# WORKSHEET: AN OPTIMIZATION PROBLEM

Names and student IDs: _____

A small decorative box has a square base. It is made with materials costing 6 shekels per square inch for the top, 1 shekel per square inch for the bottom, 2 shekels per square inch for the back, 3 shekels per square inch for the front, 4 shekels per square inch for the right side, and 5 shekels per square inch for the left side. What is the largest volume possible for materials costing a total of 84 shekels?

Step 1: Draw a picture if possible, and name quantities that are used. (There won't be a picture in the solutions.)

Step 2.1: What is to be minimized or maximized, and which of these is it?

Step 2.2: What are the restrictions on the values of the variables?

Step 3: Express the quantity in Step 2.1 in terms of quantities you can vary.

Step 4.1: Relate the variables used in Step 3.

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*Date*: 23 April 2025.

Step 4.2: Use Step 4.1 to write the quantity in Step 2.1 as a function of a single variable.

Step 5: Find the domain for the function in Step 4.2 that is relevant to the problem.

Step 6.1: Find the critical points of the function in Step 4.2.

Step 6.2 (valid if you get a problem on a closed bounded interval): Evaluate the function in Step 4.2 at the numbers from Step 6.1 and the endpoints of the domain found in Step 5.

Step 6.3: Use the outcome of Step 6.2 to find the absolute minimum or maximum, as appropriate, of the function in Step 4.2 on the domain in Step 5. Use this to answer the question asked in the problem.