COMMON CORE COLLABORATIVE BASE TEN CARDS

Grades 3–5

MEANINGFUL TASKS

by Kit Norris

TEACHER'S PAGE

GRADE LEVEL	3
TASK	Puppy Pen
COMMON CORE STATE STANDARDS ADDRESSED	3.MD.5, 3.MD.7, 3.MD.8
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

Review the meaning of square units in shapes (2.G.2).

If a rectangle measures 4 units long and 3 units wide,
how many square units are contained in this rectangle?

Encourage students to outline the rectangle on graph paper and then use appropriate-sized unit squares to fill it. After everyone agrees that 12 square units fit in this rectangle, ask them to consider this question:

If a rectangle is filled using 12 square units, what shape might it be?

If students suggest 4 units by 3 units, ask them if there is a rectangle with different dimensions that work. (Answers: 1 × 12, 2 × 6)

Ask the students: *What conclusions can we make now?*

TASK

Present the problem to the students:

Ms. Pascal wants to make a fenced-in play area in her back yard for her puppies.
She has 24 square units available in her yard.
What might the length and width of the rectangle be that will make the play area for her puppies?

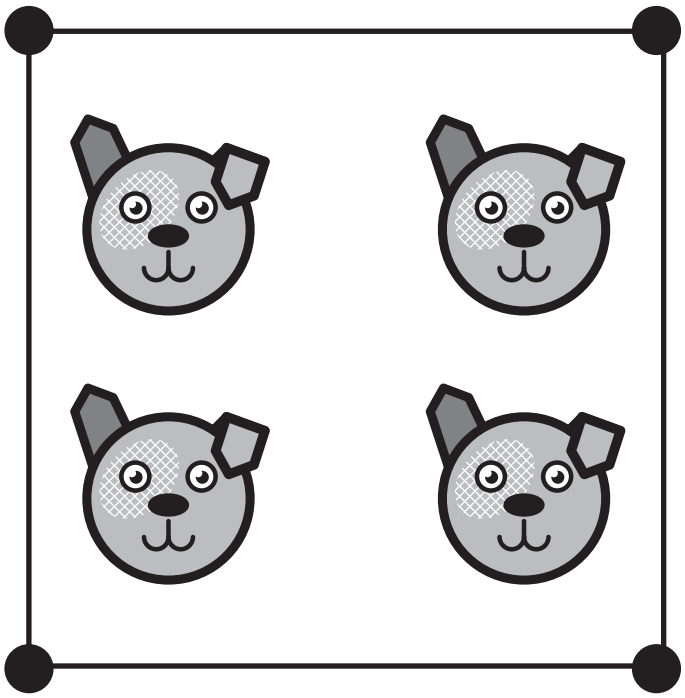
How many different-sized rectangles can you find for this play area?

EXTENSIONS

Suggest to students that they might think about a similar problem. This time, Ms. Pascal has 24 yards of fencing to use. She wants to use the fencing to create a rectangle. If she uses 24 square yards of fencing, what size might the rectangle be? How many square units would the play area have?

PUPPY PEN

NAME _____



Ms. Pascal's wants to make a fenced-in play area in her back yard for her puppies. She has 24 square units available in her yard.

1. What might the length and width of the rectangle be that will make the play area for her puppies?

_____

2. How many different-sized rectangles can you find to make this play area?

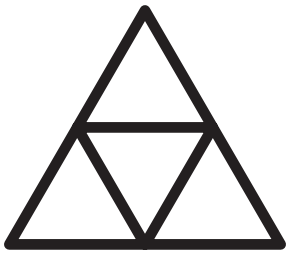
_____

TEACHER'S PAGE

GRADE LEVEL	3
TASK	How Many Do You See?
COMMON CORE STATE STANDARDS ADDRESSED	2.G.2, 3.MD.5
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 8. Look for and express regularity in repeated reasoning.

