

Math Unit 1

Describing the World Around Us

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

UBD-Unit Plan¹

¹ Adapted from *Understanding by Design, Unit Design Planning Template* (Wiggins/McTighe 2005). Each unit plan is designed for 68 weeks of instruction, depending on student levels and length and frequency of class periods. The unit is mapped out in more detailed in the Unit Guide.

OVERVIEW²

Introduction

Unit 1 introduces academic mathematics to many students for the first time. For most and often all Bridges students, it is their first encounter with math instruction in a United States high school classroom. Therefore, a primary goal of Unit 1 is to encourage students' positive attitude and curiosity for mathematics. The unit essential question—*How do we use math to describe the world around us?*—builds the foundational understanding that we rely on math to describe, function in, and make sense of the world around us.

Students begin Unit 1 with interactive activities to experience and understand the structure of the number system, place value, and symbolic notation in mathematics. In Sets 2 through 5, students build on this foundation of place value and move into performing four central operations (addition, subtraction, multiplication, division). These four operations will simply be introduced in this unit, and students will not be expected to master them. Students will also work towards solving simple word problems with whole numbers. Concrete measurement activities, specifically area and perimeter, are woven throughout the unit to provide students with challenging hands-on authentic tasks where they can immediately apply their knowledge of operations and number sense.

Students will tackle this foundational knowledge and skills each week in preparation for their final performance task: Designing the Farm. Here students will apply their knowledge of area, perimeter, and operations with whole numbers as they assume the role of farmers and designers to create a functional farm plan.

Content Connections

Unit 1, across all content classes, introduces students to the discipline. Students begin with the foundations in each discipline, on which Units 1–4 will build.

- **Unit 1 ELA:** Students begin the year unpacking the concept of identity as a bridge to understanding character. Students create identity maps for themselves and analyze their shared characteristics. The identity map is the touchstone graphic organizer for labeling and describing people, including name, gender, age, country, language, interests, and beliefs. Students begin to use the identity categories as way to analyze characters in text. Unit 1 builds the foundation for the Unit 2 study on human rights through the story *Nasreen's Secret School*.
- **Unit 1 FLL:** Students who are new to print begin Unit 1 with an introduction to the class and school community. Students learn the foundational oral and written skills of providing personal information (name, address, phone numbers, etc.) and how to navigate school (school layout, reading a map, reading a schedule). Students are also introduced to the foundations of literacy as they learn beginning consonants and their sounds as well as beginning sight words and letter formation.
- **Unit 1 Science:** The first Science unit centers on food, with breakfast as a focal point. Through analyzing breakfast food in the home country and the U.S., students learn about similarities and

² This is a summary of the unit. The sections on the following pages describe the unit in more detail.

differences in foods across the globe, as well as the cultural significance of foods. In Unit 1, students learn foundational science content knowledge (nutrition, food groups, the five senses, healthy/unhealthy) and skills (observing, describing, labeling, graphing, measuring, using tools, classifying). Unit 1 builds the foundation for the Unit 2 study of plants as food for humans and the resources plants need to grow and survive.

- **Unit 1 Social Studies³**: Unit 1 Social Studies introduces students to the foundations of geography and culture. Students enter into basic map literacy as they identify physical features (land, water, mountains, deserts) in pictures and on maps. They learn cardinal directions as they create maps of their home community. Through the culminating travel guide project, students connect the physical features of their home communities to cultural practices. Unit 1 builds the foundation for the Unit 2 study of the Trans-Saharan Salt and Gold Trade, a case study for the intersection of geography, resources, and culture.

³ The Social Studies curriculum has not been revised, but the content of the existing Unit 1 for Social Studies is described here.

STAGE 1 – DESIRED RESULTS						
Unit Targets ⁴	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6
I can identify symbols used in mathematics. (Reading Standard 7)	X	X	X	X	X	X
I can compare objects using the terms <i>equal</i> , <i>bigger</i> , <i>longer</i> , and <i>shorter</i> . (1.MD.A.1)	X	X	X	X	X	X
I can compare numbers using the word forms of <i>equal to</i> , <i>less than</i> , and <i>greater than</i> . (1.MD.A.1)	X	X	X	X	X	X
I can make comparisons between numbers using the symbols $>$, $<$, $=$. (1.MD.A.1)	X					
I can understand that the digits in a number represent amounts of millions, thousands, hundreds, tens, and ones . (4.NBT.1)	X	X	X	X	X	X
I can write numbers up to millions in standard and expanded form. (4.NBT.2.)	X	X	X	X	X	X
I can use addition strategies to combine lengths. (2.MD.B.5)		X	X	X	X	X
I can add numbers up to 1,000 . (3.NBT.2)		X	X	X	X	X
I can define the term <i>perimeter</i> in my own words. (3.MD.8)		X	X	X	X	X
I can write and solve addition equations to represent the perimeter of regular polygons (e.g., $4 + 6 + 4 + 6 = 20$). (3.MD.8)		X	X	X	X	X
I can use subtraction strategies to find differences between lengths. (2.MD.B.5)			X	X	X	X
I can subtract numbers up to 1,000 . (3.NBT.2)			X	X	X	X
I can represent subtraction equations with regrouping using place value models. (3.NBT.2)			X		X	
I can use the standard algorithm for subtraction with regrouping to subtract multi-digit numbers. (3.NBT.2)			X	X	X	X
I can use subtraction to solve missing length problems involving perimeter. (3.MD.8)			X			X
I can use repeated addition, skip counting, and arrays to calculate the area of quadrilaterals .				X		X
I can represent multiplication situations using multiplication equations and visual models (4.OA.1)				X		X
I can write and solve multiplication equations to represent the area of a rectangle. (3.MD.7)				X		X
I can find all the possible factors of a whole number when given the product. (3.OA.4., 3.OA.5)				X		X
I can compare perimeter and area . (3.MD.8.)				X		X
I can write multiplication equations with missing					X	X

