Cowabunga
Grades K-2

The Big Idea
Today we'll use the same math farmers do to figure out how the same length of fence can make 5 different-sized fields for our herd. We'll discover which shape has the largest area!

Supplies
In your kit:
- ★ Masking tape
- ★ Measuring tapes: 16
- ★ Ribbon: 1 spool
- ★ Square-foot cow cards: 1 set of 100

You provide:
- ★ Scissors: 1 pair
- ★ Writing surface: whiteboard or large sheet of paper

Key Prep
- ★ Cut 5 pieces of ribbon each 20 feet plus 2 inches in length. Make 5 separate 20-foot loops by tying the ends together.
- ★ For bonus (optional) activity on page 3: Cut (1) 12-foot piece of ribbon for every 3 kids. Make a loop out of each piece of ribbon by tying the ends together.

Room Set-up
A large space, like a multi-purpose room, works best. If you're in a smaller room, you'll need at least 10 x 10 feet of open space.

What's the Math?
- ★ Area
- ★ Number patterns
- ★ Perimeter
- ★ Properties of rectangles

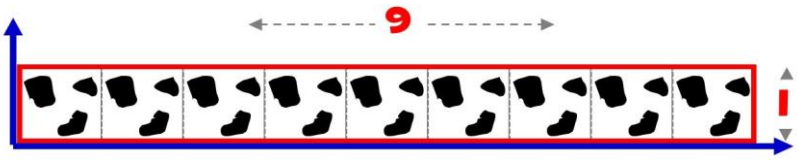
Kickoff

"Has anyone been on a farm or seen pictures of a farm? What animals live there?" **Discuss** until someone says cows. "Cows are curious, and farmers work hard to keep them from wandering away from their fields. Today, you'll be the cows and the farmers!"

Don't Let the Cows Out (15-20 minutes)

"Now it's time to be farmers. To keep these tricky cows penned in, we'll need to build a strong fence!" (Hold up 1 20-foot loop of ribbon). "We are going to make 5 different rectangle-shaped fences using the same 20-foot loop to see which fence shape holds the most cows!"

1. Hold up 1 cow card.
   - ★ "Each card is 1 foot wide by 1 foot long. For this activity, each square represents the total space that 1 cow takes up. Let's see an example of how this works."
2. Place 2 fully stretched measuring tapes on the floor to make an L. You can secure them with masking tape, if needed.
3. Place the cow cards in a stack everyone can reach.
   - ★ "Let's start by making a fence that's 1 foot wide. Then we'll gently pull the ribbon to make a rectangle."
4. Give 4 volunteer farmers 1 20-foot loop of ribbon.
5. The farmers gently place the ribbon on the floor to make a long thin rectangle 1 foot wide at opposite ends, using the measuring tapes or 1 of the cow squares to guide them.
6. Have the farmers tape down each corner of the ribbon fence.
   - ? "We know that our fence is 1 foot wide. How long is it?"
7. A volunteer can measure the length – it will be 9 feet.
   - ★ "The distance around this rectangle shape, shown here by our ribbon, is called the perimeter. When we know the perimeter of our fence, we can use math to figure out how many cows will fit inside. The space inside the perimeter is called the area. Let's use our cow squares to see how many cows will fit in the area of our fence."
8. New volunteers fill the fenced area with the cow cards in a nice neat row, making sure the squares line up edge to edge – DO NOT overlap or leave space between each square.



9. Count how many cows fit - you should get 9!
10. Write the dimensions of the fence (1x9) and cow count (9) on your writing surface:

Short side (Width)	Long Side (Length)	Number of Cows (Area)	Length of Fence (Perimeter)
1	9	9 (1 x 9)	20 (1+1+9+9)

Don't Let the Cows Out: Part II (20-25 minutes)

"Let's make different sized shapes using the same 20-foot length of ribbon to see if we can make a fence that will hold even more cows!"

1. As a group, repeat steps 1-9 above to make 4 more rectangles using the following widths: 2 feet, 3 feet, 4 feet and 5 feet.
2. Each time you complete a rectangle, write the dimension of the fence and cow counts on your whiteboard until you have a chart that looks like this:

Short side (Width)	Long Side (Length)	Number of Cows (Area)	Length of Fence (Perimeter)
1	9	9	20
2	8	16	20
3	7	21	20
4	6	24	20
5	5	25	20

? "What did we just discover?" Kids should realize that the same length of ribbon held a different number of cows when we created different sized shapes! **Party Fun Fact:** "A square is the shape with the largest area for any length fence!"

Extra Challenge (optional)

? "Using the chart, can you tell what math formula is used to find the area (number of cows) if we know the width and length of the rectangle?" **Discuss.** The answer is width x length = area.

? "What's true of every length and width in the chart above?" **Discuss.** Let the kids figure out that they always add up to 10!

? "Why do they always add up to 10?" **Discuss.** Because opposite sides of rectangles have equal lengths, the sum of a short side and a long side must equal half of the perimeter.

Wrap Up

"Did any of you know there was so much math involved in farming? You'll need this same math if you want to measure your room or build a fort!"

You can give each kid a measuring tape if you've completed **Let's Get Loud** and **Firefighter Training** (you'll need 1 measuring tape for each activity) or have fewer than 16 kids!

Bonus, if you have time: Fence-Hopping (15-20 minutes)

"Now it's time to be the cows. But you're not just any cows. You're tricky, fence-jumping cows who want to escape – if you follow the right patterns!"

1. Invite 2 volunteers to come to the front.
2. They stand 5 feet apart facing each other, with their feet at shoulder width.
3. Give them a 12-foot loop of ribbon to wrap around their ankles. This is the fence.

4. Invite 1-2 more volunteers to jump in and demo these moves:
    - Jumping and landing with both feet inside the loop or outside.
    - Landing with one foot in the loop, one foot out.
    - Or they can make up their own moves!
5. Together the club picks 3 moves as the start of a set routine. Write them in order on a blackboard.
6. Divide the kids into groups of 3. Give each group one 12-foot loop of ribbon. All kids take turns holding the fence and jumping through the routine once.
7. After everyone has had a turn jumping once, double the pattern! Jump inside the fence twice (in out, in out), jump with both feet outside the fence once then twice and land with one foot inside the loop, one foot outside the loop twice.