LAUNCH

Ask students: *How many triangles do you see?* Some students will say "4" because they are forgetting to count the big triangle.



MATERIALS

Unit tiles, graph paper

TASK

Tell students: *Today's task involves finding squares.*

Let the teams to get started. Students should each have their own worksheet. Have square tiles available for students to use. Students may also want to cut out different-size squares and use them on the 4 × 4 grid to help them count. Consider making this suggestion if a group becomes stuck.

SOLUTION

SIZE OF SQUARE	NUMBER IN LARGE SQUARE
1 × 1	16
2 × 2	8
3 × 3	4
4 × 1	1
TOTAL	29

What do you notice about the number of small squares? (They are all powers of 2.)

EXTENSION

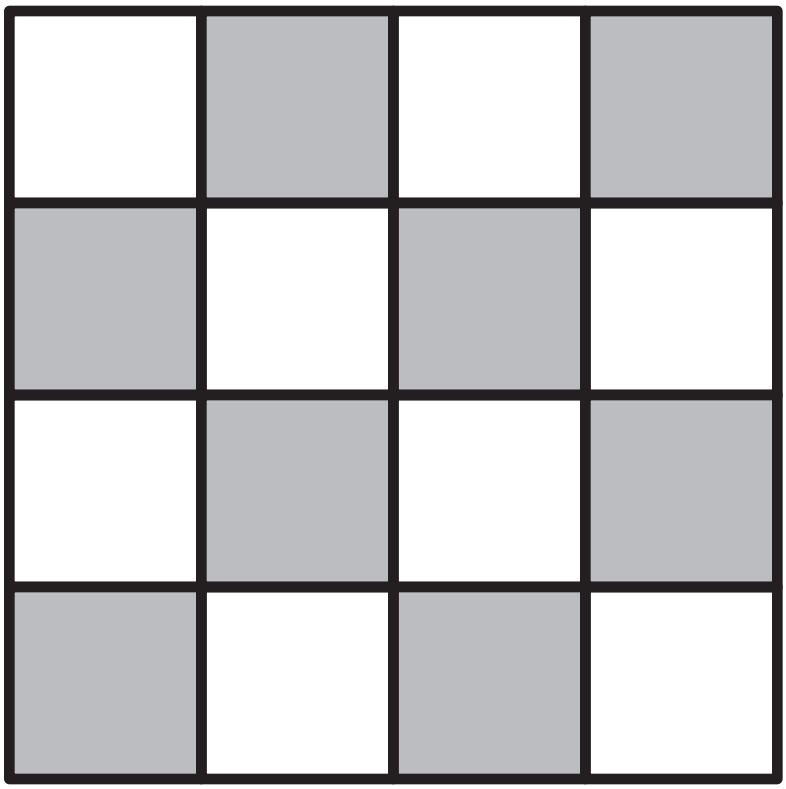
To challenge students' thinking, ask:

How many smaller squares might be in a 5 × 5 square?

Make a prediction based on what you know about the number of squares in a 4 × 4 square.

HOW MANY DO YOU SEE?

NAME _____



TEACHER'S PAGE

GRADE LEVEL	4
TASK	Broken Calculator
COMMON CORE STATE STANDARDS ADDRESSED	4.NBT.5
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 4. Model with mathematics.

LAUNCH

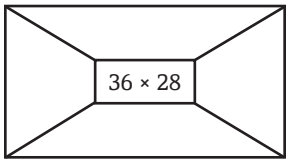
Set up the situation by asking students:

How many different ways can you find the product for 12 x 4?

You cannot use either factor in your solution!

Students might draw an array as one representation. They might also break 12 and 4 down into their factors, 6 × 2 × 2 × 2, as a second approach. Students might also partition 12 into 10 + 2 and multiply (10 + 2) × 2 × 2.

To encourage teamwork, provide each group with a large sheet of paper configured as shown below. Each of the four students now has a place to show their individual thinking. Students write the original problem in the rectangle.



