

BIN PACKING QUESTIONS

1. A carpenter is cutting pieces of timber from 8 foot lengths.
The lengths required in feet are 1, 4, 2, 4, 3, 2, 5, 2

- (i) How many 8 foot lengths need to be cut if the First Fit Algorithm is used?
- (ii) How could the timber be cut more efficiently?

2. A small ferry has 3 lanes each 20m long on its car deck. On one trip the vehicles waiting to use the car ferry have lengths:

4, 4, 7, 10, 6, 10, 12, 7

Use the first fit decreasing algorithm to decide how the vehicles can be arranged.

3. A plumber requires the following lengths (in cm) of copper piping

40 40 50 60 60 70 80 100 110 120 120 130

The piping comes in standard lengths of 2m. How many lengths are needed if the plumber applies

- (a) the First Fit algorithm
- (b) the First Fit Decreasing algorithm

Is this as efficient as possible?

4. Six items with weights given in the table are to be packed into boxes each of which has a capacity of 10kg.

- (i) Use the first fit algorithm to pack the items, saying how many boxes are needed.

- (ii) Give an optimal solution (the best solution possible)

5. Thirteen books are to be stacked on shelves, each of which is of width 20cm. The thickness of the books (in cm) are :

4 1 5.5 2 6 1.5 1.5 2 2 4 5 3 2.5

- (i) Arrange the books in increasing order of size. Taking the thinnest first, stack each book on the first shelf on which it will go. Show which size books go on which shelves using this method.

- (ii) Arrange the books in order of size and use the first fit decreasing algorithm to stack them on shelves. Show which size books go on which shelves using this method.

- (iii) Use the first fit algorithm on the original unsorted list to show that the books can be stacked on just two shelves.