

Math Unit 1

Describing the World Around Us

- How can we use mathematics to describe the world around us?

Culminating Performance Task¹

¹ The performance task is designed to showcase student mastery on a set of key unit targets that are integrated into a multi-part task. Although this is a culminating task, students are working toward the targets throughout the unit, and then finalizing and presenting the task in the last week. Students need to see a model early in the unit and lessons equip students with the knowledge and skills required to complete the performance task. The task is evaluated using a rubric that describes performance indicators for each target.

TASK DESCRIPTION

TITLE	GROUPING FOR FINAL PRODUCT (Individual, Partner, Group)	Approx. # Lessons to Finalize	Approx. # Lessons to Present
Designing the Farm	Group	3–4	1

OVERVIEW: *Students will apply their knowledge of area, perimeter, and operations with whole numbers in order to plan and design a working farm that will yield the highest income possible. The final product will include a map of the farm design plan and a summary of the calculations performed. Students will give a short presentation to show their farm design and to explain the rationale behind their choices.*

PURPOSE & ROLE²	The purpose of this task is to provide students with an engaging and challenging context in which they can apply their knowledge of area, perimeter, and operations with whole numbers along with their developing literacy skills of the mathematics classroom. Students will assume the role of a farmer/designer and will be tasked with the planning and designing a working farm that will yield the highest income possible.
AUDIENCE	Students will present their farm plan to the class at the end of Set 6. Ideally, other members of the school community are invited to attend.
FORMAT	The finished product will include two products: 1. Farm Planning Worksheet, which will be the visual diagram of their farm. 2. Farm Calculations Worksheet, which reflects all of their calculations.
TOPIC	All students will be working within the context of a farm design for this particular task. Farming was chosen as a topic because it connects to the real-life experience of growing your own food, which many students in other countries may have actual experience with. It also connects to the work they are doing in other disciplines where they are studying topics such as water and breakfast.
DIFFERENTIATION	This task is easily adaptable to meet the needs of diverse learners. Teachers can modify several aspects of the task, including, but not limited to, the amount of fencing provided, the size of the plot of land provided, and any of the numbers in the guidelines or the guidelines themselves. Students who still require the use of manipulatives should be encouraged to use them.
TECHNOLOGY	Contingent upon the availability of technology in their schools, teachers may wish to have their students record their presentations in advance using the

² This comes from RAFT (role-audience-format-topic), a widely used writing framework:
<http://www.readwritethink.org/professional-development/strategy-guides/using-raft-writing-strategy-30625.html>.



	<p>cameras on a computer, tablet, or smartphone, etc. While the goal is to have students build to feeling and being confident to speak in front of a group, this may prove too daunting as an initial task. Recording students would give them an opportunity to revise their language to be more clear, while still ensuring that the students meet intended language targets. Recordings can then be shared with the class.</p>
PRESENTATION	<p>Students will have an opportunity to present their final farm plan to the class as well as defend their thinking via a live presentation or viewing of their recording.</p>
OTHER NOTES	



KEY TARGETS AND RUBRIC: FOR TEACHERS

Targets	Needs Support	Approaching Target	Meets Target	Exceeds Target
<p>I can fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (3.NBT.2)</p>	<p>Unable to add or subtract in a timely manner.</p> <p>May still rely heavily on the use of concrete manipulatives, representations, or acting out the operation.</p> <p>Unable to work without the support of the teacher.</p>	<p>Can add or subtract in a timely manner.</p> <p>Needs little reliance on tactile aids and/or light teacher prompting.</p>	<p>Can add or subtract within 1,000 independently and in a timely manner.</p> <p>Uses strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.</p>	<p>Can add or subtract numbers beyond 1,000 independently and in a timely manner.</p> <p>Uses strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.</p>
<p>I can 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. (3.OA.3)</p>	<p>Unable to solve one-step word problems involving multiplication and division within 100.</p> <p>May still rely heavily on the use of concrete manipulatives, representations, or acting out the operation.</p> <p>Unable to work without the support of the teacher.</p>	<p>Requires some teacher support to correctly solve one-step word problems involving multiplication and division within 100.</p> <p>Cannot represent the situation using a variety of strategies such as drawings and equations.</p>	<p>Can independently and correctly solve one-step word problems involving multiplication and division within 100.</p> <p>Can represent the situation using a variety of strategies such as drawings and equations.</p>	<p>Can independently and correctly solve one-step word problems involving multiplication and division beyond 100.</p> <p>Can represent the situation using a variety of strategies such as drawings and equations</p>





















