

COMMON CORE COLLABORATIVE



ALGEBRAIC THINKING **CARDS**

Grades 3–5

MEANINGFUL TASKS

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by Kit Norris



TEACHER'S PAGE

GRADE LEVEL	3
TASK	Gathering Groups
COMMON CORE STATE STANDARDS ADDRESSED	3.OA.1, 3.OA.3
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 7. Look for and make use of structure.

OBJECTIVE Students explore the meaning of multiplication as repeated groups. (They have not necessarily worked with two-digit multiplication.)

LAUNCH Review the connection between addition and multiplication. Say: *Look at this arrangement of chairs. (2 rows of 4 chairs) How might we determine how many chairs there are altogether?*

Students will mention counting by ones and twos. Ask: *Could we use another operation? (multiplication)*

Say: *Let's represent this situation in a number sentence. How many ways could we do it?*
($4 + 4 = 8$; $2 \times 4 = 8$, $2 + 2 + 2 + 2 = 8$)

TASK Present the problem to the students:

Joy's grandmother is baking cookies. She is baking 12 batches of 24 cookies. After all that baking, how many cookies will she have?

Students should work in groups of four. For each group, provide a large sheet of paper as a shared recording sheet, divided in quarters so that each student has a specific space to show his or her work. Students should work independently and then share their thinking with their team members.

Monitor the groups' progress. Ask groups to share their thinking with the entire class. If necessary, demonstrate one path to the solution, as follows:

	# of Batches	# of Cookies in Batch
<i>Let's take one batch of 24 cookies.</i>	1	24
<i>Now let's double that.</i>	2	48
<i>Let's do it again!</i>	4	96
<i>Do we have 12 batches of cookies yet? (No, just 4.) Let's double it again.</i>	8	192
<i>Now do we have 12 batches? (Not yet.)</i>		
<i>What can we do next? (Add 96 and 192 to get the total number of cookies in 12 batches.)</i>	12	288

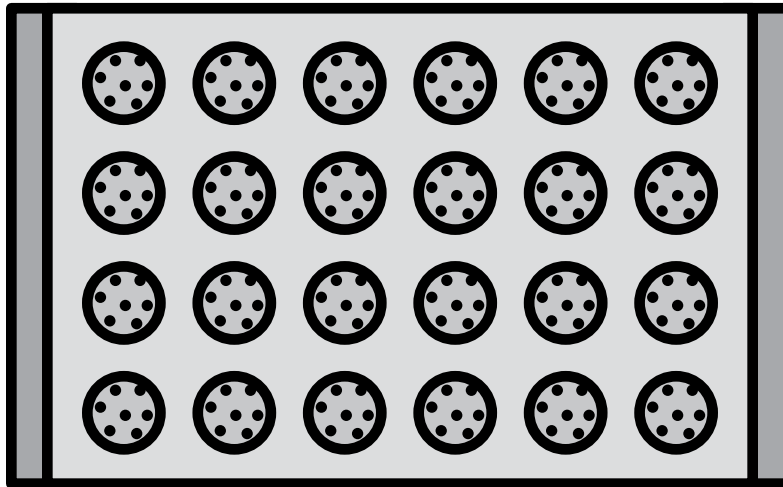
Have students explain to their shoulder partner how they solved this problem. Have the shoulder partner restate the other student's thinking.

EXTENSION Ask: *Can you find the number of cookies in any number of batches by beginning with one batch of cookies and doubling each time?*

GATHERING GROUPS



NAME _____



Joy's grandmother is baking 12 batches of 24 cookies. After all that baking, how many cookies will she have?



TEACHER'S PAGE

GRADE LEVEL	4
TASK	Multiplication Madness
COMMON CORE STATE STANDARDS ADDRESSED	4.NBT.4
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure.

LAUNCH Tell the students:

Today we are looking at patterns involving multiplication. Do the problems using the area model. (Review this tool, if necessary.)

