

GRADE 3 Mathematics: Planning a Barn (Perimeter and Area)

Summary of Learning Opportunity

The students in this class had spent time earlier in the year investigating measurement. They estimated and measured the lengths, perimeters and areas of different objects and spaces around the classroom and estimated and measured the perimeter and area of different shapes in a worksheet. In this lesson, the students were in the middle of a multiplication unit. We designed this task so that the students could connect concepts of multiplication and area. Working across math strands encourages flexible problem-solving, builds adaptive thinking and requires students to make decisions about which strategies to use. This higher-level thinking builds critical reasoning and supports long-term success in math.

Mathematics Grade 3	Learning Standards	Competencies	<p>Understanding and Solving:</p> <ul style="list-style-type: none"> Develop, demonstrate and apply mathematical understanding through play, inquiry, and problem solving Develop and use multiple strategies to engage in problem solving
		Content	<ul style="list-style-type: none"> Addition and subtraction facts to 20 (emerging computational fluency) Multiplication and division concepts Measurement, using standard units (linear, mass and capacity)

Foundational Math Connections

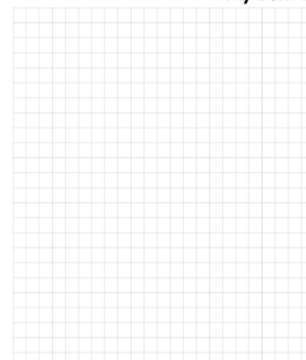
MATHEMATICS: Geometry and
Measurement (Spatial Sense) –
Measurement

