THE BUS PROJECT

TODAY'S EXPLORATION: What Is The Scale Of A Model Or Toy Bus?

Grade Level : 5

Overview: Students will explore the scale of a model bus or toy bus compared to a full-size bus.

CCSS.MATH.CONTENT.5.NF.B.5- Interpret multiplication as scaling (resizing), by:
CCSS.MATH.CONTENT.5.NF.B.5.A - Comparing the size of a product to the size of one factor based on the size of the other factor without performing the indicated multiplication.
CCSS.MATH.CONTENT.5.MD.C.5 - Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.

Practices
- Using Mathematics and Computational Thinking
- Developing and Using Models

Crosscutting Concepts
- Scale, Proportion, and Quantity

Materials:

- Scaled model of school bus or various toy buses
- Measuring tape or rulers
- Graph paper or lined paper
- Pencil
- Video - Our Brains Think About Math Visually - Youcubed

Investigation:

1. Collect toy buses or a smaller scale model of a school bus. Have enough for each group of students, or each student if they are working independently.
2. Video - Before the activity have students watch and think about the video - Our Brains Think About Math Visually - Youcubed.
3. After watching the video have students work independently or in a group.
4. Each will draw a simplified, three-dimensional model (a rectangular prism) that reflects

the model or toy bus. They will identify the length, width, and height of the bus. They will then work together, or independently, to measure each of the length, width, and height dimensions of the buses and identify those measurements on their drawn model. Make sure the students identify the unit of measurement they are taking. (in., ft., cm., or m.)

5. After this, students will work together to calculate the volume of the model or toy bus. Give reminders to remember their units.
6. After collecting the measurements and calculating the volume of the model or toy bus. Share the following information with students;
   a. The average length range is 12 - 40 ft.
   b. The average height range is 9.5 - 11 ft.
   c. The average width range is ~ 8 ft.
7. Then calculate the volume for the smallest bus and the largest bus.
8. After finding the volume of two full-size buses, compare the measurements and volume of the model or toy bus to that of a real bus. Explore the relationships. There is no right or wrong answer. The goal is to explore mathematical relationships.
   a. Can you determine a relationship?
   b. Is the real bus 2x larger, 4x larger, 16x larger, or something else?
   c. Can a ratio or fraction of size be determined if we round our two volumes to the nearest 1, 5, 10, or 100?
   d. What else do you notice about the relationship between the measurements and volumes of a small model and a real-life bus?
9. Have a class discussion, create a poster, create a slideshow, or write a reflection of the questions, measurements, and relationships discovered.

Product or Artifact Possibilities:
- Drawn mini model of bus with measurements and calculations
- Discussion, poster, slideshow or reflection.

Guiding Questions:
1. How do we measure something?
2. How do we calculate volume?
3. How can we compare the sizes of two objects?
4. Do small models have a relationship to their full size counterparts?

What Are We Discovering?

Students can find the volume of an object by measuring the length, width, and height then multiplying them. Scale models exist in large and small versions. The scale models often have a relationship through ratio and fractions. Mathematical investigation can determine this

relationship.