

Measurement

Kindergarten

Formative Assessment Lesson

Designed and revised by Kentucky Department of Education Mathematics Specialists
Field-tested by Kentucky Mathematics Leadership Network Teachers

Created for the sole purpose of assisting teachers as they develop student understanding of Kentucky's Core Academic Standard through the use of highly effective teaching and learning.

Not intended for sale.

This Formative Assessment Lesson is designed to be part of an instructional unit. This task should be implemented approximately two-thirds of the way through the instructional unit. The results of this task should then be used to inform the instruction that will take place for the remainder of your unit.

Mathematical goals

This lesson unit is intended to help you assess how well students are able to compare common measurable attributes of objects to see which has more of the attribute. It will help you to identify students who have the following difficulties:

- Describing measurable attributes of objects
- Directly comparing two objects
- Describing the difference between the measurable attributes of two objects

Common Core State Standards

This lesson involves *mathematical content* in the standards from across the grade, with emphasis on:

Measurement and Data K.MD

Describe and compare measurable attributes.

1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*

This lesson involves a range of *Standards for Mathematical Practice*, with emphasis on:

- 2 Reason abstractly and quantitatively.
- 3 Construct viable arguments and critique the reasoning of others.

Introduction

This lesson is structured in the following way:

- Before the lesson, students work individually on an assessment task that is designed to reveal their current understandings and difficulties. You then review their work and create questions for students to answer in order to improve their solutions.
- Students work in small groups on collaborative discussion tasks, to match cards with dots in regular patterns, structured 10 frame patterns, unstructured arrangements, and numerals. As they do this, they interpret the cards’ meanings and begin to link them together. Throughout their work, students justify and explain their decisions to their peers.
- Students return to their original assessment tasks, and try to improve their own responses.

Materials required

Each individual student will need:

- Two copies of the assessment task

Each small group of students will need the following resources:

- *Card sets: A, B, C, and D.* All cards should be cut up before the lesson and it would be helpful if each set were a different color.
- *Sorting Mats: A, B, C, and D.* The colors of the mats should match the color of the cards.

Time needed

Approximately 15 minutes before the lesson (for the individual assessment task), one 40 minute lesson, and 15 minutes for a follow-up lesson (for students to revisit individual assessment task). Timings given are only approximate. All students need not complete all sets of activity cards. Exact timings will depend on the needs of the class.

Before the Lesson

Assessment task: *Measuring* (15-20 minutes)

Have students do this task individually in class a day or more before the formative assessment lesson. This will give you an opportunity to assess the work, and to find out the kinds of difficulties students have with it. You will be able to target your help more effectively in the follow-up lesson. Depending on your class you can have them complete the assessment task in whole group or small groups (they should still work individually).

Frame the Pre-Assessment

Give each student a copy of the assessment task.

Today we are going to work on a task about measuring. This task is to help me see ways that I can help you if you are having any problems measuring. If you are not sure about all of your answers, it is okay. We are going to do an activity that will help us get better at measuring.

The teacher or another adult should ask each student what they could measure about the box and list what the student says. The teacher or another adult can then work with small groups of students to read the directions for the other questions and allow them to circle the answer they choose. The teacher can ask students individually to explain their choices.

It is important that the students are allowed to answer the questions without your assistance, as far as possible.

Students should not worry too much if they cannot understand or do everything, because in the next lesson they will engage in a similar task, which should help them. Explain to students that by the end of the next lesson, they should expect to answer questions such as these confidently. This is their goal.

Assessing students' responses

Collect students' responses to the task. Make some notes about what their work reveals about their current levels of understanding, and their different problem solving approaches. Partner/Group students with others who displayed similar errors/misconceptions on the pre-assessment task.

We suggest that you do not score student's work. The research shows that this will be counterproductive, as it will encourage students to compare their scores, and will distract their attention from what they can do to improve their mathematics.

Instead, help students to make further progress by summarizing their difficulties as a series of questions. Some questions on the following page may serve as examples. These questions have been drawn from commonly identified student misconceptions.

We suggest that you write a list of your own questions, based on your students' work, using, but not limited to, the ideas that follow. You may choose to write questions on each student's work. If you do not have time to do this, select a few questions that will be of help to the majority of students. These can be written on the board at the end of the lesson before the students are given the post assessment task.

The solution to all these difficulties is not to teach one particular way of counting-one to one matching-but to help students to find a variety of ways that work in different situations and make sense to them.

Below is a list of common issues and questions/prompts that may be written on individual initial tasks or during the collaborative activity to help students clarify and extend their thinking.

Common Issues:	Suggested questions and prompts:
Students can't identify a measurable attribute of an object or identify attributes that are not measurable (color, shape, etc.)	<ul style="list-style-type: none"> • What does it mean to measure something? • What are some ways you can measure something?
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(Need student data to identify these!)

