

Using Counting Collections School-Wide

What is Counting Collections?

In Counting Collections, children are given a collection of objects to count. The activity often begins with a mini-lesson in which the teacher highlights a particular idea like how to share the counting task with a partner, an efficient counting strategy they have seen students using, or a way to record their count.



The teacher will then pass out counting collections to partners. Teachers often select strategic partners and collection sizes for students based on mathematical and social goals. Children begin counting together, negotiating the way they will count their collection and then recording how they counted.

While students are working the teacher will circulate, observing children's strategies, problem solving with students, highlighting strategies that are being used, discussing recordings, and supporting partners to work together.



Often the teacher will conclude the activity by revisiting the idea highlighted in the mini-lesson or sharing out ideas that emerged from students during the task.

Learning Important Mathematical Ideas Through Counting Collections

Why is counting important?

The important skills and understandings that make up counting are developed through many opportunities to count. As adults who count with ease, it is hard to recall all of the component skills involved in learning to count and making sense of quantity. Some of the important concepts of number that children develop include:

- Number names: What do I say?
- Sequence of numbers: What order do the number names go in?
- Name-symbol relation: How do I write that number?
- One-to-one correspondence: Saying one number name for each object counted.
- Cardinality: The last number said is the total amount of objects.
- Relative size: Which is bigger?
- Base-ten structure: How do these numbers (written and verbal) go together?
- Efficiency and accuracy in counting: How can I group objects to count and record more efficiently?
- Representations: How do I communicate my ideas in words, numbers, and drawings?

Developing Counting Skills Over Time

Young students are working to coordinate three aspects of number during Counting Collections. To really understand what 12 means, students need to connect the verbal name (“Twelve”), the quantity (12 items), and the written number (12). This activity asks students to work on all three aspects during Counting Collections by counting the items, assigning a unique number name to each item, determining the total amount, and then representing that quantity in words and written notation. Students often utilize number charts in order to find out how to write new numbers.

Later on, students develop a richer understanding of how our base-ten number system is structured and begin to make use of place value to count more efficiently. This is often done using tools like a ten-frame or cups to hold groups of ten.



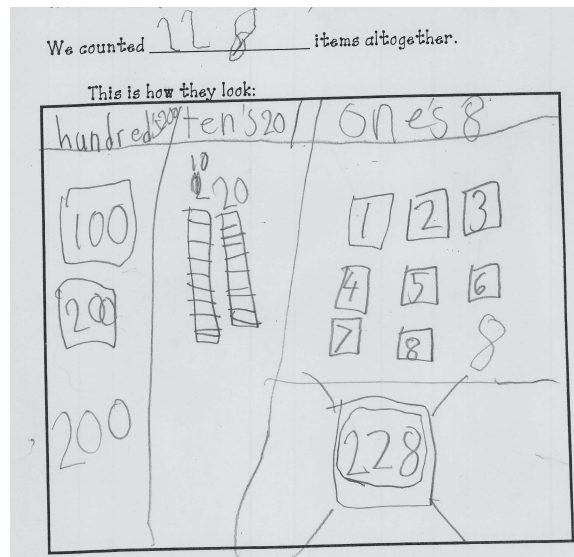
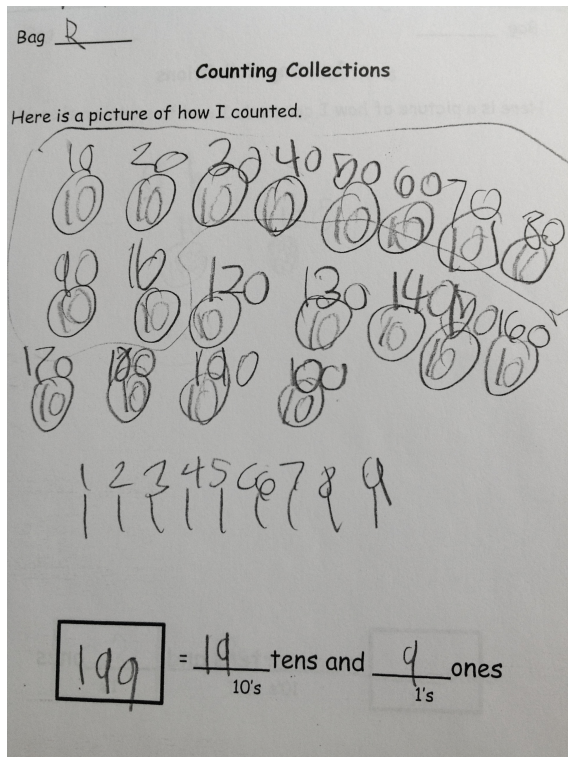
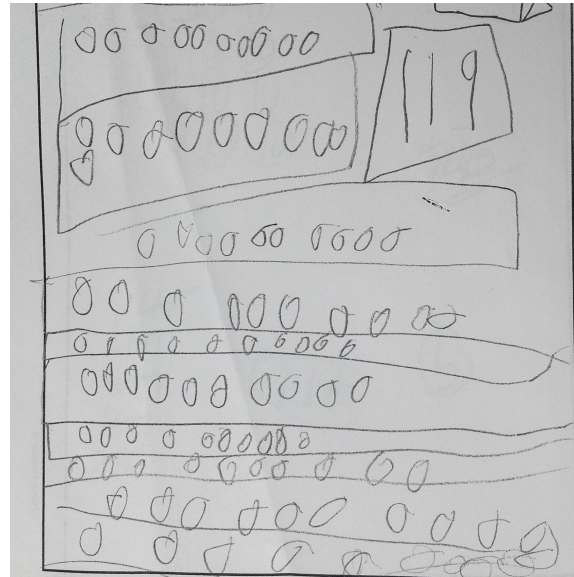
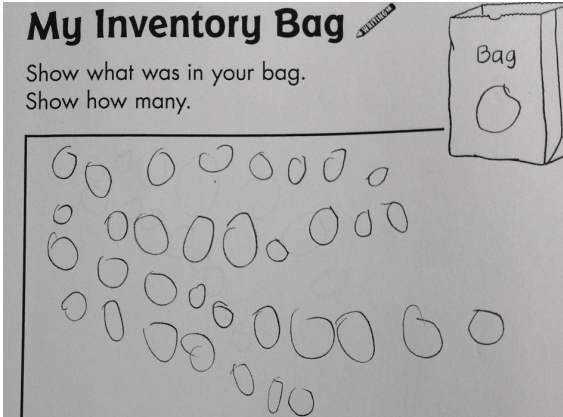
In the past we have often not given students enough practice counting and writing numbers far beyond 100.