MATHEMATICS: Computational
Fluency (operations) –
Understanding of Operations

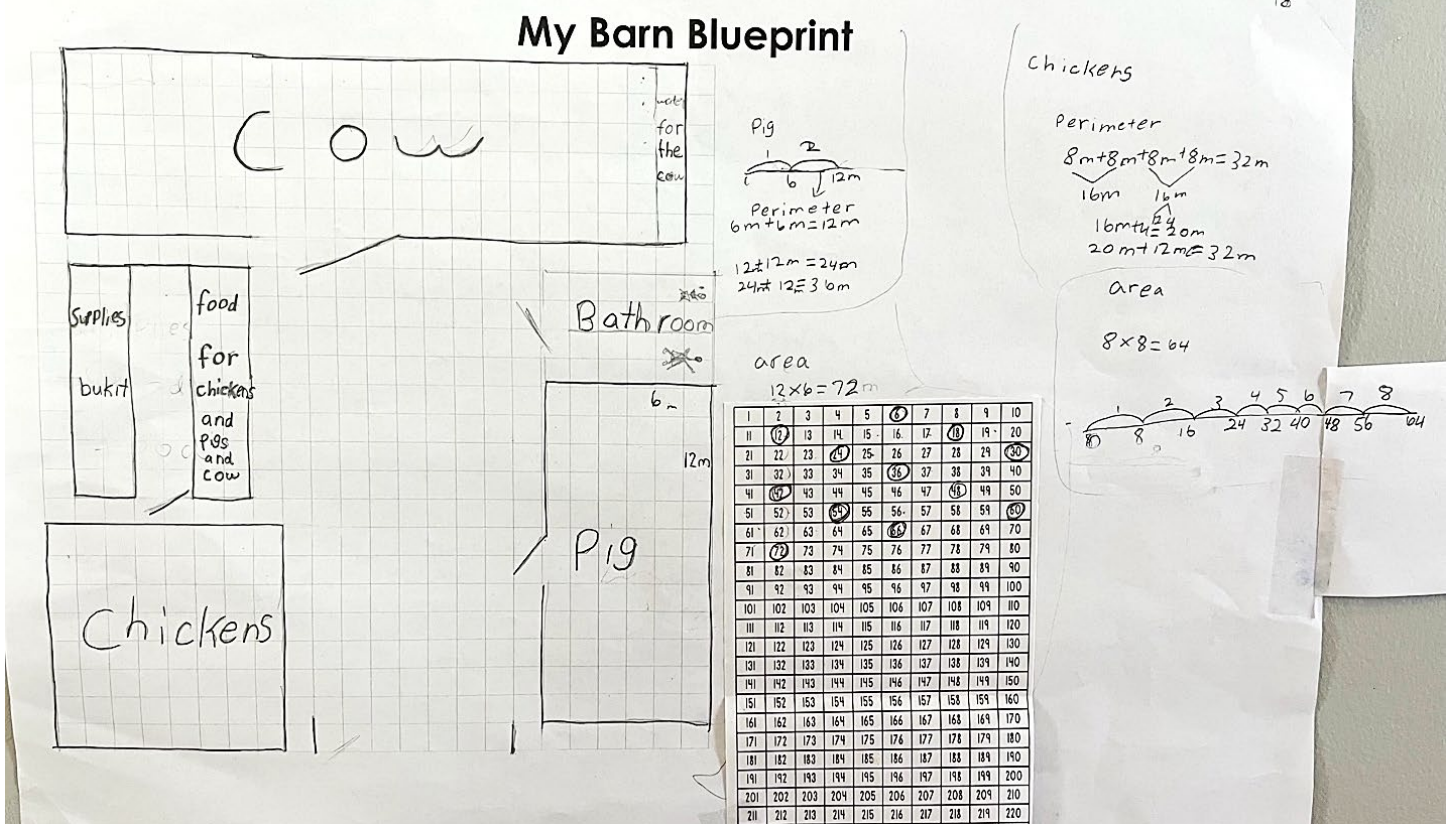
Instruction

- Students were challenged to plan the layout of animal enclosures in a barn. While the animals would spend most of their time outside in the farmyard, they would need a safe space indoors. I gave the students approximate measurements for farm animals:
 - Cow 2-3 meters long, 1 meter wide
 - Pig 1-2 meters long, 140 cm wide
 - Chicken 40-60cm long, 20 cm wide
- Students would need to give the animals enough space based on their size and a space for supplies. We also discussed other space planning considerations like:
 - How big of a space would each animal need?
 - How would the animals get from the barn door to their enclosure, and how big of a path would they need?
- Students were given paper containing both blank and graph paper sections to plot out their barns. Students were asked to determine the area and perimeter of each of the animal enclosures and show their work.

