors.

At this stage, the children are beginning to notice what they did to change the number and can say how many they added or took away for one of the numbers. Work with small numbers and small differences to help them become more aware of what they are doing to change the number. Ask them to consider ahead of time whether they need to get some more or take some off to make the new number. Continue with the activities described above at the instructional level identified for Method for Changing.

Needs Practice (P)

(P) – Says number added or taken away for all 3, but makes 1 error, **or** figures out the number added or taken away 2 or 3 (out of 3) times. May make an error.

At this stage, the children are able to figure out how many they added or took away 2 or 3 (out of 3) times. Focus on providing many experiences with small numbers and small differences until they know how many to add or take away without needing to figure it out.

TEACHER-DIRECTED ACTIVITIES	
1:1-8	Grow and Shrink
1:1-15	Tall and Short
1:1-16	One More/One Less
1:1-17	Give and Take
1:1-20	Towers, Towers, Towers

INDEPENDENT ACTIVITIES	
1:3-22	<i>Counting Boards: Changing Numbers</i>
2:1-8	<i>Grow and Shrink: Using the Plus (+) and Minus (-) Signs</i>
2:3-16	<i>Apartment Buildings</i>

Ready to Apply (A-, A)

(A-) – Says number added or taken away but checks 1 to 3 (out of 3) times.

At this stage, the children know the number they added or took away, but they lack confidence and need to check. Continue with the activities described above for “Needs Practice”. Help the children become aware when they know how many they added on or took away. Sometimes have them predict ahead of time what they think the number will be to help them see that they know some differences even before they count.

(A) – Says number added or taken away for 3 (out of 3) times, no errors.

Once children know the relationships between numbers within a certain range, give them experiences with larger numbers or greater differences.