This can become a barrier for students as they are developing strategies for operating on larger numbers. Counting Collections provides a space for students to learn about and generalize the structure of the base-ten number system well into the hundreds and beyond, supported by tools such as 1,000 charts.

Developing Recording Strategies Over Time

After students count their collections you will have them show you *how* they counted. When you first begin Counting Collections, this might mean students leave out the items to show you how they lined up the items, how they have grouped their items, what it sounds like to count them, etc. You will also introduce students to recording their count on paper. This is an important part of the activity; recording the counted collection is a chance for students to practice representing quantity and writing numbers.

When young students first record their collection on paper they might draw the collection by ones, draw how they organized the count, or write the total amount. Eventually students may use number sentences to show how items were grouped and combined when counting. In order for students to use formal mathematical notation to record how they counted, you will have to introduce some conventions. Below are some samples of student representations of collection that demonstrate a wide range of sophistication.



Creating a School-Wide “Library” of Counting Collections

Counting Collections is a routine activity that students can do over and over again. Students benefit from many opportunities to count and develop increasing sophistication and confidence with counting and representation. Many primary teachers have found it useful to do counting collections once a week or more. Intermediate teachers might do collections less often, depending on the mathematics they are focusing on at the time.

If you want an entire school to be doing Counting Collections it is useful to pool resources to create a “library” of collections that teachers can borrow for a day and then return. This allows teachers to have a wide range of collection sizes available to them without needing to generate and store all of them.

Items for Collections

Look around... there are items that can be used for counting collections everywhere!



Some guidelines for selecting items to count:

Anything can be counted: collections do not need to be fancy or expensive!

- For young students, larger items are safer and make counting easier
- Round items that roll, like beads, can make counting and clean-up tricky
- Items that link together (like paper clips) can become tangled and might require some extra time to organize
- Try to strike a balance between exciting-to-count and distracting:
 - Unique and intriguing items like plastic bugs or baseball cards can be fun to count, but may also distract students from the task.
 - Collections that contain multiple colors or shapes like pattern blocks or beads are tempting to sort!

Some easy collection ideas:

- Puzzle pieces from an old puzzle
- Playing cards from an incomplete deck
- Pattern blocks
- Rocks
- Buttons
- Plastic bottle caps
- Marker caps from dried up markers

How do I gather all these things?

Invite staff, parents, and community members to collect and donate items that they might already have. You could even request particular items like buttons. If everyone brings in a few buttons, you have a collection (or a few collections!). It might be helpful to have a central location that people can drop off items, like in the office. You can also use manipulatives and office supplies that you already have at the school.

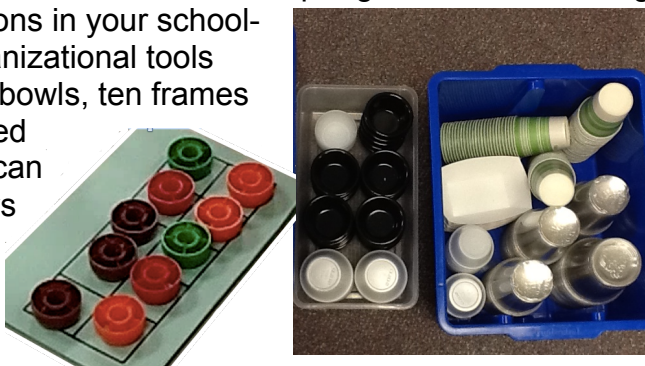
How do I organize all of these Counting Collections?

