Kindergarten rich tasks mathematics

Instructional mathematics tasks are accessible to all learners because they invite students to wrestle with a problem. Students share their ideas, ask questions of one another, use and apply multiple representations, and collaborate to develop various solution pathways. Then, teachers use students' solutions to make the math visible, connect prior learning, and forecast new mathematical learning.

Directions: You can launch the tasks in a whole group to provide opportunities for students to discuss their understanding of the task and suggest strategies to solve. Then, organize the students in pairs to encourage participation. Provide manipulatives, chart paper, and markers.
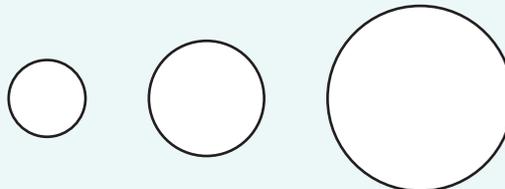
1

Topic

Counting and Cardinality: Count to tell the number of objects.

Task

How many cubes will fit? Count to find out!

Facilitate

Display three circles of varying sizes to the students. The circles should be distinctly different in size with the largest circle the size of a regular sized paper plate. Ask them to turn and talk with a partner to share what they notice about the circles. Elicit from the students that there are three circles that are of different sizes. Ask, "How many cubes will fit in each circle?" Ask the students to share guesses and record the guesses underneath each circle.

Alternately, ask the students to write a guess for each circle on a sticky note and post it under the circle. Distribute the three circles, cut separately to each student and ask them to fill the circle with cubes and count to find how many will fit. Ask the students to record the amount of cubes for each circle below the circle. As the students are counting, observe how students count and use one-to-one correspondence.

Make the Math Visible

Display each circle to the students. Ask the students to share the number of cubes they counted for each circle. Record the numbers they counted for each circle below the circle. Ask, "What do you notice about what we counted?" Elicit from the students that they counted fewer cubes for the smaller circle and more cubes for the larger circle. Ask a student to model counting to fill the circle.

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Topic Operations and Algebraic Thinking: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

Task Fannie picked four flowers from the garden. Some are yellow and some are purple. How many might be yellow and how many might be purple? Draw a picture.

Facilitate Ask, how many ways might Fannie pick four yellow and purple flowers? Record the students' ideas. Encourage the students to talk with a partner. Encourage the students to draw multiple solutions. As the students find one solution, encourage them to find another solution.

Make the Math Visible Post student work for the class or small group. Ask, "What do you notice about the solutions?" Post the student work to show a pattern, 3 + 1, 2+ 2, 1 + 3, and ask the students, "What do you notice about the flowers?" Encourage the students to notice that 3 yellow flowers and 1 purple flower is different from 1 yellow flower and 3 purple flowers. Students might notice that the number of flowers is switched revealing commutative property.

Notes

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3

Number and Operations in Base 10: Work with numbers 11 to 19 to gain foundations for place value.

Task

Luke and Leo are brothers. Luke has 14 erasers and Leo has 12 erasers. They are filling ten frames to compare their erasers. Luke thinks that he has more and Leo thinks that he has more! How many tens and how many more erasers will each brother have?

Luke	Leo
14 erasers	12 erasers
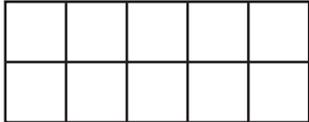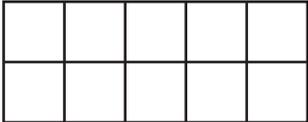
14 is 10 and _____ more

12 is 10 and _____ more

Facilitate

Pose the problem to the students by telling them the story and stop before asking them the final question. Ask them to talk with a partner about what they notice and record the notices. Then, ask the students what questions they have. Record the students' questions. Reveal the task question to the students. Distribute Luke's and Leo's bags of cubes to represent the erasers, 10 frames, and sentence frames with 14 is 10 and _____ more and 12 is 10 and _____ more to pairs of students. Ask the students to fill the 10 frames with cubes and find out how many more. Ask students to record on the sentence frames.

Make the Math Visible

Collect some sample student sentence frames from the students and post for all to see. Ask students to turn and talk to discuss what they notice. Elicit from the students that the number of erasers that each brother has matches the number of 10 and more. For example 14 has a 10 and 4 more. Ask the students to predict about how many 10 frames could be filled with 16 cubes. Ask, "How many more cubes will we have from the 16 after we fill the 10 frame?" Ask a student to count to fill the 10 frame and then count to show how many more. Record this for all of the students to see.

