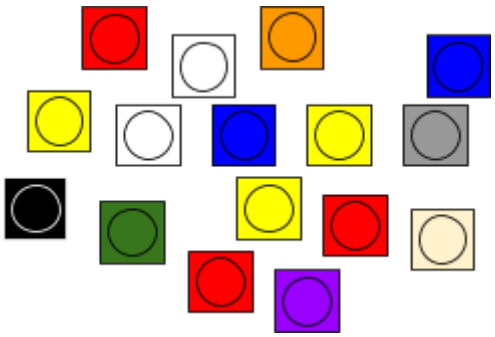
Lesson: Factor Frenzy!

By: Mr. Gazer

Title of Activity	Factor Frenzy!
Math Topic	Number, Shape & Space
General Outcome	Develop number sense.
Specific Outcomes	**Grade 7** 1. Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10, and why a number cannot be divided by 0. [C, R] **Grade 8** 1. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers). [C, CN, R, V] ***This activity builds on the following specific outcome from Grade 6:*** 3. Develop and apply a formula for determining the: - area of a rectangle
Grade Level	7
Resources	Alberta Education, Mathematics Kindergarten to Grade 9 (2007). Edmonton, AB. Perkins, A., & Pettis, C. (2019). Decomposing Rectangles. *Mathematics Teaching in the Middle School*, *24*(7), 389–389. https://doi.org/10.5951/mathteacmiddscho.24.7.0389
Description	Students will use 16 1x1 lego pieces to explore the factors of the number 16 and the areas of rectangles. The purpose of the exercise is to visually demonstrate factors of a positive integer, and more broadly multiplication itself. Building off of skills gained in the previous Grade 6 curriculum (i.e. area of a rectangle), students will manipulate the lego pieces to build rectangles whose side-lengths represent the factors of the number 16 (the area).
Tips for Teachers	● **Required Materials:** ○ At least 16 1x1 Lego pieces ○ Flat lego board for building (optional) ○ Extra Lego pieces for extension (optional) ● **Extension of the Problem:** ○ Ask if 3 or 5 is a factor of 16, and prove why or why not using the Lego pieces. ○ If students successfully performed the given task, ask them to repeat the task with a different (but larger) number such as 60. The number 60 is a *highly composite number* meaning that it has many factors (1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 60). Keep in mind that this will require more Lego pieces than the initial task!

	● **Extension to Grade 8 students:** Though this problem/task is meant for Grade 7 students, it may be extended to Grade 8 by asking questions related to square roots and square numbers. Extension questions around perfect squares are still included for the 7th Grade students in this activity.

Factor Frenzy!

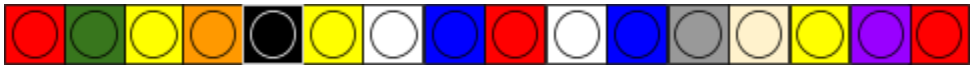


Background for Students

This exercise will have you manipulate pieces of Lego to explore the concept of multiplication and the factors of a positive integer. After this task, you will be able to visualize and explain what it means to be a factor of a number and relate multiplication to 2-D shapes.

Instructions & Questions for Students

1. Below shows a rectangle that can be made with the 16 Lego pieces:



   How many different rectangles can you make using **all** 16 of the 1x1 Lego pieces provided with this activity?

2. What is the area of each of the rectangles you've created in Question 1? What are the lengths and widths?
3. How can you explain the fact that multiple, different rectangles can have the same area?
4. Given what you've found with your rectangles, what are all of the factors of 16?

Extension Questions

1. Is 3 a factor of 16? Show why or why not with the Lego pieces.
2. A *perfect square* is a number which can be created by multiplying another integer by itself (for example, 4 is a perfect square because 2 multiplied by 2 is 4. 5 is *not* a perfect square because there is no integer that you can multiply by itself to get 5.)

    a. Is 16 a perfect square? Why or why not?
    b. Can you think of another perfect square?
    c. Can you show with the Lego pieces that 10 is *not* a perfect square?