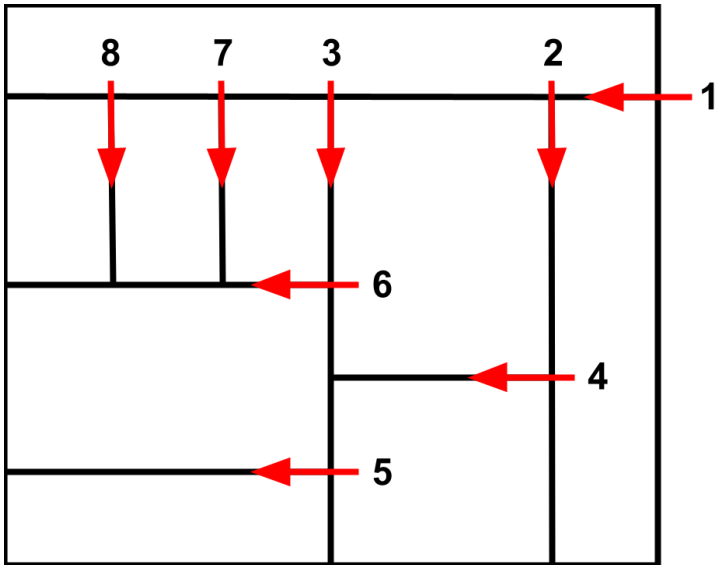
Criterion A: Planning

Defining the Problem

My client, Katie Finley, is the head of the chroma department in Art Brands, which prints designs that can be heat-pressed onto different fabrics, like shirts and blankets. Currently, the sales department is trying to estimate whether the designs can be printed on a sheet. This is important because the screens used to create the images are the majority of the cost. Screens are the size of the sheet, so the more designs printed on a sheet, the fewer screens needed, and the more cost-effective the process is. My client wants a code that produces a yes/no whether the designs can fit on a sheet, and if it is a yes, how many sheets are required to fulfill the total quantity of designs desired. A constraint that makes the problem more difficult is that my client needs to be able to guillotine cut these sheets after printing. A guillotine cut is where a sheet is cut, creating two smaller sheets and then those two smaller sheets are cut making more pieces. This process repeats until every design is on their piece of film.



Example of a sheet being guillotine cut

Rationale for the Proposed Solution

The project involves getting the dimensions of each design and the sheet, then exploring the tree of possible guillotine-cut layouts until either a layout is found that fits every design, or there are no more possible layouts. As Java is the coding language I am most familiar with, it is the logical choice when processing the number and size of designs. The project will use recursion to find the arrangement because once a design is placed it can be "cut" out of the sheet and the problem can be repeated on the two new sheets that are created from this cut until all designs are placed or no more designs can be placed. I will use LinkedLists to store the number and dimensions of designs while figuring out whether the designs would fit, and a Java GUI to take in the

dimensions and order number, as well as display the output of data. Java GUI is the ideal mode of receiving data and displaying results as it is the method I am most familiar with.

Success Criterion

- Designs with their dimensions and quantity can be added through a button press and user input.
- The size of the sheet is selected through a drop-down menu of the four different sizes that Art Brands prints on.
- A yes/no answer is displayed depending on whether the designs can fit on a sheet of the given size.
- The number of sheets that need to be printed to match the number of designs requested is calculated and shown.
- A sheet layout with each design a unique color is displayed as proof of the designs fitting on the sheet.

Word Count: 456