Notes

Rich Mathematical Tasks, Kindergarten, created by Beth McCord Kobett.

4

Topic   Measurement and Data: Describe and compare measureable attributes.

Task   **Longer or Shorter Than:** Each pair will need a stuffed animal and three sentence strips labeled *Same*, *Longer*, *Shorter*.

Which objects are the same length as your stuffed animal? Longer than your stuffed animal? Shorter than your stuffed animal?

Facilitate   Line up stuffed animals in the front of the room so they can be easily compared. Ask the students to turn and talk to discuss what they notice about the stuffed animals. Record their notices. Students will likely say that some of the stuffed animals are longer, taller, shorter, bigger, and smaller among other attributes. Display the *Same*, *Longer*, and *Shorter* sentence strips to the students. Explain to the students that today they will find three items in the classroom that are the same length as their stuffed animal, three items that are longer than their stuffed animal, and three items that are shorter than their stuffed animal. Explain that they will put the items under each sentence strip. As student pairs are working, ask questions such as "How do you know that object is longer (shorter) than your stuffed animal?" "Show me how you compared." Arrange a pair-to-pair share to have the student pairs show and explain their sorts to one another.

Make the Math Visible   Ask the students to explain how they know an object is the same length as another object. Ask a student that you previously observed comparing two objects to demonstrate for the class. Make explicit how the student lines up the two objects to compare. Ask, "How do you know an object is longer than another object?" Ask another student to demonstrate and, once again, highlight how the student is lining up one edge of each of the objects to make the comparison. Repeat with the concept of shorter. Provide an opportunity for students to check and revise their selections.

Notes

Topic

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Geometry: Analyze, compare, create, and compose shapes.

Task

What new shapes can you make with two squares? What new shapes can you make with two triangles? Two rectangles?

Facilitate

Display the squares, triangles, and rectangles to the students and ask, "What do you notice about the shapes?" Encourage the students to talk with a partner about the shapes. Ask, "What shapes do you see?" Discuss the shapes with the students. Ask "What shapes can you make with two shapes that are the same?" Distribute three baggies, one with two squares, one with two triangles, and one with two rectangles. Say, "Use two of the same shapes to make a new shape. Then trace around the shape that you made." As students are composing new shapes. ask, "What are the names of the shapes that you used to make new shapes?" "How did you arrange your shapes to make a new shape?" "What is the name of the new shape?"

Make the Math Visible

Ask the students to share their new shapes in partners. Ask, "How can we use two shapes to make a new shape?" "What do you notice about the new shapes?" "What is the name of the new shape?" Ask the students to describe the shapes they see.

Adapt-a-Mathematical TASK Tool

Do you have a task that is not quite right? Use this guide to adapt the task to meet your needs!

How does the task meet your STUDENTS' needs?

ACCESS and EQUITY: Ensure that the task is "responsive to students' backgrounds, experiences, cultural perspectives, traditions, and knowledge" (NCTM, 2014, para. 1, https://www.nctm.org/uploadedFiles/Standards_and_Positions/Position_Statements/Access_and_Equity.pdf). Consider students' language readiness, including access to mathematical vocabulary.

- How can you differentiate the context of the task to support the students' backgrounds, experiences, and cultural needs?
- How can you group students to engage the students' socio-emotional and developmental needs?
- How can you "open up" the task to encourage access to the task for all learners?
- How can you connect the task to the mathematics the students have learned and students' interests?

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How do you PLAN for students to learn from the task?

MATHEMATICAL GOAL: The task should provide students opportunities to access new mathematical knowledge and to solidify, consolidate, or extend knowledge. Tasks can be changed to highlight multiple learning needs and content standards. Ensure that you strategically connect the learning goal to the task.

- What do your students know how to do right now?
- What do you expect your students to understand as a result of this task?
- What do you anticipate students will do? What changes might you make as a result of your anticipation?

FACILITATE: Task facilitation is critical to student success. Consider how you will organize students and **design** purposeful questions to help them discover and connect mathematics concepts and procedures.

- What **questions** are you going to ask? What tools will you provide? How will students be grouped?
- How and when will you provide opportunities for student **discourse**?

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How do you move learning FORWARD?

FORMATIVE ASSESSMENT: Collecting information about student understanding will help you adjust instruction as you conduct the task.

- How will you listen, observe, and identify students' strategies?
- How will you respond to students' understanding?
- How will you provide feedback to students?
- How will you provide opportunities for students to provide feedback to one another?
- How will you provide opportunities for students to persevere and productively struggle through problems?
- How will you make the mathematics visible for your students?

Notes

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