# MODELLING SITUATIONS INVOLVING EQUAL-SIZED GROUPS

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Greer (1992) suggests that the most important types of situations where multiplication of integers is involved are: equivalent groups; multiplicative comparison; rectangular arrays/areas; and, Cartesian products. In Norwegian schools, multiplication is usually introduced through situations with equivalent groups, where 4·7 means 7+7+7+7, while 7·4 means 4+4+4+4+4+4+4. In a developmental research project in Norway, LaUDiM (Language Use and Development in the Mathematics Classroom), a class of Grade 3 students (8 years old) were given Tasks 1 and 2 below. The teacher's goal was that the students should "write arithmetic representations that fitted with the tasks". The research goal was to get insight into challenges with different types of situations.

Task 1: Class 3c plan to arrange a class party in the Café. The day before the party, they will bake muffins for the party at school. Ms. Hall has to go the grocery store to buy eggs for the muffins. The recipe says there should be four eggs in one portion. The students have decided that they will bake twelve portions of muffins. How many eggs should Ms. Hall buy?
Task 2: The muffins are placed on baking trays to be baked in the oven. On a baking tray there is space for five rows of muffins, and there is space for seven muffins in each row. How many muffins can be placed on one baking tray?

In the classroom, Task 1 was divided into three phases: first, the students' iconic representations of the situation; second, the students' arithmetic representations of the situation; and, third, the teacher's introduction of the conventional notation (12□4). The teacher wanted the students to learn a convention of multiplication – that the first factor in a product signifies the number of groups and the second factor signifies the size of the groups. This is related to situations of equivalent groups, which is a non-commutative situation. However, with 1000 portions with 4 eggs in each (an example introduced by the teacher during the third phase), it is easier to calculate the total of eggs as 1000+1000+1000+1000 (four times 1000), rather than 4+4+4+4+… a thousand times (1000 times four) – both modelled by repeated addition. This creates a conflict with the desired convention – a tension between the meaning of multiplication as the total of equal-sized groups put together, and the arithmetic operation of calculating the product. The review of Task 2 was used to illustrate that what initially is a rectangular-array situation, can be interpreted as an equal-sized groups situation, where the rows or columns are the groups. However, what makes sense for rows and columns does not make sense for eggs and portions of muffins. Awareness of this issue became an important consideration among the teacher and researchers in reflections on the planning processes and for future task design in the project.

## Reference

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