My Barn Blueprint



Demonstrations of Student Learning, Teacher Assessment, and Reflection

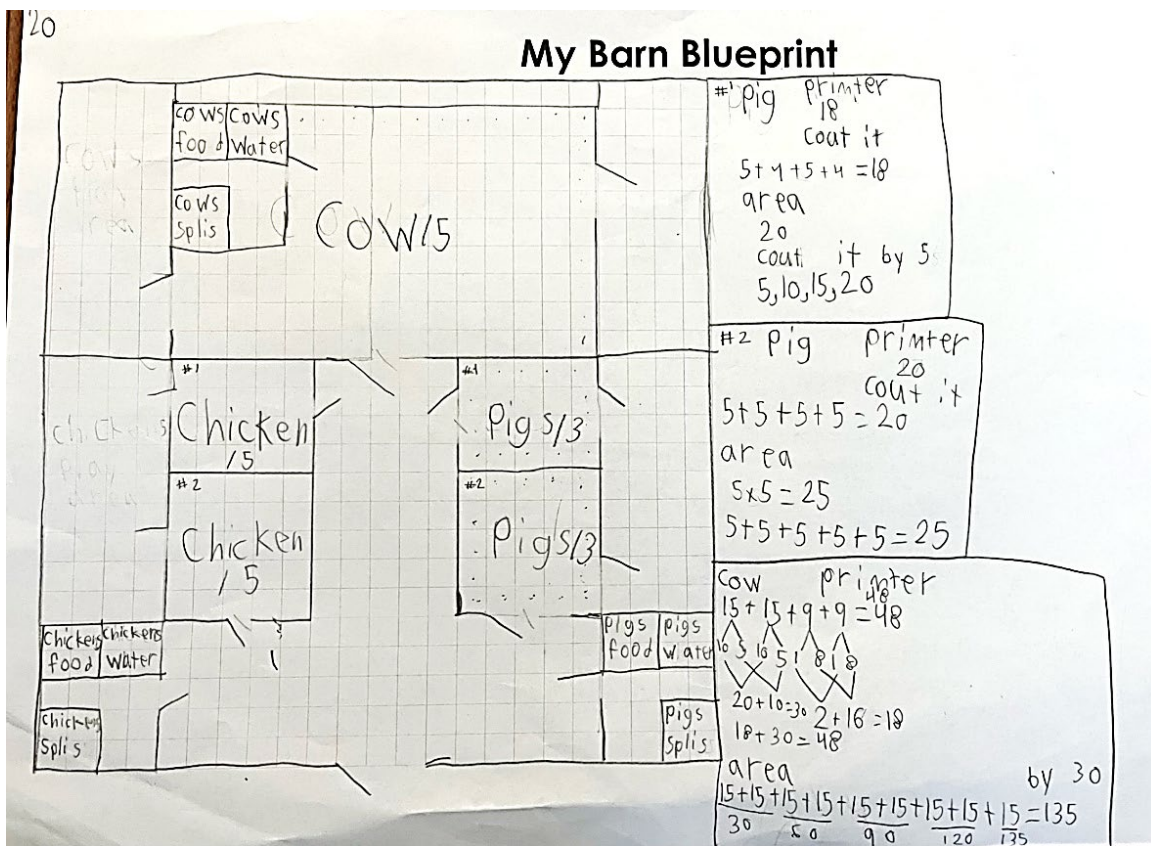


Teacher's Observations and Assessment

This student was able to use the measurements of the different animals to estimate the space needed to create enclosures for them. They were also able to create pathways for the animals to get in and out of the barn. This student used foundational computational fluency skills such as showing multiplication in different symbolic forms like a number line and hundred chart and was able to explain their strategies. They are **proficient** in their mathematical understanding and problem-solving skills.

This student was clearly able to record and explain their thinking about perimeter and area. When asked what perimeter was, they said, "Perimeter is around the outside edge of the shape, so for the pig's I counted 12 on one side so I knew the other side would be 12, then I counted 6 on the top so it would be 6 on the bottom. $6 + 6 = 12$ and $12 + 12 = 24$, then I added $24 + 12 = 36$ ". This demonstrates **proficiency** in measurement.

This student used symbolic forms to demonstrate their understanding of multiplication as skip counting a number of times. For example, they used an open number line to calculate the area of the chicken enclosure (jumping by 8, 8 times to get to 64), a hundred chart to calculate the area of the pig enclosure (jumping by 6, 12 times to get to 72). This demonstrates **proficiency** in computational fluency skills.



Teacher's Observations and Assessment

This student was able to use the measurements of the different animals to estimate the space needed to create enclosures for them. They were also able to create pathways for the animals to get in and out of the barn. The student used different strategies to determine the area and perimeter of each enclosure:

For the smaller enclosures, they counted the sides of each square around the border of the shape (perimeters) or the total squares inside the shape (area). The counting of the sides and squares indicated that the student understood what the perimeter and area were (either the distance around the shape or the inside of the shape). This student also used different equations to determine the perimeter and area of each enclosure. For example, for the area of #2 pig enclosure, the student first used a known multiplication fact ($5 \times 5 = 25$) and then used repeated addition ($5 + 5 + 5 + 5 + 5 = 25$).

For the cow enclosure, the student used addition for the perimeter. When I asked them to explain their thinking, they responded, "I made the numbers more friendly to work with. I didn't know what $15+15$ equals, so I broke it up into 10 and 5. When I asked how they solved the area, they were able to use the previous calculation as an addition strategy. They said, "I knew from the perimeter that $15+15=30$, so then I just grouped them together into groups of 30. Counting by 30's is easy for me because I can just use my fingers to keep track 30, 60, 90, 120. Then I added 15 to make 135."

This student used foundational computational fluency skills such as decomposing and recomposing, was able to explain their strategy, and demonstrated their knowledge that multiplication is related to repeated addition. They are **proficient** in the competencies and content assessed in this task.

Sample Report Card Comment

The proficiency indicators can also be used to provide descriptive feedback during conferences with parents and through written report card comments.

Sample comment for student:

- Student is able to use different strategies to determine the area and perimeter of different shapes.
- Student understands the process of multiplication. They are able to use repeated addition to solve equations. We will continue to work with Student in learning different strategies to assist them when multiplying (i.e. an open number line, skip counting).
- Student is able to develop and use multiple strategies when engaging in problem solving activities.