Then look for the pattern. What is happening?

TASK Have the students work in teams of four, as they did for the first task (Gathering Groups). Tell them that two team members will calculate the first problem and the other two team members will calculate the second problem.

Say:

Find the products using the area model. Compare your results. What patterns do you see?

MULTIPLICATION MADNESS



NAME _____

A.
$$\begin{array}{r} 64 \\ \times 23 \\ \hline \end{array}$$

B.
$$\begin{array}{r} 46 \\ \times 32 \\ \hline \end{array}$$

Group's first conjecture:

Complete this sentence: Our team thinks that these two products are _____ because

Try the next two examples (C and D) to see if your conjecture (what you wrote above) will be true again. Compare the products. What do you notice?

C.
$$\begin{array}{r} 24 \\ \times 84 \\ \hline \end{array}$$

D.
$$\begin{array}{r} 42 \\ \times 48 \\ \hline \end{array}$$

Group's second conjecture:

Our team thinks that these two products are _____ because

E.
$$\begin{array}{r} 12 \\ \times 63 \\ \hline \end{array}$$

F.
$$\begin{array}{r} 21 \\ \times 36 \\ \hline \end{array}$$

Group's third conjecture:

Our team thinks that these two products are _____ because

Why is this the case? Discuss with your group and be ready to share your thinking with the class.



TEACHER'S PAGE

COMMON CORE STATE STANDARDS ADDRESSED	GRADE LEVEL	5
STANDARDS FOR MATHEMATICAL PRACTICE	TASK	Theater Seating
		5.OA.2, 5.NBT.1, 5.NBT.5, 5.NBT.7
		1. Make sense of problems and persevere in solving them.
		4. Model with mathematics.
		7. Look for and make use of structure.

LAUNCH

Say to students:

Patterns exist everywhere in mathematics. Today we will look at patterns in multiplication. For example, we know that $4 \times 6 = 24$, so we also know that $40 \times 60 = 240$. We are using known facts to help us figure out another fact.

TASK

Have students work in groups of four to answer the question about the best possible arrangement of chairs. Be ready for them to say that it doesn't make any difference whether the arrangement is 25 rows of 36 chairs or 26 rows of 35 chairs.

Lead them to see that it does make a difference and that the size of one arrangement in relation to the other is based on place value. The richness in this task is finding that relationship. Encourage students to think more deeply about the relationship. Just stopping at the statement "26 rows of 35 chairs is greater" is not sufficient. Ask students to explain how they know.

Give the students another problem in which the units digits differ by 2 and the tens digits differ by 1 and see if they can determine the difference between the two products. For example, ask:

Which is greater, 37 rows of 29 chairs or 27 rows of 39 chairs?

You can suggest that students use two area models to show the partial products. Students can then see that two of the boxes are always the same and the other two will vary. What causes this variance?

EXTENSION

Provide students with examples in which the tens digits differ by more than 1. Can they predict the resulting difference in the products? For example, pose the question:

Which is greater, 26×41 or 21×46 ?

THEATER SEATING



NAME _____

1. Ms. D. Rector wants to have as many chairs placed in the auditorium as possible so that parents and friends can come to watch the fifth grade's class play. Which arrangement of chairs will allow for the greatest number of seats? 25 rows of 36 chairs or 26 rows of 35 chairs? (Show your work.)

2. Ms. D. Rector has invited friends of the school to attend the fifth-grade class play. Which arrangement of chairs will allow for the greatest number of seats? 47 rows of 56 chairs or 46 rows of 57 chairs? (Show your work.)

Discuss the following questions with your team:

3. What pattern do you notice in the first situation about the digits in each factor? How are they the same? How are they different? _____

What effect did that have on the product? _____

4. What pattern do you notice in the second situation about the digits in each factor? How are they the same? How are they different? _____

What effect did that have on the product? _____

5. What do you notice about the products in both of these situations? How do the products differ?

What is causing this difference? _____
