

A Closer Look at the Standards for Mathematical Practice - Kindergarten

Kindergarten Sample Tasks	Kindergarten Sample Tasks
Task A: Materials: - One of the student's shoes to use to compare to other items. - A bin of seven to ten commonly used classroom items, such as a glue bottle, a pair of scissors and a crayon, that are similar in size but distinctly longer or shorter than a students' shoe. - Sheets of paper, folded in half with the words 'longer' and 'shorter' written, in 2 different colors, at the top of each side. Setup: All students have the prepared sheet of paper and a pencil. Action: The students begin by removing their shoe; this is their 'measuring item'. Then they select an item from the bin to measure against their 'measuring item'. They directly compare it by holding it against their item and decide if it is longer or shorter than their shoe. The students then draw a picture of it on the correct side of the longer/shorter sheet depending on how it measured up. They continue to compare items to measure against their shoe until they have 2-3 drawings on each side of their sheet.	Task B: Materials: - a pair of scissors - a crayon/marker - a glue stick - a long, skinny wooden block from the classroom block set to compare Actions: The teacher will pre-select a group of classroom objects for the students to use. Each student will choose two objects to compare and they will lay them next to each other and compare which is longer. The teacher may need to show students that they need to make sure the starting ends are correctly lined up, like this: Not like this this: The teacher can have the students record their findings in one of two ways: - Students can trace both objects on a black piece of white paper. The students can label their drawings depending on their literacy skills and then circle the longer object. - Students can use the attached blackline master. This requires higher level skills as students must decide which object is the longer and shorter object, conserve that information in their brain and then write the word/draw pictures (not trace) of the item in the correct box. This also asks students to work with both the concepts longer and shorter instead of simply determining which is longer. Students should repeat the activity with multiple pairs of objects.

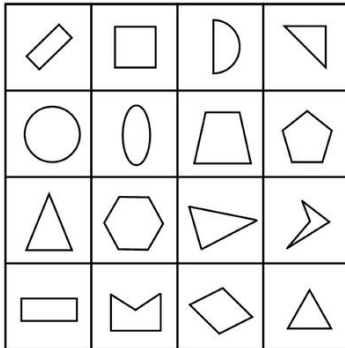
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Task C:

Materials:

This game uses the 16 cards below.



Actions:

Students in pairs take turns drawing two cards. They should name something that is the ALIKE or DIFFERENT between the two cards. Then the next two cards are drawn and the process repeats until no cards remain.

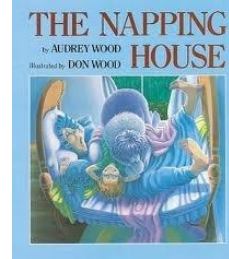
In a cooperative game, the students work together to name a property for each pair.

In a competitive game, the student who can name a property first gets to keep the cards and the student with the most cards at the end of the game wins. Since the properties may depend on the orientation of the cards, students should sit side-by-side in this version.

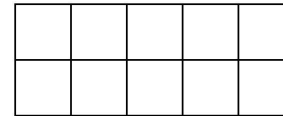
Task D:

Materials:

- The Napping House by Audrey Wood



- One ten-frame for each child



- 6-10 counters per child

Actions:

The teacher reads *The Napping House* to the class, stopping each time a person or animal gets into the bed so the students can add a counter to the ten-frame.

After each page, stop to ask the children how many are sleeping in the bed after each counter is added to the ten-frame. For example, at the beginning there should be 1 counter for granny. When the child gets in the bed, there should be 2 counters. Have the children tell how many people there are in the bed now. Do this after each counter is added to the ten-frame.

There should be 6 counters on the ten-frame once the wakeful flea is added. Once the flea bites the mouse, the children should begin taking the counters off the ten-frame to represent how many people/animals are still in the bed. For example, once the flea bites the mouse, there are only 4 people/animals left in the bed.

By the end of the story, there should be no counters on the ten-frame.

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Task E:

Pose this question to the students:

Bobbie Bear has a box of red and blue buttons. She takes 4 buttons out of the box. How many of each color button might she have?

After students answer the question, ask them to draw pictures and write the number for each color. Students may represent their solution using drawings, equations, or both. Not all possible pairs that total 4 are required to meet this standard, but students should be encouraged to include more than one.

