How to find the correct parcel to deliver

Age group	13 and above
Time	30 mins
Subject	Computing

National Curriculum links

This activity would suit KS4 students or the top end of KS3.

The national curriculum for computing for key stages 3 and 4 aims to ensure that all pupils *"can analyse problems in computational terms"* and *"are responsible, competent, confident and creative users of information and communication technology."*

England Key stage 3 subject content

Pupils should be taught to:

- design, use and evaluate computational abstractions that model the state and behaviour of real-world problems
- understand several key algorithms that reflect computational thinking (for example, ones for sorting and searching)

England Key stage 4 subject content

Pupils should be taught to:

- develop and apply their analytic, problem-solving, design, and computational thinking skills

Learning outcomes

Pupils should be able to:

- Explain how a linear search works.
- Describe the advantages and disadvantages of a linear search.
- Compare binary and linear search methods.

Skills developed

- **Decomposition:** Breaking a bigger problem down into smaller more manageable sections.
- **Abstraction:** Removing unnecessary details to focus on the key parts.
- **Communication:** Sharing thoughts with others on how they arrived at their solution.
- **Collaboration:** Working with others to discuss the problem.

Prior knowledge

Students will need to have an understanding of linear and binary searches.

Overview of 'Searching for parcels'

This task is a real-world example of the application of linear and binary searches and their advantages and disadvantages.

A driver has to think about how they pack the parcels in their van in order to deliver them efficiently to recipients. When loading the parcels into the van there are a number of considerations:

- the route of the van
- delivery addresses
- the name of the delivery recipients

In this task students are presented with a scenario in which the driver has decided to organise the parcels in their van in alphabetical order based on the surname of the recipient. The driver uses a linear search to find the correct parcel when he arrives at a recipient's address. The students are encouraged to consider how a linear search works and the advantages and disadvantages of using it in this scenario. This leads students to consider how a binary search could improve searching for the correct parcel.

Resource Overview

This resource includes these items:

- Teacher notes.
- Student activity sheet setting out the task and giving the information required for the students.
- Exemplar solutions which teachers may use to support groups of students who need some scaffolding to get started.
- Presentation slides to help explain the tasks.

The context

In this problem Luca is a delivery driver and has packed his van with parcels to deliver. He has packed the parcels in alphabetical order using the surname of the recipient. This means that the parcels closest to the van door have surnames starting with A and the parcels furthest from the door, Z. Luca has arrived at his first delivery location and needs to deliver the parcel for Jones. With the linear searching approach, he has to look at 7 parcels before finding the one he needs to deliver.

The task asks students to answer the questions linked to the scenario and consider how a linear search works and the impact of a linear and binary search.

Supporting notes

Learners should understand what a linear and binary search is to be able to apply this to this scenario.

Useful websites

- **Isaac Computer Science – Searching algorithms**
- **Isaac Computer Science – Linear search**
- **BBC Bitesize – Linear search**
- **BBC Bitesize – Binary search**

(Please note - to use the free Isaac Computer science website, users need to register: **https://isaaccomputerscience.org**)

Generation Logistics Education Hub

This resource is one of the many engaging resources available from Generation Logistics on their Education Hub. For more details go to: **https://educationhub.generationlogistics.org**

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