Classroom-Ready

RICH MATH TASKS

GRADES 2-3

Engaging Students in Doing Math

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CORWIN | Mathematics

Thank you

FOR YOUR INTEREST IN CORWIN

Please enjoy this complimentary excerpt from Classroom-Ready Rich Math Tasks, Grades 2-3, by Beth McCord Kobett, Francis (Skip) Fennell, Karen S. Karp, Desiree Harrison and Barbara Ann Swartz.

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CORWIN

Grade 3

Mathematics Standard

- Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical Practices

- Construct viable arguments and critique the reasoning of others.
- Look for and express regularity in repeated reasoning.

Vocabulary

- array
- divisible
- remainder
- rectangle
- row

Materials

- tiles or counters, 25 for each student or student pairs
- whiteboards, dry-erase markers, and erasers for each student or student pair
- Quick Image student pages

Task 10
Marching Band Arrangements

Using arrays and equations to solve problems involving multiplication and division

TASK

Marching Band Arrangements

Figure 5.21 Marching Band

Source: huseyintuncer/iStock.com

The school's marching band is trying to figure out the best arrangement for the upcoming parade (Figure 5.21). They want all of their rows to be equal, which means they must have the same number of band members in each row. However, every time they line up, someone is left over and doesn't fit in one of the rows! Can you help them figure out how to line up in equal rows?

There are 25 students:

- Can the band march in pairs?
- Can the band march in rows of 3?
- Can the band march in rows of 4?

Task adapted from tasks based on the children's book *A Remainder of One* by Elinor Pinczes.

TASK PREPARATION

- Consider using this as a whole-group lesson or with student pairs.

ACCESS AND EQUITY

If you have student partners, consider letting them alternate roles: one models with the counters while the other writes the equation on the whiteboard and then they can alternate throughout the task.
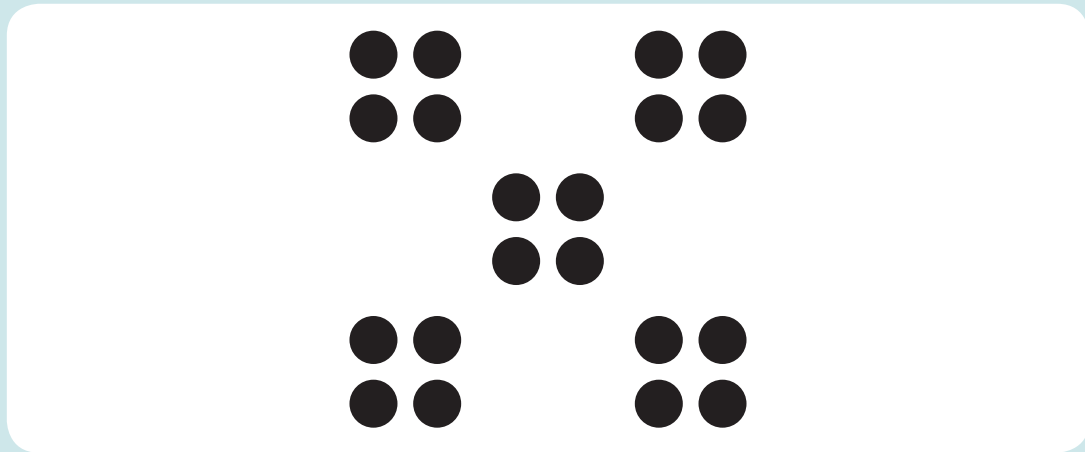
- If possible, locate the book *Remainder of One* by Elinor Pinczes. This is a great resource for perhaps launching or closing this task.

  » Pinczes, E. (1995). *Remainder of one*. Boston: Houghton Mifflin.

LAUNCH

1. Open with a Quick Image.

2. Flash Figure 5.22 for a few seconds.

Figure 5.22 Quick Image 1

a. Ask, "How many dots do you see? How do you know?"

b. Have students do a *Turn and Talk* to first share how many dots they saw with a partner. Then ask them to share *how* they saw the dots or how they knew there were that many.

c. Solicit student volunteers to share *how* they saw the dots. Be sure to highlight the different ways students are grouping the dots or skip counting. Counting by ones is usually not an efficient strategy due to the Quick Image.

d. Record the corresponding equations (number sentences) that represent *how* the students were seeing the objects. For example, if they saw five groups of 4, write $5 \times 4 = 20$; but if they saw two groups, then one group, and two more groups, you could write $(2 \times 4) + 4 + (2 \times 4) = 20$.

e. Ask, "How do you see multiplication in this set of dots?" "How do you see division?" (e.g., if we know there are 20 total dots and know 4 dots are in each group, then we can ask, how many groups: $20 = 4 \times$ _____ or $20 \div 4 =$ _____. *Or,* if we know there are 20 total dots and know there are 5 groups, then we can ask how many in each group: $5 \times$ _____ $= 20$ or $20 \div 5 =$ _____.)

f. Repeat the Quick Image activity two more times with Figures 5.23 and 5.24.