Task F:

This task is a sequence of questions posed by the teacher to the students.

Christina has 7 candies. Some of them are chocolate, and some of them are lemon.

a. If she has one chocolate candy, how many lemon candies does she have if the rest are lemon?

b. If she has two chocolate candies, how many lemon candies does she have if the rest are lemon?

c. If she has 3, (4, 5, 6) chocolate candies, how many lemon candies does she have if the rest are lemon?

Once a student finds one answer, ask him/her to find another. Ask the student to use objects, pictures, or equations to demonstrate his/her thinking. Not all pairs that total 7 are required to meet this standard, but students must include more than one.

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Task G:

Make 9 in as many ways as you can by adding two numbers between 0 and 9.

Task H:

Students will be given double sided counters/dots. It is important for the markers to match the colors on the counters. Students take five counters, shake them around, pour them onto the desk. Next, they count how many counters are yellow and how many are red. Students then record the numbers in their book and write a corresponding equation. For example, if the counters landed so that 1 was yellow and 4 were red, then the student would draw one yellow dot and four red dots and then write "1+4=5" under the drawing. The student would then collect the counters and roll them again. For each combination of colors, the students record with a picture and an equation. Students continue until they fill their book of 5. The teacher can choose how many pages to put in, somewhere between five and eight is a good number so that students get a chance to see multiple combinations. After the students have completed their books, the teacher should have a whole-group discussion to make the number relationships explicit. One way to do this is to write each of the two addends into a table and to discuss possible patterns and reasons for the pattern. The teacher can ask specific questions such as, "What do you notice about the numbers in the table?" Or "Why is it that as one number gets bigger, the other number gets smaller?"

0	1	2	3	4	5
5	4	3	2	1	0
0+5=5	1+4=5	2+3=5	3+2=5	4+1=5	5+0=5

Once students have completed the book, the activity can be repeated but with a book that has 6 pages. The students would then need to create one page for each possible way to make five. How to make "My Book of 5": The book could simply be blank pages stapled together and the student creates the circle and writes the equation under. If your students need more scaffolding each page of the book can consist of five empty circles which the students color in. This will make it impossible for the students to accidentally draw four or six circles.

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Participant Guide

Directions: Match each task to the SMP targeted by the author of the task. While some tasks may connect to more than one SMP, there is one task that most closely aligns with each of the SMPs. Thus, each SMP will have one task to match and each task will only be used once.

Note: The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, only one practice connection will be discussed in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

Standards of Mathematical Practice (SMP)	Standards of Mathematical Practice (SMP)
MP.1. Make sense of problems and persevere in solving them.	MP.5. Use appropriate tools strategically.
MP.2. Reason abstractly and quantitatively.	MP.6. Attend to precision.
MP.3. Construct viable arguments and critique the reasoning of others.	MP.7. Look for and make use of structure.
MP.4. Model with mathematics.	MP.8. Look for and express regularity in repeated reasoning.

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Facilitator's Guide

Throughout facilitation of this activity it will be important to remind participants:

- Use the cluster level narratives to better understand what attending to the mathematical practices might look like in the classroom.
- Emphasize to participants the statement at the end of each cluster within the *KAS for Mathematics*, “The identified mathematical practices, coherence connections, and clarifications are possible suggestions; however, they are not the only pathways.”

Standards of Mathematical Practice (SMP)	Standards of Mathematical Practice (SMP)
MP.1. Make sense of problems and persevere in solving them. Task D: Kindergartners are exposed to multiple problems through the story, <i>The Napping House</i>. As students listen to the story, they use counters on a ten frame to keep track of each additional person/animal who gets in the bed until the flea bites the mouse. Then the story changes to subtraction as people/animals start to leave the bed. Throughout this guided task, students are introduced to the processes of problem-solving in a non-threatening way. They are able to unpack the parameters of the problem by manipulating the counters one at a time. This allows them to make sense of the actions occurring in the story. These concrete objects help them to conceptualize and solve each problem as posed in the story. The teacher can guide this conceptualization by stopping after each action and asking questions such as, “What just happened in the story?” “How are we going to show that on our ten frames?” “How many are in the bed now?” and “How do you know how many are in the bed?”	MP.5. Use appropriate tools strategically. Task A: During this exploration, young learners investigate the attribute of length by directly comparing two objects and deciding which object is shorter and which is longer (one of the objects is the student’s shoe). Kindergartners will easily directly compare lengths in simple situations. In this case, the shoe becomes the measuring tool because it is consistently used for all comparisons the child makes. As students become proficient in this practice, they will be able to consider a tool’s usefulness and consider its strengths and limitations, as well as know how to use it appropriately. Since this may be a new experience for kindergartners, there will be learning involved as to how to position the two objects to accurately compare their lengths. The necessity of aligning endpoints can be explicitly addressed and reinforced throughout this task (MP.6). The opportunity for conversation often occurs in comparison situations (“The teacher’s pointer stick is longer than my shoe!) and it provides an opportunity for students to explain which objects are longer or shorter than their shoes. (MP.3).

