K:6 More Shells or More Stars?

Teacher Notes

Central math concepts

Several tasks in kindergarten focus directly on the domain of counting and cardinality, which is students' all-important entry point to number and operations. At a high level, counting and cardinality (how many there are) involves:†

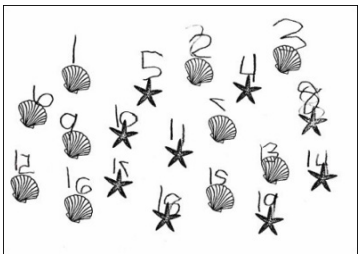
- Knowing number names and the count sequence;
- Counting to tell the number of objects; and
- Comparing numbers.

Cardinal counting (counting to tell how many) is both procedural and conceptual. Cardinal counting a group of objects uses the procedure of saying the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. This procedure depends on students becoming fluent in saying the count sequence, so that they have enough attention to focus on the pairings involved in counting objects. And conceptually, cardinal counting involves principles of cardinality:

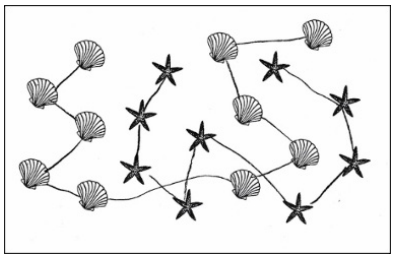
- Understanding that the last number name said tells the number of objects counted.
- Understanding that each successive number name in the count sequence refers to a quantity that is one larger.
- Understanding that the number of objects is the same regardless of their arrangement or the order in which they were counted.

When it comes to comparing numbers, the focus in kindergarten is on comparing the amounts in two collections of objects. Students "[i]dentify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, for example, by using matching and counting strategies" (CCSS K.CC.C.6).

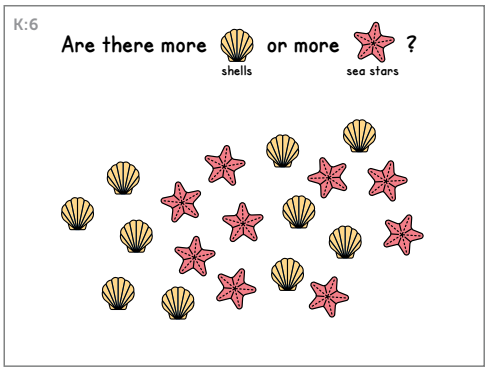
In task K:6 in particular, comparing the number of shells to the number of sea stars involves conceiving of the total group of objects as two groups, and using a method to keep track of the counts of two scattered arrangements (see the two samples of student work).



A student counted the total group, instead of counting two groups.



For each group, a student drew a line to keep track of the objects counted.



Answer

There are more shells. (Students should use counting to decide, rather than making a guess or an unsupported claim.)

Click here for a student-facing version of the task.

Refer to the Standards

K.CC.B.5; MP.1, MP.6. Standards codes refer to www.corestandards.org. One purpose of the codes is that they may allow a task to shed light on the Standards cited for that task. Conversely, reading the cited Standards may suggest opportunities to extend a task or draw out its implications. Finally, Standards codes may also assist with locating relevant sections in curriculum materials, including materials aligned to comparable standards.

Aspect(s) of rigor:

Concepts, Procedural skill and fluency

Relevant prior knowledge

The following mathematics knowledge may be activated, extended, and deepened while students work on the task: saying the count sequence through 10; counting with 1-1 correspondence; and concepts of cardinality.

Extending the task

How might students drive the conversation further?

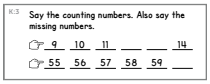
- Two students who got different answers could show each other how they determined the answer and resolve their disagreement.
- Students who can count out objects with support can create a "puzzle" version of task K:6 using numbers that are within their known count sequence and for which they have cardinal-counting experience and experience comparing groups of objects, by drawing two collections of objects (or assembling objects, or pasting cutouts to a sheet of paper, etc.). Students could ask a caregiver, parent, or family member to solve their puzzle.

Related Math Milestones tasks

K:1

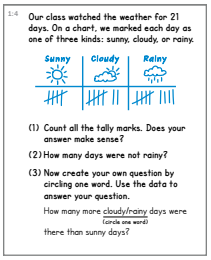
K:14

K:3

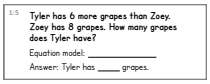


Task **K:1 How Many Blocks?** involves concepts and skills of counting and cardinality. Task **K:14 Animals from Land and Sea** involves a comparison of two groups (groups which the student forms by classifying the animals). Task **K:3 Say the Numbers (Teens, Decades)** involves the counting sequence.

1:4



1:5



In later grades, students begin to quantify how many more are in one group than another, as in the word problems in tasks **1:4 Analyzing Weather Data** (part (3), situation type "Compare with Difference Unknown") and **1:5 Tyler's Grapes** (situation type "Compare with Bigger Unknown"). For Compare problems in grade 2, see the Map of Addition and Subtraction Situations in K–2 Math Milestones.

Additional notes on the design of the task

- Observing a student while they work on the task can provide information about development in the progression of skills and concepts in counting and cardinality.
- Completing the task doesn't require students to write a comparison statement such as 10 > 9 because writing comparisons that include the symbols > and < is introduced in grade 1.
- Students might know about sea stars under the name *starfish*.

Curriculum connection

1. In which unit of your curriculum would you expect to find tasks like K:6? Locate 2-3 similar tasks in that unit. How are the tasks you found similar to each other, and to K:6? In what specific ways do they differ from K:6?
2. Thinking about the curriculum unit you identified, at what point in the unit might a task like K:6 help students converge toward grade-level thinking about the important mathematics in the task? What factors would you consider in choosing when to use such a task in the unit?*

† For additional discussion, see pp. 4, 5 of *Progressions for the Common Core State Standards in Mathematics (draft): K, Counting and Cardinality; K–5, Operations and Algebraic Thinking* (Common Core Standards Writing Team, May 29, 2011. Tucson, AZ: Institute for Mathematics and Education, University of Arizona).

* Math Milestones™ tasks are not designed for summative assessment. Used formatively, the tasks can reveal and promote student thinking.

Anticipating and responding to student thinking about the task

Imagine how students might think about the task, and what you might see and hear while they work.

On this page, you can write your thoughts on the following questions.

Solution Paths

- What solution paths might you expect to see?
- What representations might you see? What correspondences between those representations might be noticed by students (or be worth pointing out to students) and discussed by them?
- What misconceptions or partial understandings might be revealed as students work on the task? How could you respond to these positively and productively?

Language

- What might you expect to hear from students engaged with the task? What does that language reveal about their mathematical thinking, and how might you respond to different ways of thinking?
- If students are using early English or using multiple languages in an integrated communication system, how might you help their classmates see those mathematical ideas as valuable?
- Even when using nascent language, students are thinking and communicating their thinking. What might it look like to respond positively and productively to the mathematics in their thinking before giving feedback on the language used?

Identity, Agency, and Belonging

- How can you engage students' interests, experiences, or funds of knowledge?
- How can you build students' self-confidence as learners, thinkers, and doers of mathematics?
- What choices are there for a student to make in the task? How can you build students' agency to the point where they notice and make these choices to solve problems?
- How might one use feedback to build student agency? Where might there be opportunities to build students' self-confidence?