⁴ Only targets new to this unit are included here.

factors to solve problems involving unknown size of groups and unknown number of groups. (3.OA.4.)						
I can write division equations to represent problems of unknown size of groups and unknown number of groups. (3.OA.4.)					X	X
I can represent and solve problems involving multiplication and division. (4.OA.2.)					X	X
I can apply concepts of operations with numbers, area, and perimeter to solve an authentic task. (3.MD.C.5, 3.MD.C.6, 3.MD.C.7)						X
I can work on a challenging problem and not give up. (MP 1)	X	X	X	X	X	X
I can think about numbers in many different ways. (MP 2)	X	X	X	X	X	X
I can show my work and explain how I got my answers. (MP 3)	X	X	X	X	X	X
I can use math symbols and numbers to solve a problem. (MP 4)	X	X	X	X	X	X
I can use math tools, pictures, drawings, and objects to solve the problem. (MP 5)	X	X	X	X	X	X
I can check my work to make sure my calculations are correct. (MP 6)	X	X	X	X	X	X
I can use what I already know about math to solve the problem. (MP 7)		X	X	X	X	X
I can use a strategy that I used to solve another math problem. (MP 8)		X	X	X	X	X

Essential Questions & Enduring Understandings

Students will understand that ...

How do we use mathematics to describe the world around us?

Students will understand that we need math to help us carry out basic tasks that we need to survive in the world. We use numbers and symbols to help us make sense of and describe situations that happen in real life. The operations that we perform with numbers model real-life actions that we perform, such as putting things together, taking things apart, arranging objects in groups, or creating smaller groups from a larger one. The final performance task bundles foundational math targets from the unit, requiring students to use math to design a structure needed for farming. Students will see that you need math to get by in the world.

UNIT AT A GLANCE		
SET	GUIDING QUESTIONS & KNOWLEDGE <i>Students will know that ...</i>	SKILLS <i>Students will be able to ...</i>
1 5 lessons	<p>How do we use symbols to describe the world around us? What does the number's place tell us about its value?</p> <p><i>Math can be used to describe the events that happen in our everyday lives. We use numbers and symbols to help us describe these events. We will be able to compare numbers to symbols using $<$, $>$, or $=$; identify place value in numbers up to millions; and write multi-digit numbers in standard form and expanded notation.</i></p>	<ul style="list-style-type: none"> • identify several symbols used in mathematics • make written and oral comparisons between object lengths using the terms <i>equal</i>, <i>bigger</i>, <i>biggest</i>, <i>longer</i>, and <i>shorter</i> • make comparisons between objects using the symbols $>$, $<$, $=$ • understand that the digits in a number represent amounts of millions, thousands, hundreds, tens, and ones • write numbers up to millions in expanded form
2 5 lessons	<p>How do we add numbers? How do we use addition to find an object's perimeter?</p> <p><i>When we combine or put groups together, we are adding. We can use what we know about place value to help us add numbers efficiently. We can use addition to help us find the perimeter of objects.</i></p>	<ul style="list-style-type: none"> • use addition strategies to combine lengths and find the perimeter of an object • define the term perimeter in their own words • write and solve addition equations to represent the perimeter of regular polygons (e.g., $4 + 6 + 4 + 6 = 20$)
3 5 lessons	<p>How do we subtract numbers? How do we use subtraction to find real-world problems in math?</p> <p><i>When we take away from a group, we are subtracting. We can use what we know about place value to help us subtract numbers efficiently. We can use subtraction to help us solve real world problems and find the perimeter of objects.</i></p>	<ul style="list-style-type: none"> • subtract numbers up to 20 • represent subtraction equations with regrouping using base ten blocks • use the standard algorithm for subtraction with regrouping to subtract multi-digit numbers • use subtraction to solve missing length problems involving perimeter • use subtraction to solve problems with real-world contexts
4 5 lessons	<p>How do we multiply numbers? How do we use multiplication to find the area of a quadrilateral?</p> <p><i>Multiplication is a more efficient form of repeated addition. Arrays are one way we</i></p>	<ul style="list-style-type: none"> • use repeated addition, skip counting, and arrays to calculate the area of quadrilaterals • represent multiplication situations using multiplication equations and visual models • communicate the process of finding the

