Bridges in Mathematics
Grade 3 Unit 8

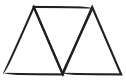
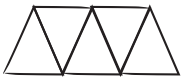
Bridge Design & Construction: Data Collection & Analysis

In this unit, your student will:

- Research bridge engineering and design
- Design and build model bridges to meet specific criteria and constraints
- Plan and carry out tests to find failure points and make improvements to their model bridges
- Practice math skills developed earlier this year, including work with fractions, time and measurement, estimation, geometry, and multiplication

Your student will practice these skills by solving problems such as these:

PROBLEM	COMMENTS
A bowling ball has a mass of 9 kg, and a basketball has a mass of 600 g. What is the difference in mass between the bowling ball and the basketball? 8,400 grams 9 kg = 9,000 g 9,000 – 600 = 8,400	Students review the relationships among metric units and work with greater numbers.
While working at the garden store, Casey had 27 cans of plant food to put on three empty shelves, so he put an equal number of cans on each shelf. That day, Tammy bought 2 cans from the bottom shelf. Shane bought 6 cans — 3 from the top shelf and 3 from the middle shelf. Michael bought 2 cans — 1 from the top shelf and 1 from the bottom shelf. How many cans of plant food were left on each shelf at the end of the day?  5 cans are on the top shelf. 6 cans are on the second and third shelves.	While this problem might initially appear to be complex, a sketch can make it accessible. Invite your student to make a drawing of how the shelves at the store looked when Casey finished stocking the plant food. Then ask them how they can show which cans of plant food were purchased throughout the day.

PROBLEM	COMMENTS
Jameson built some tiny truss bridges using toothpicks. He made sketches of his bridges like those below. 1–Triangle Truss  3 toothpicks 3–Triangle Truss  7 toothpicks 5–Triangle Truss  11 toothpicks How many toothpicks will it take to build a truss bridge with 15 triangles? Explain your answer. (triangles x 2) + 1 = toothpicks (15 x 2) + 1 = 31	Students practice algebraic thinking in observing the relationship between the number of triangles and the number of toothpicks in each bridge. Your student might determine that each bridge has twice as many toothpicks as the number of triangles, plus 1. Students might also use a different approach to discover the answer. For example, they might use a ratio table: Number of Triangles: 1, 3, 5, 7, 9, 11, 13, 15, 17 Number of Toothpicks: 3, 7, 11, 15, 19, 23, 27, 31, 35

For additional support, you can use the Math Vocabulary Cards app at apps.mathlearningcenter.org

Frequently Asked Questions About Unit 8

Q: Some of the work in this unit doesn't seem like math at all. Why is my student asked to, for example, gather or examine pictures of real-life bridges?

A: Assignments like this one help students develop transferrable research skills that will help them learn to apply mathematics they know to solve problems. In this unit specifically, observing real-life bridges will inspire and inform students' model bridge designs.

Q: Why is there so much review in this unit?

A: At this point in the school year, third graders have studied all the mathematical skills they'll need to progress to fourth grade. Most skills introduced in this unit involve model design and testing, data collection, and analysis. Students will use their existing math strategies to help develop new skills in these areas.

This unit also gives students the opportunity to apply many of the skills they developed over the year. Applying mathematical skills to novel problems and new contexts is a sophisticated process that challenges students to take their current knowledge and understandings to a higher level.

Q: How can I support my student's learning?

A: To support your student in learning mathematics, you can:

- Visit mathathome.mathlearningcenter.org and work through some or all of the activities in Grade 3: Set 8 together. These activities complement the learning that takes place in the classroom during Unit 8 and provide fun ways to engage children in mathematical thinking. This set does not include any Work Place games or activities, but you can still access them in Sets 1–7.
- Support your student as they learn about bridges. Invite them to share what they're working on in class. If possible, explore different types of local bridges with your student.
- If your student would enjoy learning about bridges through literature, consider looking for bridge-related books at your local library, such as *How Do Bridges Not Fall Down?: A Book About Architecture & Engineering* by Jennifer Shand, illustrated by Srimalie Bassani.