Date _____

9.1 Bin Packing

FM.0.1 Use bin-packing techniques to solve problems of optimizing resource usage.

Bin-packing Problem – finding the minimum number of bins of weight capacity W into which weights $w_1, w_2, \ldots, w_n$ (each less than or equal to W) can be packed without exceeding the capacity of the bins.

Next-fit (NF) - Open a bin & place items in as they appear, If item doesn't fit, close bin permanently & open new bin.

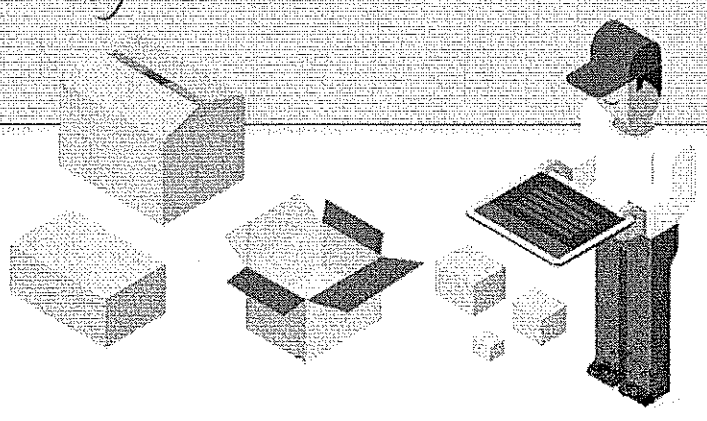
First-fit (FF) - Same as next fit, except if item can fit into a previous bin, store it in there.

Worst-fit (WF) - Place items in order in which they arrive, Place item into bin with a most amount of room. If item doesn't fit, open new bin.

Next-fit Decreasing (NFD) - Same as next-fit, but put items in decreasing order.

First-fit Decreasing (FFD) - Same as first-fit, but put items in decreasing order.

Worst-fit Decreasing (WFD) - Same as worst-fit, but put items in decreasing order.



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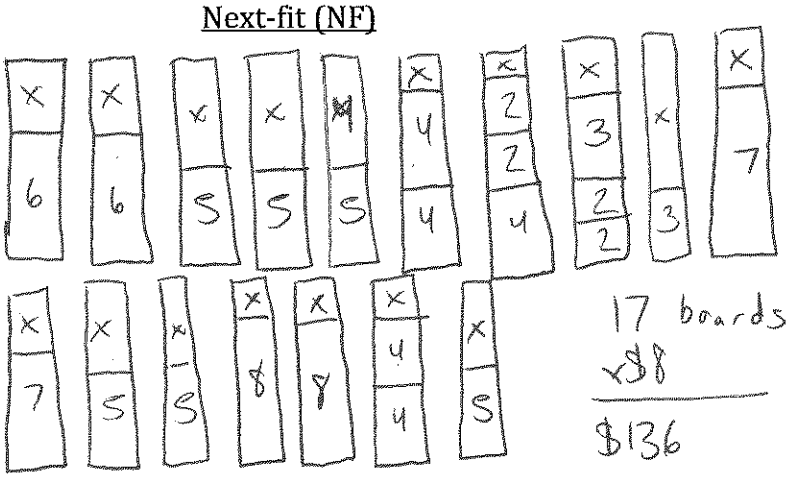
8, 8, 7, 7, 6, 6, 5, 5, 5, 5, 5, 5, 4, 4, 4, 4, 4, 4, 3, 3, 2, 2, 2, 2

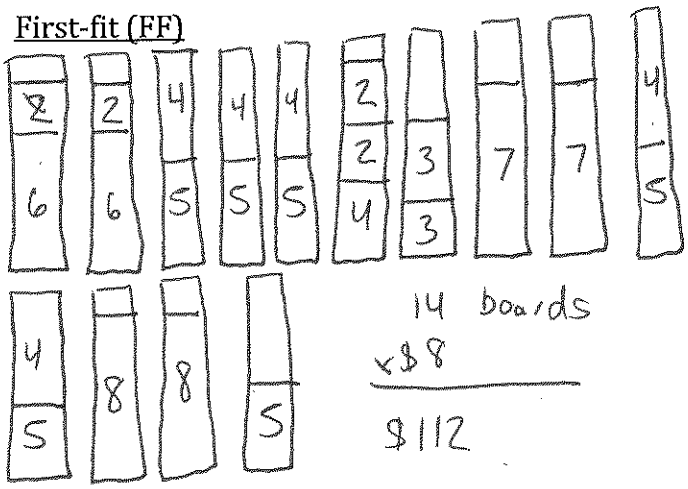
Example Suppose you plan to build a wall system for your books, CDs, DVDs, and fish tank. It requires 24 wooden shelves of various lengths: 6, 6, 5, 5, 5, 4, 4, 4, 4, 2, 2, 2, 2, 2, 3, 3, 7, 7, 5, 5, 8, 8, 4, 4, and 5 feet. The lumberyard, however, sells wood only in boards of length 9 feet. If each board costs $8, what is the minimum cost to buy sufficient wood for this wall system?

