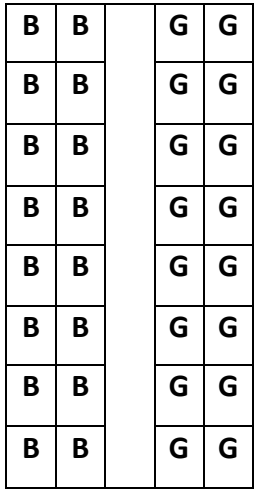
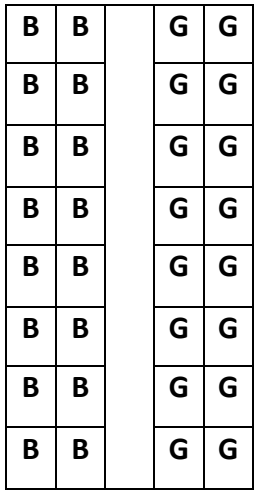
Task: Field Trip Task **3rd Grade**

The 3rd grade students at Shayne Elementary are going on a field trip to the zoo. The students will sit on the bus according to the diagram below. There are three buses. (B stands for boy, G stand for girl.)

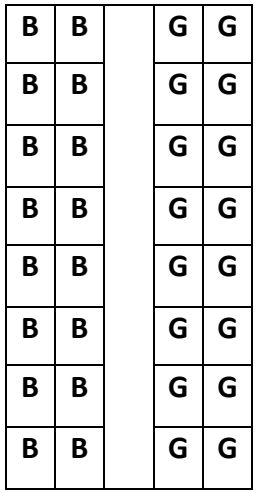
A. Show as many ways that you can think to find the total number of students and write equations for each.



Bus 1



Bus 2



Bus 3

B. The parents of 6 boys and 9 girls meet the class at the zoo so these students do not ride back on the bus with the rest of the class. How will the number of students on each bus have to change so that each bus will have an equal number of students? Use the diagram above and equations to show your reasoning.

Common Core State Standards for Mathematical Content	Common Core State Standards for Mathematical Practice

3.OA.1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* 3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* 3.OA.3. 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.5. Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

Essential Understandings

- Each multiplicative expression developed in the context of a problem situation has an accompanying explanation, and different representations and ways of reasoning about a situation can lead to different expressions or equations.
- The commutative and associative properties of multiplication and the distributive property of multiplication over addition ensure flexibility in computations with whole numbers and provide justifications for sequences of computations with them.
- The right distributive property of division over addition allows computing flexibly and justifying computations with whole numbers.

Explore Phase

Possible Solution Paths	**Assessing and Advancing Questions**
<u>PART A:</u> Students may count the number of boys on each bus: 2 x 8 = 16. There is the same number of girls, so 2 x 16 = 32 is the number of students on each bus. There are three buses, so 3 x 32 = 96 students. 2 x 8 x 2 x 3 = 96. Students may count the number of students in a row: 2 + 2 = 4. There are 8 rows on the bus, so 8 x 4 = 32 students on one bus. There are three buses, so 3 x 32 = 96 students. 3 x 8 x (2 + 2) = 96.	<u>Assessing Questions</u> Why did you decide to write this equation? Can you say what each number in your equation represents? <u>Advancing Questions</u> How are the different ways you thought about the problem connected? Where do you see they are the same and where are they different? <u>Assessing Questions</u> Explain to me how you thought about how to count the students on the buses. Did you consider one bus at a time? Why? <u>Advancing Questions</u> I see that you did a few calculations at a time and worked toward the total. Can you show me how we can put them together to make a single

Students may count all three buses as one complete array: 8 x 12 = 96 students. Students may count the number of students on one bus with an array: 8 x 4 = 32. There are 3 buses, so 3 x 32 = 96 students. 3 x 8 x 4 = 96. Looking at the first row, there are four students in the first row on all three buses, so 3 x 4 = 12. There are 8 rows on each bus, so there are 8 x 12 = 96 students. 3 x 4 x 8 = 96.	equation? <u>Assessing Questions</u> Explain to me how you chose the numbers in your equation. Where are these in the diagram of the buses? <u>Advancing Questions</u> Is there another way to think about finding the total number of students? <u>Assessing Questions</u> Explain to me why you counted the number of students in the first row. How did this help you? <u>Advancing Questions</u> Explain to me what each number in your equation represents. Can you find another equation that will allow you to count the total number of students?
<u>PART B:</u> Students may add 6 and 9 to make 15. 15 students are not riding back. Because there are 3 buses, 5 students should not ride each bus. $(6 + 9) \div 3 = 15 \div 3 = 5$ Students may say 2 boys shouldn't ride each bus and 3 girls shouldn't ride each bus, so 5 students shouldn't ride each bus. $(6 \div 3) + (9 \div 3) = 2 + 3 = 5$	<u>Assessing Questions</u> Explain to me why you added the students together. If I want the same number of students to not ride back on each bus, what operation should you consider using? <u>Advancing Questions</u> How do you make sure the number of students on each bus will stay the same? Tell me how you considered counting the boys and the girls that will not be riding back on each bus.
Possible Student Misconceptions	
Students may not be able to understand the diagram. Students may want to count the students one at a time, without considering using arrays/multiplication, and not be able to provide another method.	<u>Assessing Questions</u> Let's look at bus 1. Tell me how you could think about counting the students on this bus. How many rows of seats are there? How many students in each row? <u>Advancing Questions</u> How can you quickly count the students on one bus if you know the number of students in each row and the number of rows? How can you count the number of students on three buses?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	<u>Assessing Questions</u> Let's think about one bus. Explain to me what the diagram is showing you. <u>Advancing Questions</u> How can you count the number of students on just one bus? How many

	rows of students are there? How many students are in one row?
If students finish early….	<u>Assessing Questions</u> Explain to me all the ways you were able to count the students. Explain to me what each number in your equation represents. <u>Advancing Questions</u> Are there any other ways you can think to count the students? What are the connections between all of the equations you have? How are they similar and how are they different?
Discuss/Analyze	
Whole Group Questions	
• Who can share a way to count the number of student going on the field trip? Be ready to explain your reasoning and what each number in your equation represents? • In a multiplication equation, what are the numbers multiplied together called? (factors) What is the number you get when multiplying called, in this case the number of students going on the field trip? (product) • Who else has a way to count the number of students? Let's try to have several ways of thinking about it. • What are the connections between all of the different ways we have? How are they similar and how are they different? Is one easier to understand than the others? Why? • Let's think about part B. Who can explain what is going on here? What are we trying to figure out? • If I want to have the number on each bus riding back to stay equal, how can we decide that? What operation will you use? Why? • How did you consider keeping the number of boys and girls equal?	