TASK

Students must find the product of 36 × 28 as if they were using a calculator. However, the only calculator available for the task is broken. The calculator's "2" key does not work. Students are asked to find other ways to find the product.

POSSIBLE SOLUTIONS

a) Partition 28: 36 × 28 is the same as (36 × 8) + (36 × 10) + (36 × 10).

b) Break 36 and 28 into their factors: 6 × 6 × 7 × 4

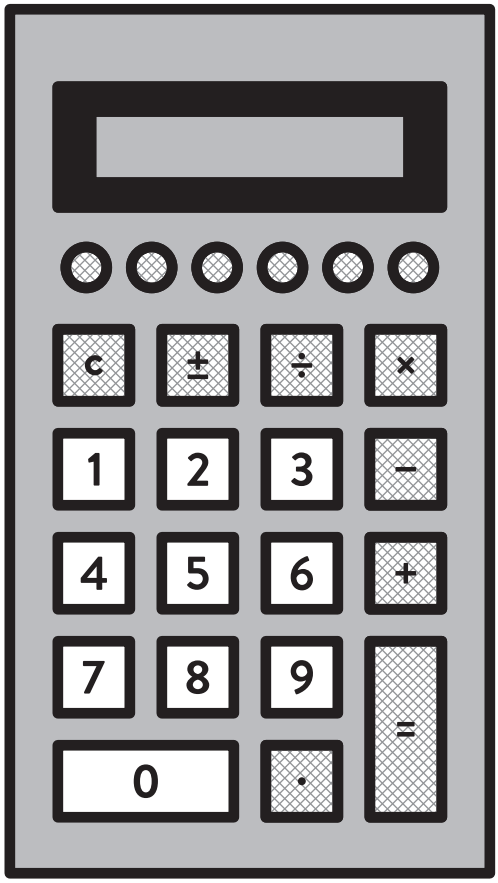
EXTENSION

Ask students to find the quotient of 872 ÷ 4. This time the "7" key does not function!

(Possible solution: Partition 872. 800 ÷ 4 + 40 ÷ 4 + 32 ÷ 4)

BROKEN CALCULATOR

NAME _____



Find the product of 36 × 28.

Good news! You can use a calculator.

Bad news. You can only use this calculator.

More bad news: The calculator's "2" key does not work!

Find the product without using the "2" key.
Try to find several ways of finding the product.

TEACHER'S PAGE

GRADE LEVEL	4
TASK	Letter from Camp
COMMON CORE STATE STANDARDS ADDRESSED	4.NBT.4
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 3. Construct viable arguments and critique the reasoning of others. 7. Look for and make use of structure.

LAUNCH

Explain to the students that a boy was away at summer camp. He was having a great time, but he decided that he'd like to have a little more money to spend on snacks. So he wrote a letter home. His father enjoyed doing puzzles, so the boy wrote his message in code. The students' job is to figure out what the boy wrote to his father. *What letter does each number represent?*

Some guidelines:

- All but two digits are used.
- Repeating letters are represented by the same number. (For example, the E in *send* has the same value as the E in *more*.)
- If student groups appear stuck, have them focus on the M. What must it be? (The position of the M indicates that it must be a 1, and it is formed because S + M is greater or equal to 10.)

Ask students to share their process. Encourage them to write general equations indicating the relationship among the letters.

EXTENSION

The father wrote back in a different code.
Here is the answer to what the father replied to his son:

```
 SPEND
-LESS
------
 MONEY
```

What numbers do the letters stand for now?

LETTER FROM CAMP

NAME _____

Here is the answer that his father discovered after solving his son's puzzle:

What number does each of the letters represent?

```
  S E N D
+ M O R E
---------
M O N E Y
```

TEACHER'S PAGE

GRADE LEVEL	5
TASK	How Many Do You See?
COMMON CORE STATE STANDARDS ADDRESSED	5.OA.2 (Extending the pattern)
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 8. Look for and express regularity in repeated reasoning.