<p>I can multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. (3.MD.7b)</p>	<p>Counts unit squares one by one to calculate the area of a quadrilateral, but does not arrive at the correct sum, or cannot determine a strategy to compute area without significant teacher support.</p>	<p>Counts unit squares one by one or uses repeated addition to find the total area to calculate the area of a quadrilateral, and arrives at a correct total with minimal teacher support.</p>	<p>Relates area to multiplication and independently uses multiplication to find the area of quadrilaterals.</p>	<p>Relates area to multiplication and extends the concept to find the area of other shapes beyond quadrilaterals.</p> <p>Can find the area of irregular shapes by decomposition.</p>
<p>I can solve real-world problems involving perimeters of polygons. (3.MD.8) Note: In this unit, students are only being asked to compute the perimeter of quadrilaterals.</p>	<p>Cannot independently calculate the perimeter of a quadrilateral and requires significant teacher support.</p> <p>Still needs to count the perimeter unit by unit to arrive at a final solution.</p>	<p>Can independently find the perimeter of quadrilaterals only when given all four side lengths.</p> <p>Cannot extend the process of finding perimeter to real-world situations.</p>	<p>Can independently solve real-world problems requiring them to find the perimeter of quadrilaterals, including situations involving missing sides.</p>	<p>Can solve real-world multi-step math problems involving polygons.</p> <p>Can find the length of multiple unknown sides of a polygon.</p> <p>Applies the formula for perimeter.</p>
<p>I can make sense of problems and persevere in solving them. (MP 1)</p>	<p>Little or no engagement in the task.</p> <p>May require significant prompting or support from the teacher.</p>	<p>Chooses a partially correct or correct strategy for one part of the task, but not another.</p> <p>May require significant prompting or support from the teacher.</p>	<p>Chooses a correct strategy.</p> <p>Systematically applies reasoning and content knowledge in an effort to solve the problem.</p>	<p>Chooses an efficient strategy.</p> <p>The teacher makes adjustments only as needed.</p> <p>Systematically applies reasoning and content knowledge in an effort to solve the problem.</p>



I can construct viable arguments and critique the reasoning of others. (MP 3)	<p>Lacks correct reasoning or evidence to justify reasoning.</p> <p>Reasoning applied to a claim is not mathematically valid.</p> <p>Does not provide any mathematical reasoning or explanation.</p>	<p>Provides correct reasoning or evidence to justify reasoning.</p> <p>May provide some mathematical reasoning or explanation, but it is not mathematically valid.</p>	<p>Can apply correct reasoning to a problem and provides appropriate evidence to justify reasoning.</p> <p>The explanation or reasoning provided is mathematically valid.</p>	<p>Can apply correct reasoning to a problem and provides appropriate evidence to justify reasoning.</p> <p>The explanation or reasoning provided is mathematically valid.</p> <p>Can apply reasoning to another student's work and explain how the solutions are similar or different.</p>
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TARGETS AND RUBRIC: FOR STUDENTS