Suggested lesson outline

Collaborative Activity: Sorting *Card Sets A, B, C, and D* (30 min.)

Strategically group students based on pre-assessment data in to groups of two or three. With larger groups, some students may not fully engage in the task. Group students with others who displayed similar errors/misconceptions on the pre-assessment task. With kindergarteners, you may want to do this with a group of six or so students, allowing them to work in pairs as you watch their work and give verbal directions. While you want to be available to guide them, to read to them, and to give general directions, you should not give them specific directions as to where to place objects. Rather, you should ask them questions to help clarify their thinking and ask them to explain their thinking. You will also want to make notes about their thinking to see if there are patterns in the thinking across your classroom or groups of students.

Give each group *Card Set A* and *Sorting Mat A* (Taller/Shorter).

Introduce the lesson carefully:

I want you to work as a team. Take turns placing a pair of picture cards onto the sorting mat. Each time you do this; explain your thinking clearly to your partner. If your partner disagrees with your match then challenge him or her to explain why. It is important that you both understand why each pair is placed where it is on the mat. There is a lot of work to do today and you may not all finish. The important thing is to learn something new, so take your time.

Your tasks during the small group work are to make a note of student approaches to the task, and to support student problem solving. As you monitor the work, listen to the discussion and challenge students to explain their reasoning.

For the heavier/lighter and holds more/holds less you may have students work with similar pairs (for example, they two animals are a pair, the spoon and shovel are a pair) or you may have them choose two things to determine which goes on each side of the chart.

Make a note of student approaches to the task

You can then use this information to focus a whole-class discussion towards the end of the lesson. In particular, notice any common mistakes.

Support student problem solving

Try not to make suggestions that move students toward a particular approach to the task. Instead, ask questions to help students clarify their thinking. Encourage students to use each other as a resource for learning. (“What does your partner think? Explain to your partner why you think that goes there.”)

If one student has placed a particular card on the mat, challenge their partner to provide an explanation.

If you find students have difficulty articulating their decisions, then you may want to use the questions from the *Common Issues* table to support your questioning.

If the whole class is struggling on the same issue, then you may want to organize a whole class discussion around that problem later.

Placing Card Set B (Longer/Shorter)

As students finish with sorting card set A and can explain their work, give them card set B and sorting chart. Continue to monitor work and listen to discussion.

Placing Card Set C (Heavier/Lighter)

As students finish matching card set B and can explain their work, hand out card set C. Continue to monitor work and listen to discussion.

Placing Card Set D (Holds more/Holds less)

As students finish matching card set C and can explain their work, hand out card set D. Continue to monitor work and listen to discussion.

Taking two class periods to complete all activities

If you have to divide the lesson into two class periods, you may want to have a way for students to save the work they have done with sorting the card sets. You may have them tape the cards onto the T-charts. You may choose to have them do this even if you are not dividing up the class period just to use as a visual during the class discussion.

Sharing Work (10 minutes)

When students get as far as they can with sorting the card sets, allow groups to compare their cards to other groups. Students are permitted to ask questions and make changes to their original decisions.

Extension activities

Ask students who finish quickly to make another set of cards that shows a picture for each space in the chart.

Plenary whole-class discussion (10 minutes)

Conclude the lesson by discussing and generalizing what has been learned. The generalization involves first extending what has been learned to new examples, and then examining some of the conclusions the students came up with.

Allow groups to bring up some of their work samples and share why they chose those placements. You might also have them give other examples of pairs that would fit into each category and tell why.

Improving individual solutions to the assessment task (10 minutes)

Give the students a new copy of the original task, *Measurement*.

Think about what you have learned during this lesson.

Using what you have learned, try to improve your work.

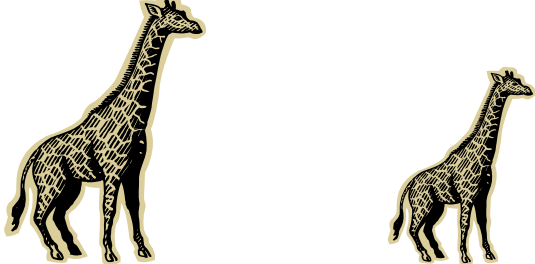


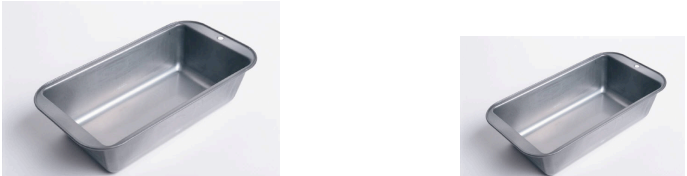
To focus your students, refer to the common issues chart. Use the questions which reflect the greatest need(s) of your students. You may choose to share these aloud with the whole group, ask them of individuals as you move around the room, or work with small groups.