Next-fit (NF)



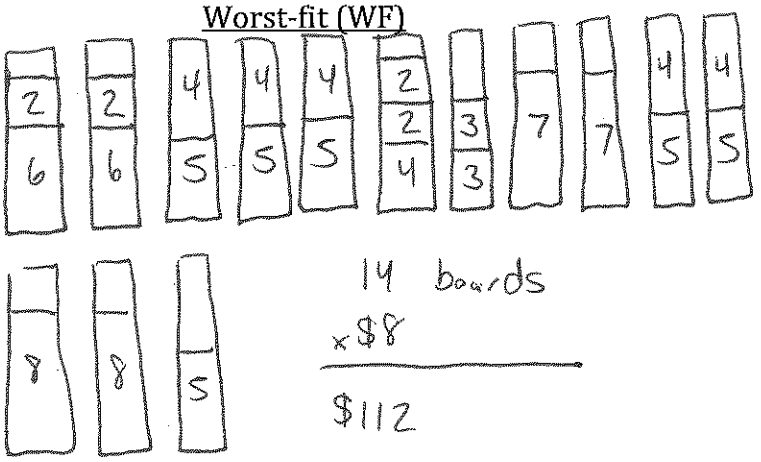
17 boards
×$8
$136

First-fit (FF)



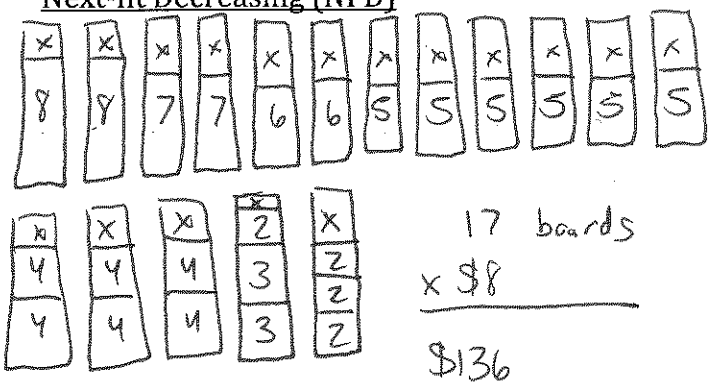
14 boards
×$8
$112

Worst-fit (WF)



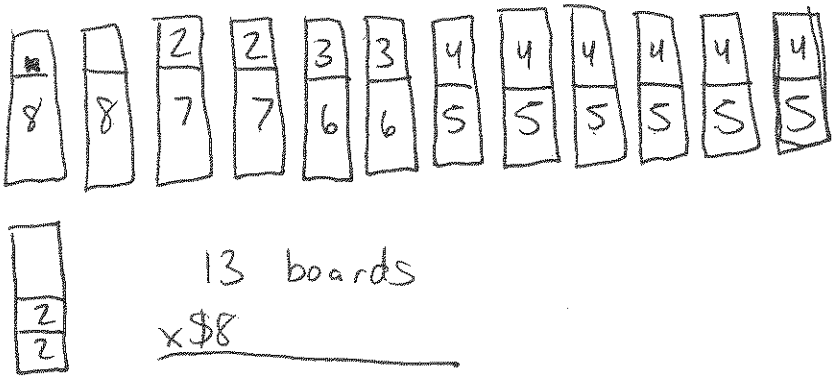
14 boards
×$8
$112

Next-fit Decreasing (NFD)



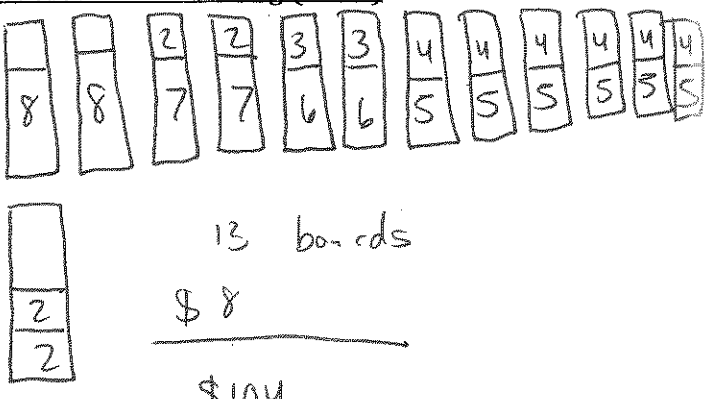
17 boards
×$8
$136

First-fit Decreasing (FFD)



13 boards
×$8
$104

Worst-fit Decreasing (WFD)



13 boards
$8
$104