	<p><i>see multiplication in everyday life. We can use what we know about multiplication to find the area of many different objects, including land.</i></p>	<p>area of a rectangle both orally and in writing</p> <ul style="list-style-type: none"> • write and solve multiplication equations to represent the area of a rectangle • find all the possible factors of a whole number when given the product • compare perimeter and area
<p>5</p> <p>5 lessons</p>	<p>What does it mean to divide? How are multiplication and division related?</p> <p><i>Division is related to multiplication. It is the inverse or opposite operation of multiplication. When we divide, we are forming equal sized groups from a set.</i></p>	<ul style="list-style-type: none"> • write multiplication equations with missing factors to solve problems involving unknown size of groups and unknown number of groups • write division equations to represent problems of unknown size of groups and unknown number of groups • represent and solve problems involving multiplication and division
<p>6</p> <p>5 lessons</p>	<p>How do we use the four basic math operations to solve real world problems?</p> <p><i>We can use adding, subtracting, multiplication, and division to solve many real world problems. There are clues and signal words that can help us determine which operation to choose. Students will develop and present their final Performance Task.</i></p>	<ul style="list-style-type: none"> • apply concepts of operations with numbers, area, and perimeter to solve an authentic task • explain and justify their solutions to a real world problem

STAGE 2 – ASSESSMENT EVIDENCE	
Major Assessments	
Beginning Assessment On Demand ⁵ - Individual	Pre-Unit Diagnostic Assessment Students should complete a constructed response format test before beginning the unit. The purpose of this diagnostic is to help teachers determine students' entry points into the curriculum as well to identify any misconceptions or potential areas of struggle for students. <i>(Note: This assessment is not provided in materials; teachers will need to create this.)</i>
Mid Unit On Demand - Individual	Mid-Unit Benchmark Exam The mid-unit assessment is designed to gauge student progress at the midpoint of the unit (at the end of Set 3). It should be in constructed response format. Multiple choice should be intentionally excluded from this exam to allow for students to ease into the practice of testing. Multiple choice will be introduced as a format beginning in Unit 2. It is also suggested that calculators not be given to students for this task in order to assess students' knowledge of addition and subtraction. It is advisable, however, to allow students to use manipulatives or number lines to assist them in performing operations. Doing so will reduce the cognitive demand of students to have to memorize all of the numbers and is a scaffold that can be likened to providing students with a word bank on a vocabulary test. <i>(Note: This assessment is not provided in materials; teachers will need to create this.)</i>
Performance Task⁶ Over Time - Collaborative	Designing the Farm 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. Students will also apply the disciplinary literacy skills of the mathematics classroom as they present and justify their solutions. Students will assume the role of a farmer/designer and will plan and design a working farm that will yield the highest income possible. <i>(Note: See the Performance Task Description and Rubrics document for more details.)</i>
Final Assessment On Demand - Individual	Final Unit Exam Students should complete the final constructed response exam at the end of the unit. This exam should be the same format as the pre-unit diagnostic. It is designed to show student performance toward meeting the unit targets. <i>(Note: This assessment is not provided in materials; teachers will need to create this.)</i>

⁵ On Demand refers to an assessment completed in one sitting, without teacher support.

⁶ See the Performance Task Description and Student Model for more details on this assessment.

STAGE 3 – LEARNING PLAN	
SET 1	Mathematical Notation: How do we use symbols to describe the world around us? What does the number's place tell us about its value?
1	Symbols
2	Which One is Bigger?
3	Numbers in the Hundreds
4	Numbers in the Thousands
5	Numbers in the Millions
SET 2	Addition: How do we add numbers? How can we use addition to find an object's perimeter?
6	Using Addition to Find Total Length
7	Two-Digit Addition
8	Addition with Regrouping
9	Addition Using the Standard Algorithm
10	Perimeter
SET 3	Subtraction: How do we subtract numbers? How do we use subtraction to find an object's perimeter?
11	Two-Digit Subtraction
12	Two-Digit Subtraction with Regrouping
13	Three- and Four-Digit Subtraction
14	Subtraction Using the Vertical Algorithm
15	Perimeter and Missing Side Length
SET 4	Investigating Area and Arrays: How do we multiply numbers? How do we use multiplication to find the area of a quadrilateral?
16	Area
17	Multiplication and Repeated Addition
18	Arrays and Commutative Property
19	Dimensions and Known Area
20	Perimeter and Area
SET 5	Division: How do we divide numbers? How are multiplication and division related?
21	Missing Factors
22	Division Equations
23	Dividing with Base Ten Blocks
24	Multiplication and Division Word Problems
25	Solving Problems

SET 6	Applying Our Learning: How do we use the four basic math operations to solve real world problems?
26	Launching the Task
27	Exploring Solutions to the Task
28	Preparing for the Presentation
29	Final Presentations
30	Summarizing the Work of the Unit