Measuring Task

Name _____



What can you measure about this object?

Circle the one that is taller.	 Two giraffes are shown. The one on the left is significantly taller than the one on the right.
Circle the one that is shorter.	 Two cats are shown. The one on the left is smaller than the one on the right.
Circle the one that is heavier.	 Two rhinos are shown. The one on the left is larger than the one on the right.
Circle the one that holds less.	 Two rectangular trays are shown. The one on the left is larger than the one on the right.

Taller

Shorter

Same

Longer

Shorter

Same

Heavier

Lighter

Same

Holds More

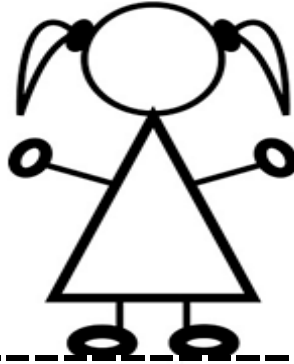
Holds Less

Same

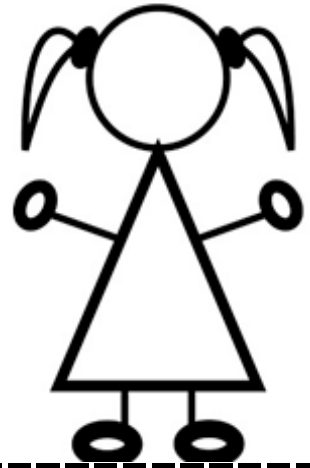
Card Set A



Card Set A



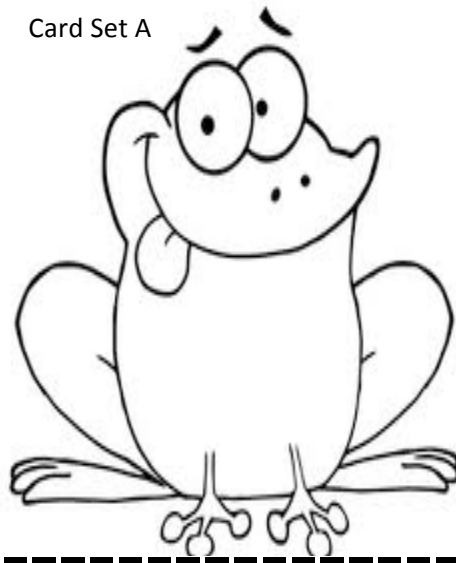
Card Set A



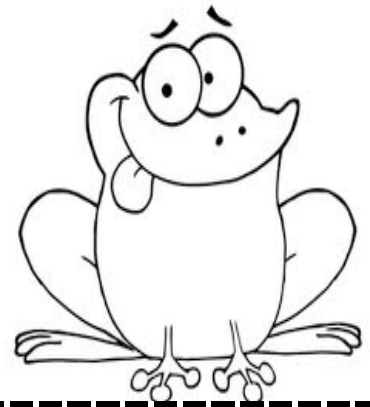
Card Set A



Card Set A



Card Set A



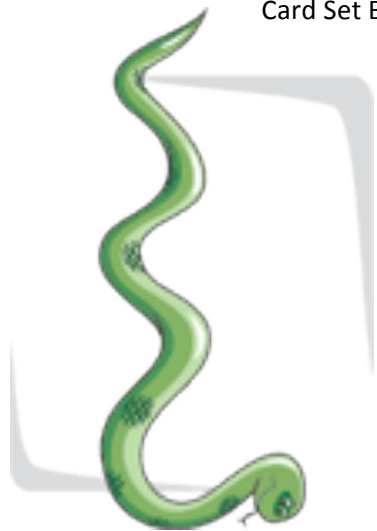
Card Set A



Card Set A



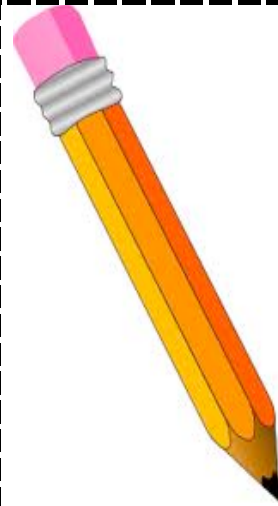
Card Set B



Card Set B



Card Set B



Card Set B



Card Set B



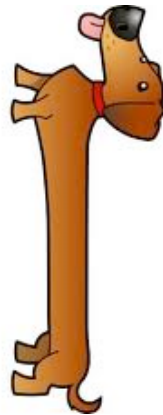
Card Set B



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