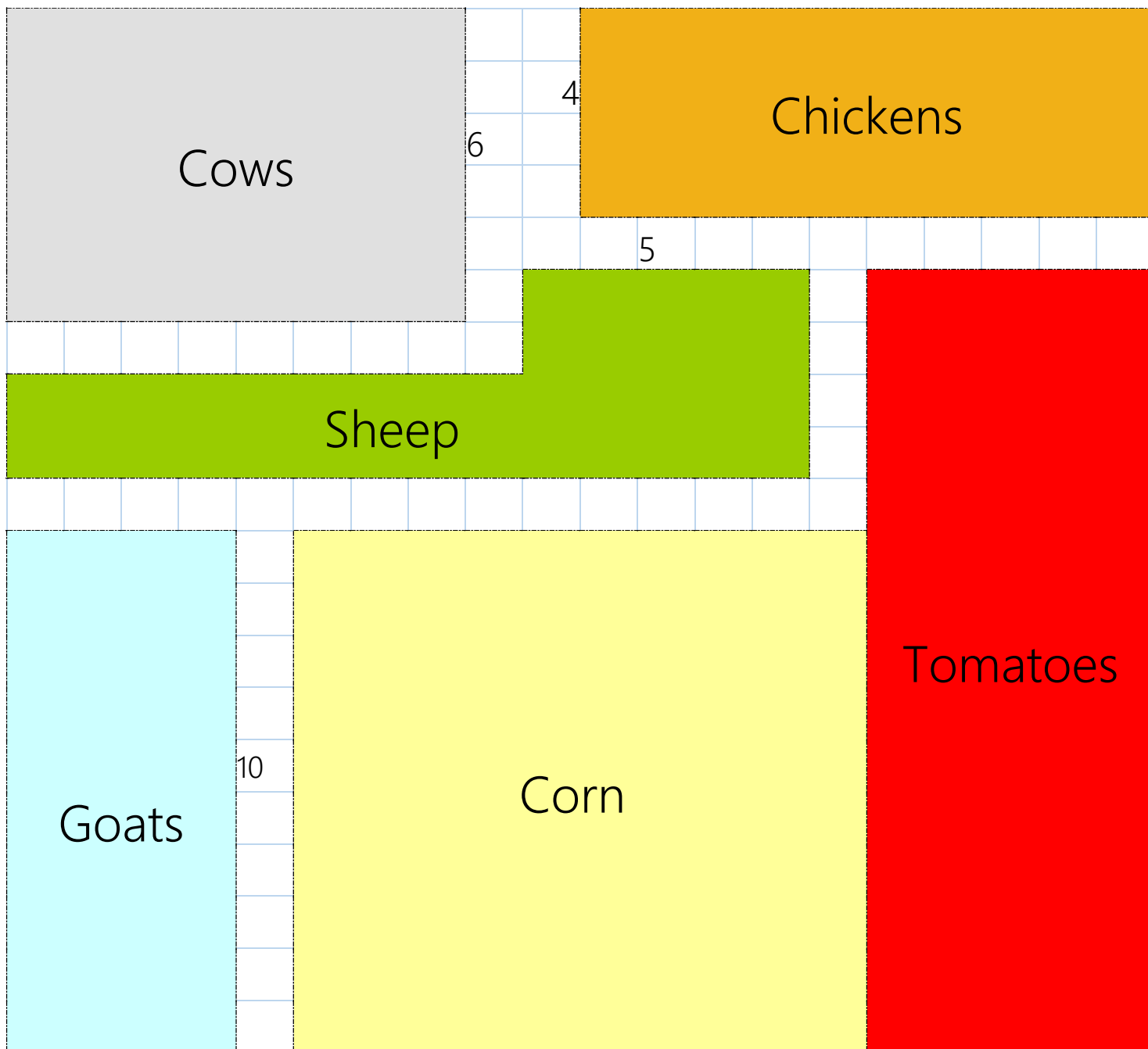
Long-Term Targets	Needs Support	Approaching Target	Meets Target	Exceeds Target	Teacher Comments
I can fluently add and subtract within 1,000. (3.NBT.2)					
I can use multiplication and division within 100 to solve word problems. (3.OA.3)					
I can use multiplication to find the area of quadrilaterals. (3.MD.7b)					
I can solve real-world problems involving perimeters of polygons. (3.MD.8)					
I can work on a challenging problem and not give up. (MP 1)					
I can show my work and explain how I got my answers. (MP 3)					

Name: Lisa

Date: February 20, 2016

Designing the Farm: Farm Planning Worksheet

Directions: Design your farm. Label all of the parts. Remember: Plants shouldn't grow next to where the animals live!