As you gather items for collections, begin to organize them in plastic bags or other containers. You could choose to label the collections by letter to keep track of the bags, if desired.

Once you have lots of collections organized into bags you can begin to make class sets. It takes about 13-15 bags to make a classroom set (enough for each pair of students and a few extra). You do not need to know the exact amount of items in each collection, but it is helpful to organize classroom sets so that there is a similar range of items in each bag. For example, in a primary class set there might be between 20-50 items, in an intermediate class set there might be 200-300 items.

We have found that cardboard filing boxes are about the right size for a classroom set and are easy to carry. Label the size of collections so that it is easy to find collections that are just the right size for your students.

One goal of counting collections is that students learn to group items in increasingly efficient ways. It is helpful to provide students with tools to help organize their counting. In addition to gathering counting collections in your school-wide library, you might also provide organizational tools like: plastic cups, paper plates, trays, or bowls, ten frames (to organize 10 individual items), “hundred frames” (larger 10 frames that students can place cups of 10 on top of), or other ways to group items.



How many items do I put in the collections?

The size of your collections will vary with your students. For example: Kindergarten collections might range from 15 (in September) to 150 or more later in the year. First graders may begin with counts of 50-100 and later to count 200 as they transition to counting by tens and ones. Second and third graders may begin counting 100-150 objects by ones or tens and gradually increase the size of the collection and the efficiency of grouping. Third, fourth, and fifth graders will continue to develop efficient ways of counting including groups of 10, 20, 50, etc to count large collections (300+). They will also count smaller collections of sets (eg. 12 boxes of 8 crayons).

Sets of Items

For older counters, gather collections that come in packages that can't be opened. For example, boxes of 100 paperclips, 12 pencils, 8 crayons, 25 binder clips, etc. You can also include some loose items, like 5 boxes of 12 pencils and 5 loose pencils. These collections provide an opportunity to count by groups other than 10, building flexible strategies for counting and ideas about multiplication.



A Sample Library for a School of ~400 K-5 students

	Approximate Quantity Range	Grades that would be likely to use this box	How many of this box to make
Early Kindergarten collections	4-15	K	4
A boxes	20-60	K-1	4
B boxes	50-100	K-2	3
C boxes	100-150	K-3	3
D boxes	150-200	1-3	2
E boxes	200-500	2-5	2
Sets of items	varies	3-5	1
Challenge or whole class boxes	400-1,000	3-5	1

What to do with those inevitable stray items that turn up?

A collections "lost and found" bin is a great place to collect these loose items. When you have enough, they can turn into their own collection bag! This is often one of the students' favorite collections to count.



Classroom Materials

Students in every class will need access to number charts to support their counting and recording of the collections. This might be a 20, 30, 50, 100, 300, or 1,000 chart, depending on the size of collections that students are working with.

You might provide a supply of basic recording sheets for counting collections in your collections library, but teachers will likely begin using different variations on the recording sheet depending on what mathematical ideas they want students to focus on. Below are some examples of different recording sheets that teachers have used.

Name _____ Date _____

Bag _____

Counting Collections

I have _____ items.

Here is a picture of how I counted.

Bag _____

Counting Collections

I have _____ items.

Here is a picture of how I counted.

_____ = _____ tens and _____ ones.
10's 1's

What **collection** are you counting? _____

Estimate how many items are in your set: _____

Now **organize** your objects and count them.

In the box below, make a **representation** of your set:

How many objects are in your set? _____

What is the **difference** between your **estimate** and the **actual number** of objects in your set? _____

Show your work here:

Innovations and Extensions of Counting Collections

Counting Collections is a great activity to develop students' concepts of counting, quantity, and the base-ten number system. Many teachers have innovated and modified the Counting Collections activity in order to work on other mathematical ideas, like:

Flexible understanding of number and quantity:

- Students draw a card with a number on it and build a collection of that size (representing a written number as a counted collection of items, rather than counting to find out how many and creating a written representation)
- Is your collection even or odd?
- How many tens in your collection? How many ones?
- Estimate before counting, adjust estimate along the way, compare estimate to the final count.

Addition and subtraction:

- After counting 2 collections, determine how many are in the two collections altogether. (Join Result Unknown situation)
- After counting a collection, find out: how many more to ____? (Join Change Unknown situation)

Multiplication and division:

- Understanding multiplication as a number of equal size groups of objects: Writing equations using multiplication to record the count.
- Factors and multiples: Given a collection of ____ items, what are all the equal groups you can create?
- Dividing a collection: How many groups? How many objects in each group?
- Multiple meanings of division: Dealing items out one-by-one versus scooping a given amount each time
- Skip counting by 5s, 10s, 20s, 100s

Counting Collections Resources

Schwerdtfeger, J., & Chan, A. (2007). Counting Collections. *Teaching Children Mathematics*, (March).

Investigations, elementary math curriculum published by TERC: “Inventory Bags” activity, grades K-2