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MP.2. Reason abstractly and quantitatively. Task F Students make sense of quantities and how they are related in a problem situation. In the task at hand, students first create a meaningful representation of the problem by using objects, pictures, or equations. Then, they manipulate the objects, pictures, or equations by finding different pairings of chocolate and lemon candies totaling seven. Lastly, students periodically contextualize the problem by connecting the mathematical objects or symbols back to the context. Thus, students build meaning for the mathematical symbols by reasoning about the problem rather than memorizing an abstract set of rules or procedures. Problems that begin with a context and are represented with mathematical objects or symbols are often examples of modeling with mathematics (MP.4).	MP.6. Attend to precision. Task B: This task helps illustrate MP.6. Kindergartners will be working with the most fundamental ideas of measurement during this activity, directly comparing two objects to determine which object is shorter and which is longer. Since this may be a new experience for kindergartners, there will be learning involved as to how to position the two objects to accurately and precisely compare their lengths. The necessity of aligning endpoints can be explicitly addressed and reinforced throughout this task (MP.6). The opportunity for conversation often occurs in comparison situations (“This crayon is shorter than my new pencil!”) and provides an opportunity for students to explain which objects are longer or shorter using their new vocabulary (MP.3, MP.6).
MP.3. Construct viable arguments and critique the reasoning of others. Task C: Students work in pairs and take turns drawing two cards. These cards have pictures of different shapes. The students are asked to describe what is similar or different between the two shapes. This type of task lays the foundation for the art of explanation leading to “critiquing the reasoning of others.” Before students can critique the reasoning of others, they must feel comfortable in supporting their own thinking with evidence. For instance, a kindergartner might offer the explanation, “I know that the shape has straight sides and the second shape has one curvy.” The teacher can easily promote a classroom discussion on this argument by asking, “Do you agree and why?” This type of math talk in the classroom is built through collaborative problem solving and dialog.	MP.7. Look for and make use of structure. Task G Kindergartners are introduced to an exploration that builds the underpinnings of understanding the commutative property. MP. 7 emphasizes the importance of students recognizing relationships and making connections between different ideas. In this case, students observe that when they tried to find all the sums of 9 they could add the same 2 addends but in a different order. This eventually leads to recognizing that the structure of the commutative property basically cuts their learning of addition facts in half.

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MP.4. Model with mathematics.

Task E

Students apply the mathematics they know to solve problems arising in everyday life. For this problem, young children might arrange red and blue buttons or two-colored counters to represent the mathematical elements of the problem or write an addition sentence to describe the situation. As stated in the commentary, it might be beneficial with kindergartners to have them reach into a box of red and blue buttons and pull out four. Then, as a class compile the different pairings and decide if you have all the possible combinations of red and blue buttons. Two colored counters are useful in that students can count out four counters and turn over the counters to show all the two-color combinations. It doesn't matter whether children use buttons or two-colored counters. The real significance lies in that students can identify the mathematical elements of the situation and use the model to represent those elements and the relationships among them.

MP.8. Look for and express regularity in repeated reasoning.

Task H

Students mix up five 2-colored counters and pour them onto their desks. After determining how many are red and how many are yellow, they write the corresponding equation. This process continues until all the possible equations have been written. Through questioning the teacher guides students to notice a relationship between the two addends. First graders use repeated reasoning and begin to notice as one addend gets bigger, the other addend gets smaller. They also may notice that the two addends are never the same. This type of investigation opens the door for making conjectures and generalizations based on repeated reasoning. As students begin to explain why these generalizations must be true, they construct, critique, and compare arguments (MP.3).

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