LAUNCH

Ask students: *How many triangles do you see?* Some students will say "4" because they are forgetting to count the big triangle.

MATERIALS

Unit tiles, graph paper

TASK

Tell students: *Today's task involves finding squares.*

Let teams get started. Students should each have their own worksheet. Have square tiles available for students to use. Students may also want to cut out different-sized squares and use them on the 8 × 8 grid to help them count. Consider making this suggestion if a group becomes stuck.

After students have been working for a little while, encourage some students to look for an organized approach by suggesting that they find all of the 8 × 8 squares and then all of the 7 × 7 squares and then all of the 6 × 6 squares, and so on.

SOLUTION

SIZE OF SQUARE	NUMBER IN LARGE SQUARE
1 × 1	64
2 × 2	49
3 × 3	36
4 × 4	25
5 × 5	16
6 × 6	9
7 × 7	4
8 × 8	1
TOTAL	204

Ask: *Is it a coincidence that the number of each smaller-sized squares is a square number?*

EXTENSION

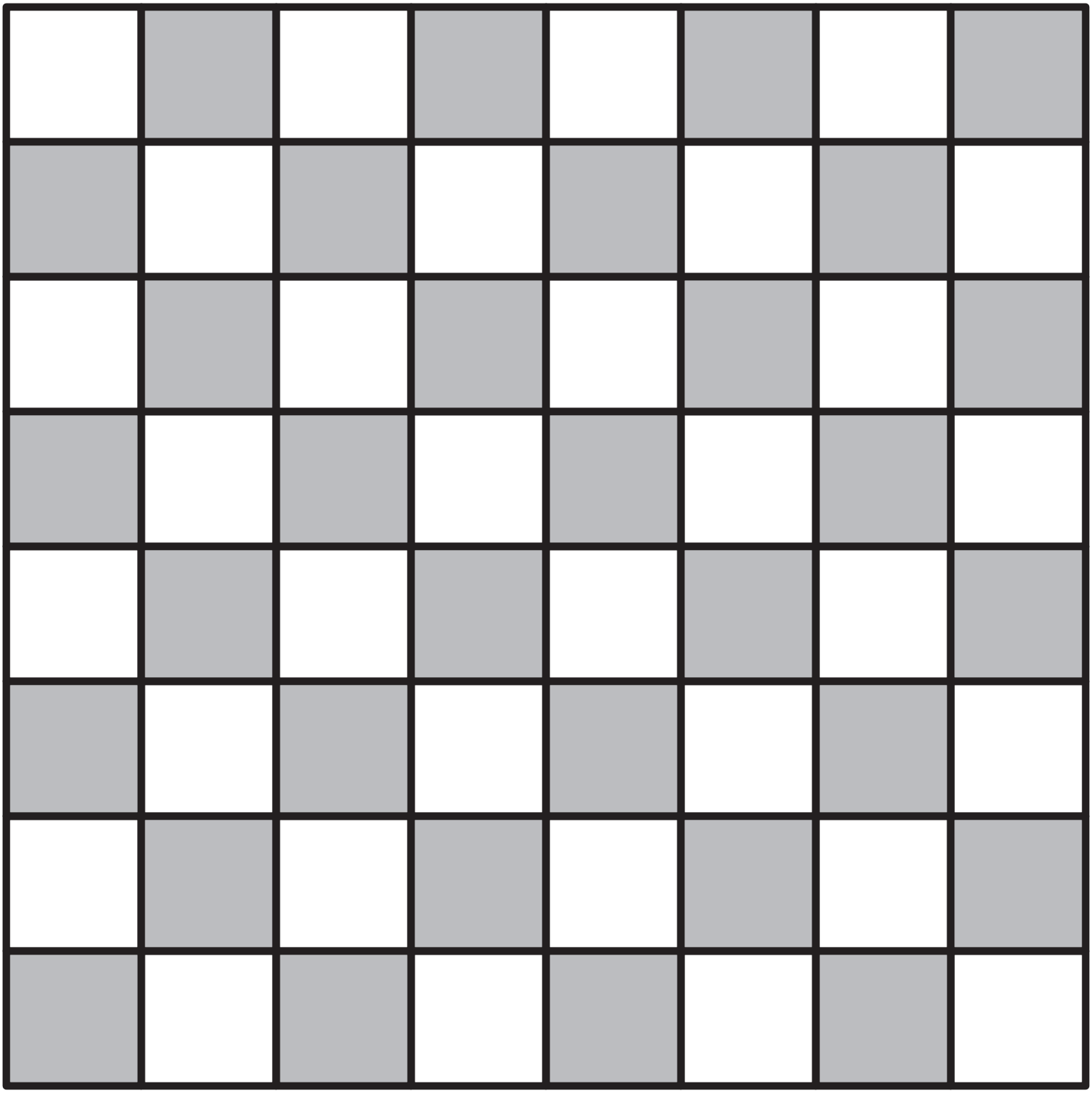
To challenge students' thinking, ask:

