

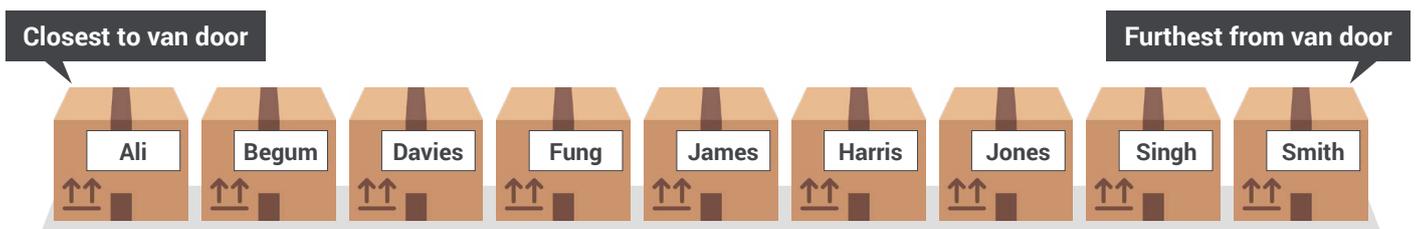
## How to find the correct parcel to deliver

### Background information

Luca is a delivery driver who has decided to position the parcels he has to deliver in alphabetical order inside his van. The parcel recipients with a surname starting with A will be closest to the doors of the van, Z the furthest away from the doors. The diagram below shows how the parcels, with the recipients' surnames on, are organised in the van.

At Luca's first delivery location he needs to deliver the parcel for Jones. Luca uses a linear searching approach to find the correct parcel. This means he must look at 7 parcels before finding the one he needs to deliver. In other words, he must compare the name 'Jones' with 7 parcels before finding the correct match.

Luca thinks using this linear search approach is a good idea as he will be able to find the parcels easily when he reaches each destination.



### Your task

Answer the following questions:

- Explain how the linear search works for Luca's first delivery.  
*A linear search looks at each parcel in turn, starting with the first parcel with the surname Ali. The search stops when the correct parcel is found.*
- How many comparisons would Luca have to make to find the parcel for **Singh**?  
*8 - Ali, Begum, Davies, Fung, Harris, James, Jones, Singh*
- How many comparisons would Luca have to make to find the parcel for **James**?  
*5 - Ali, Begum, Davies, Fung, James*
- What would be the best-case scenario?  
*The parcel Luca needs is the first parcel he looks at.*
- What would be the worst-case scenario?  
*The parcel Luca needs is the last he looks at.*
- What are the advantages and disadvantages of this parcel organization system in Luca's van?  
*The advantages are that if the parcel needed has a letter at the beginning of the alphabet it is found in fewer steps, so it is delivered more quickly.*  
*The disadvantages are that if the parcel needed has a letter at the end of the alphabet more comparisons are needed to find the correct parcel so it takes longer.*

- If the parcels were not in alphabetical order how would this affect Luca's linear search?

*For a linear search the items do not need to be in order. Over the course of Luca's delivery round it will take the same number of comparisons to deliver all the parcels regardless of whether they are in order or not, so Luca's delivery round will take the same amount of time.*

- How could a binary search improve searching for a parcel?

*For a binary search to work, the parcels must be in alphabetical order as binary searches only work on ordered lists. A binary search would allow the parcels to be halved with each comparison, thereby reducing the time it takes to find a parcel. Over the course of Luca's delivery round a binary search method would enable parcels for delivery to be found quicker.*