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10

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Math Unit 1

• *Performance Task:
Student Sheet*

Name: _____ Class: _____ Date: _____

Farmers earn money by raising animals and growing vegetables. For this task you will pretend that you are a farmer. Your task is to design a farm that will earn you the most amount of money.

To show your work you will need to draw a map to show where you put the animals, plants, and fences. You will also need to show your calculations that tell the reader how much money you are earning.

Here are your guidelines:

- You have 200 units of fence to put around your animals and plants.

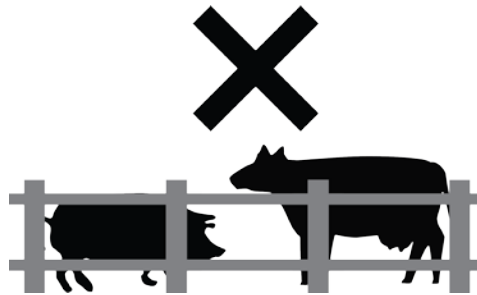


- You can have as many plants and animals as you want, but need to have at least one plant and one animal.
- Each type of animal must have its own separate space with a fence that goes around the perimeter. Animals that are the same can share the same space. For example, cows can stay with cows, and pigs can stay with pigs,

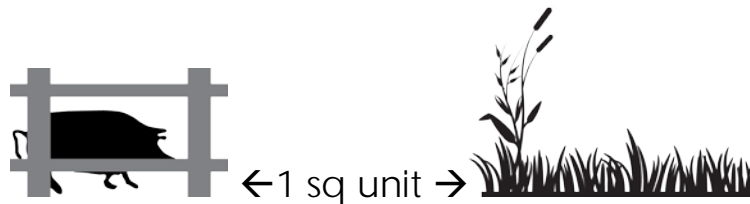


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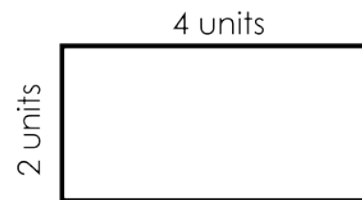
but cows can't stay with pigs.



- There needs to be at least 1 sq. unit of space between vegetables and animals.



- On your map, you must show the measurements of your farm and the area and perimeter of each animal pen and vegetable patch



- You must write down your calculations that show how much money your farm will earn on the Farm Calculations Worksheet.

Math Unit 1





- *Performance Task: Farm Planning Sheet*






Math Unit 1

- *Performance Task: Farm Values Worksheet*

Name: _____ Class: _____ Date: _____

Farm Values Worksheet

Animals		
<p>Chickens</p> 	<p>Every ten chickens need 5 square meters of land</p>	<p>You will make \$10 each month for every chicken.</p>
<p>Cows</p> 	<p>Each cow needs 8 square meters of land.</p>	<p>You will make \$50 each month for every cow.</p>
<p>Sheep</p> 	<p>Each sheep needs 2 square meters</p>	<p>You will make \$20 each month for every sheep.</p>
<p>Goat</p> 	<p>Each goat needs 1 square meters</p>	<p>You will make \$7 each month for every goat.</p>

Vegetables		
<p>Peas</p> 	<p>You will make \$8 for every square meter of peas planted.</p>	
<p>Tomatoes</p> 	<p>You will make \$10 for every square meter of tomatoes planted.</p>	
<p>Lettuce</p> 	<p>You will make \$4 for every square meter of lettuce planted.</p>	
<p>Corn</p> 	<p>You will make \$30 for every square meter of corn.</p>	
<p>Open Land</p> 	<p>You can have land that is open. That means there are no plants or animals on it. Open land will cost you money because you will have to water it and</p>	<p>-\$5 for each square meter.</p>



	take care of it.	
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Math Unit 1

- *Performance Task: Farm Calculations*



Name: _____

Date: _____

Designing the Farm: Farm Calculations Sheet

Directions: Record all of the parts of your farm here. List the area and perimeter. Calculate the total amount of money each plant or animal will earn for you. Use the back of the sheet if you need more space to write.

Name of Animal or Vegetable	Perimeter	Area	Total Money Earned