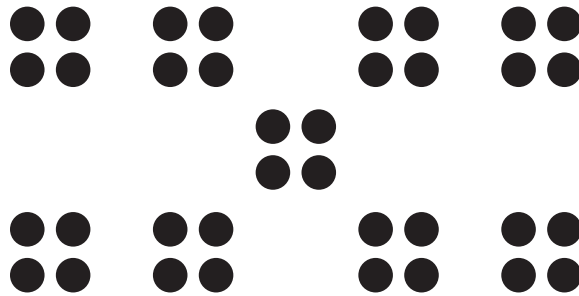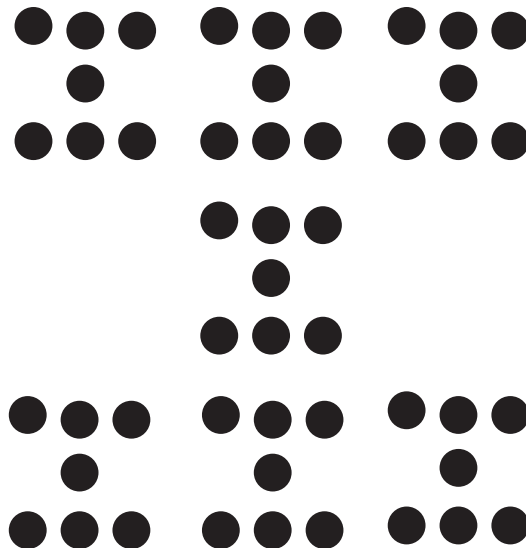**Figure 5.23 Quick Image 2**

Figure 5.24 Quick Image 3

3. Segue into the task by reading the first part of the task: "The school's marching band is trying to figure out the best arrangement for the upcoming parade. They want all of their rows to be equal, which means they must have the same number of band members in each row. However, every time they line up, someone is left over and doesn't fit in one of the rows! Can you help them figure out how to line up in equal rows?"

4. Ask the class, "Have you ever been to a parade? What is a marching band?" to ensure all students are familiar with the context of the problem.

5. Have students *Turn and Talk* with a partner to share initial ideas about how the students in the marching band should arrange themselves for the parade.

FACILITATE

1. Give each student or student pair 25 counters to represent the students in the marching band. Tell the class they will use the counters to figure out how to help the students arrange themselves so that no one is left out of a row.

2. Support students exploring the different arrangement possibilities by asking, "What if the students marched by (rows of) twos?" Prompt the students to create arrays with their counters. Ask, "If the band members arranged themselves by twos or in pairs, does everyone have a partner? (no) Why or why not? How do we write this with an equation?" (e.g., 2 × 12 + 1)

   » **Show Me.** Have students create an array to show the students marching in rows of two.

   » Record one multiplication equation and the corresponding division equation on the board (e.g., 2 × 12 = 24 or 25 ÷ 2 = 12 with 1 left over or 12 with a remainder of 1).

   » Ask, "Why does a band member not have a partner if they march in rows of two?" Students can share ideas about having one more or one left, without using the word *remainder*.

3. Ask, "What if the students marched in rows of three?"

   » **Show Me.** Have students create an array to show the students marching in rows of three. Then prompt them to write out an equation on their dry-erase boards that matches their array and hold up their boards.

4. Record one multiplication equation and the corresponding division equation on the board (e.g., 3 × 8 = 24 or 25 ÷ 3 = 8 with 1 left over or 8 with a remainder of 1. Ask:

   » Why does a band member not have a partner if they march by threes?

   » If the students arrange themselves in rows of four, does that work? Why or why not? Represent with an equation.

5. **Show Me.** Have students create an array to show the students marching in rows of four. Then prompt them to write out an equation on their whiteboards that matches their array and hold up their boards.

6. Record one multiplication equation and the corresponding division equation on the board (e.g., 4 × 6 = 24 or 25 ÷ 4 = 6 with 1 left over or 6 with a remainder of 1). Ask, "Why does a band member not have a partner if they march in rows of four?"

7. Say, "So far we have tried to march in rows of two, three, and four." Ask, "Is it possible for someone not to be left out? If so, how many rows will the students need to make so that there are no remainders?"

8. **Show Me.** Have students create the array they think will solve the problem and write an equation on their dry-erase boards to model the number of band members in each row.

Note: Consider using the Show Me tool for monitoring and recording student responses (see Appendix B).

CLOSE: MAKE THE MATH VISIBLE

1. Sequence student work to have students share their ideas for lining up the students in the marching band in a way that all students can understand the solution.

2. **Hinge Question.** How many rows did the students need to make so that all the rows had an equal number of band members? After hearing several responses:

   » Record one multiplication equation and the corresponding division equation on the board (e.g., $5 \times 5 = 25$ or $25 \div 5 = 5$).

3. Then, have students discuss with a neighbor why all students now "fit" (because 25 is divisible by 5 and there are no "leftovers or remainders").

4. Conclude the lesson with a Check Out Circle by asking students to complete the sentence stem: "Today I learned …, I realized …, or I was surprised by …" to share their learning from today's lesson.

POST-TASK NOTES: REFLECTION & NEXT STEPS

Task 10: Quick Images Student Pages