Grade 3 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 or groups of four to encourage participation. Provide manipulatives, chart paper, and markers.

1

Topic

Operations and Algebraic Thinking: Represent and solve problems involving multiplication and division.

Task

Sammy, the Color Guard Director, is working on organizing her 24 members to march with the band. She must find all the ways they can march and then decide which is the best formation. The members must always be organized in equal rows. Let's help her out!

Facilitate

Cover up the number 24 in the problem with a sticky note and display the task to the students. Ask the students to discuss the task with a partner. Students may have questions about the color guard. There are many pictures and videos of color guards online, which can be used to develop prior knowledge. Ensure that students understand that the color guard will need to be arranged in rows and columns with no leftovers. Distribute color tiles or cubes to the students and ask them to find, record, and represent all the possible arrangements. As students work, ask, "What do you notice about the arrangements?" and "How many arrangements can you find?"

Make the Math Visible

Ask the students to share solutions. As the students share, record all the possible color guard arrangements (24 × 1, 12 × 2, 4 × 6, 3 × 8). Introduce the mathematics vocabulary, *array*, by using the students' representations as examples of arrays. Encourage the students to notice that 24 × 1 and 1 × 24 is the same arrangement, which is represented by commutative property. Conduct a discussion about the best arrangement and encourage students to defend their ideas by using the representations that they made.

Notes

2

Topic

Number and Operations in Base 10: Multiply one-digit numbers by multiples of 10 in the range of 10 to 90 using strategies based on place value and properties of operations.

Task

Naoko is looking for the best deal on juice boxes for the school picnic. He needs a total of 100 boxes. Which juice box deal should he buy? Prove your idea with words, pictures, and numbers.

- Two 10 packs of juice boxes for $6.00
- Four 10 packs of juice boxes for $10.00

Facilitate

Arrange the students in pairs to collaborate on solutions and distribute materials, including base 10 blocks, 10 frames, and hundreds charts. Encourage the students to represent the two deals using multiple representations. Students might make arrays, use repeated addition, and multiplication. Ask, "How can you represent the total number of juice boxes and cost of the juice boxes?" and "Which deal is the best? Why?"

Make the Math Visible

Ask the students to share solutions and highlight student work that reveals understanding about place value. Emphasize students' representations, including arrays, repeated addition, and use of multiples of 10. Encourage the students to notice patterns when multiplying by 10. Encourage the students to discuss whether it is a better deal to buy exactly what they need with no leftovers or to buy extra.

3

Topic

Number and Operations—Fractions: Understand a fraction on a number line and represent fractions on a number line.

Task

Raya, Meredith, Vina, and Marco are running a race. Elena is handing out water to the runners at the water station, which is placed at the $\frac{1}{2}$ mile mark. The following fractions show where everyone is in the race right now. Who is closest to the water station?

- Raya—$\frac{2}{8}$
- Meredith—$\frac{8}{8}$
- Vina—$\frac{4}{8}$
- Marco—$\frac{3}{8}$

Facilitate

Reveal the task to the students and ask them what they notice about the fractions that describe the runners' position on the number line. Distribute open number lines and fraction bars to the students. Ask, "How can you use the number line to find each of the runner's position in the race?" Encourage the students to represent the runners' current position in the race on a number line to prove who is closest to the water station.

Make the Math Visible

Select students to share solutions that reflect multiple representations. Ask students who use the fraction bars to share first. Ask students who used the number line to mark the fractions to explain how they divided up the number line. Encourage the students to describe their work using mathematics vocabulary, including equal parts, unit fraction, numerator, and denominator. If students do not use the vocabulary, use student work to highlight mathematics vocabulary. Ask, "What is the unit fraction?" and "How does the unit fraction help us figure out how to partition the number line?"

4

Topic

Measurement and Data: Solve word problems involving addition and subtraction of time intervals.

Task

Imani helps first graders during homework club. Imani's goal is to volunteer at least 2 hours each week. How much time has she volunteered this week? Did she make her goal? Prove how you know.

On Monday, she started at 5:30 and ended at 6:15.

On Tuesday, she started at 4:15 and ended at 5:05.

On Wednesday, she had to come home right after school.

On Thursday, she started at 4:10 and ended at 5:20.

On Friday, she was only able to help for 10 minutes because she had another obligation.

How much time did Imani spend volunteering? Did she make her goal? Prove how you know!

Facilitate

Distribute manipulative clocks to the students. Ask, "How can you keep track of Imani's time?" and "How will you figure out the total time?" Encourage the students to find the total minutes and convert the time into hours and minutes.

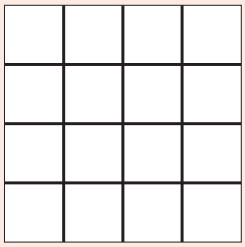
Make the Math Visible

Ask the students to share a variety of strategies. Encourage students to model how they found the time using the manipulative clocks. Some students may count by fives, while others may use benchmark times including quarter and half hours. Discuss the time equivalencies, including 60 minutes = 1 hour, 30 minutes = $\frac{1}{2}$ hour, etc., to build student understanding of time conversion.

Notes

Topic 5 Task

Geometry: Partition shapes into parts with equal areas.



How many ways can you show $\frac{1}{2}$?

Facilitate

Display only a square partitioned into 16 equal sections and ask the students to turn and talk about what they notice. Encourage the students to notice that there are 16 equal sections. Some students might also connect the visual representation to an array by describing the square as a 4 × 4 array. Then reveal the question to the students. Have students make predictions about the number of ways they can show $\frac{1}{2}$ and record the predictions. Distribute multiple copies of the partitioned squares to the students and colored pencils or markers. As the students are working, ask, "What do you notice about your representations?" and "How might you use a pattern to find multiple representations for $\frac{1}{2}$?"

Make the Math Visible

Ask the students to share solutions in a progression from the simplest representation to the most advanced. For example, a simple solution might show the square divided in half down the middle with $\frac{1}{2}$ of the squares shaded. A more advanced solution might show every other square shaded in a pattern. As students are sharing their solutions, help students see that while the visual representations are very different, they all represent $\frac{1}{2}$ of the total square.

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?

Notes

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**?

Notes

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