How many smaller squares might be in a 10 × 10 square?

Make a prediction based on what you know about the number of squares in an 8 × 8 square.

HOW MANY DO YOU SEE?

NAME _____



TEACHER'S PAGE

GRADE LEVEL	5
TASK	Consecutive Sums
COMMON CORE STATE STANDARDS ADDRESSED	5.NBT.7
STANDARDS FOR MATHEMATICAL PRACTICE	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 8. Look for and express regularity in repeated reasoning.

LAUNCH

Introduce this collaborative task by stating:

Patterns are everywhere. What are some number patterns that you are familiar with?

Students might mention odd or even numbers, square numbers, multiples of a given number, and so on.

Say: *In today's task, you will be working in your teams to find sums of consecutive whole numbers.*

Make certain that students understand the meaning of *consecutive*, and define the set of whole numbers.

TASK

Teams are asked to find the values 1 to 40 using consecutive whole numbers. Numbers cannot repeat in the sequence for one value, and negative numbers or fractions are not included in the set of whole numbers.

For example: $5 = 2 + 3$

$6 = 1 + 2 + 3$

Encourage students to look for patterns. Students will quickly see that odd numbers can be made with two consecutive whole numbers. Students might discover that adding three consecutive numbers is the same as multiplying the middle number by 3.

Let students continue to work. They will begin to ask whether or not all of the values can found. Try to avoid answering this question directly, since knowing that not all values can be found will encourage them to stop looking for some values. Eventually students will notice that the numbers 2, 4, 8, 16, 32 . . . cannot be created as sums of consecutive values. Encourage students to explain why this is the case. Intuitively, students might reason that 2, 4, 8, 16, 32 . . . are multiples of 2. These values cannot be made by consecutive whole numbers that are odd.

EXTENSION

Ask students to find the sum of the first 20 consecutive *odd whole numbers*.

Do they use patterns discovered in the consecutive sums task to help make this task easier?

CONSECUTIVE SUMS

NAME _____

Represent the values 1 to 40 as sums of consecutive whole numbers. You may use as many consecutive whole numbers as you want for any one value. You may not repeat a number in representing any value.

Then present your findings as a team. Your findings should include:

- The strategies you used
- The patterns you found
- Any remaining questions you have

CONSECUTIVE SUMS		
1 =	16 =	31 =
2 =	17 =	32 =
3 =	18 =	33 =
4 =	19 =	34 =
5 =	20 =	35 =
6 =	21 =	36 =
7 =	22 =	37 =
8 =	23 =	38 =
9 =	24 =	39 =
10 =	25 =	40 =
11 =	26 =	
12 =	27 =	
13 =	28 =	
14 =	29 =	
15 =	30 =	