Box of boxes

**Objective**

Students design boxes with specific dimensions, then try to create a box with the smallest volume of empty space with all the cubes from the designed boxes.

**Materials**

* Linking cubes
* Isometric dot/grid paper
* Pictures of little boxes (Boaler, 2018, p. 50)
* Record sheet (Boaler, 2018, p. 51)

**Steps**

1. Students will create 4 small boxes with the following dimensions out of linking cubes
   * 3 X 1 X 1
   * 2 X 2 X 2
   * 3 X 2 X 2
   * 3 X 2 X 1
2. Pose the questions, “What is the smallest box you can make that will hold all of these boxes?” and “What are the dimensions of your box? What is the volume? How much empty space will be left in your box?”.

\*\*Note: Remind the students it has to be a rectangular prism.

1. On isometric dot or grid paper, have students show work/thinking to answer the question.
2. Use the Record sheet, to record dimensions, volume and empty space.
3. As a class, discuss the following:
   * What boxes did you create?
   * How did you find the volume of the boxes your created?
   * How did you figure out the amount of empty space in each of your packing boxes? What box leaves the least amount of empty space?
   * What strategies did you come up with for minimizing the empty space?
   * How can we be sure that we, as a class, have found the smallest packing box?

**Resources**

Boaler, J., Munson, J., and Williams, C. (2018). *Mindset mathematics: Grade 5*. Jossey-Bass.