



EduTrend Contents

EDUTECH · TECHNOLOGY · MIDDLE SCHOOL

Sorting Showdown

Compare sorting algorithms by counting their steps

Ages 12–14

Level: Intermediate

60 minutes

Pairs · up to 30

Activity 04

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 04 · AT A GLANCE

Sorting Showdown

Pairs sort eight number cards using two algorithms: bubble sort and selection sort. They count the comparisons each one makes, record results, then test with already-sorted and reversed lists. Finally they discuss which algorithm suits which situation and why efficiency matters for large data.

Learning outcomes

By the end of the session students can:

- follow a sorting algorithm;
- count algorithm steps;
- compare efficiency;
- relate efficiency to data size.

KEY WORDS

algorithm · sort · comparison · swap · efficiency · data size

CURRICULUM LINKS

Maths: counting and patterns.
Science: fair comparison. Everyday life: search and ranking.

1**EXPLORE**

How does it work?

2**DECOMPOSE**

Break the problem down

3**DESIGN**

Plan the steps

4**BUILD**

Make or program it

5**DEBUG**

Find and fix errors

6**REFLECT**

Is it the right tool?

Materials (per pair)

- 8 number cards
- Algorithm step cards
- Tally sheet
- Worksheets 1, 2 and 3

Before the session

- Print card sets.
- Print algorithm steps.
- Prepare three list orders.
- Print worksheets.

SAFETY

No specific hazards. Keep cards on desks.

ACTIVITY 04 · SESSION PLAN

Step by step

A sorted list makes an optimised bubble sort stop early, which surprises students.

Time	What happens	Say or ask
0–8 min Hook	Sort cards however you like.	<i>“How did you do it?”</i>
8–25 min Bubble sort	Follow steps, tally comparisons.	<i>“How many comparisons?”</i>
25–40 min Selection sort	Follow steps, tally.	<i>“Which used fewer?”</i>
40–52 min Test cases	Sorted and reversed lists.	<i>“Does the start order matter?”</i>
52–60 min Discuss	Efficiency and big data.	<i>“What about a million items?”</i>

CHALLENGE CARD (print or copy onto the board)

Sort cards with two algorithms, count comparisons for three starting orders and recommend an algorithm with reasons.

ACTIVITY 04 · FACILITATOR NOTES

The computing know-how in brief

Sorting algorithms put data in order. Bubble sort repeatedly compares neighbours and swaps them. Selection sort repeatedly finds the smallest remaining item and moves it to the front.

Efficiency describes how the number of steps grows with data size. For both algorithms the steps grow roughly with the square of the list size, which is why faster algorithms are used for large data.

Common ideas to listen for

- “All algorithms are equally fast.” Step counts differ.
- “Computers are so fast efficiency does not matter.” It matters with big data.
- “The same algorithm always takes the same steps.” Starting order can change it.

Adapting the activity

Support

Use five cards.

Stretch

Research merge sort and compare.

WORKSHEET 1

Comparisons

Name: _____

Class: _____ Date: _____

Tally comparisons.

Comparisons

List order	Bubble sort	Selection sort
Random		
Sorted		
Reversed		

WORKSHEET 2

Swaps

Tally swaps.

Swaps

List order	Bubble sort	Selection sort
Random		
Sorted		
Reversed		

WORKSHEET 3

Recommendation

Which algorithm would you use?

Our recommendation and reasons

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Follows algorithms	Counts accurately	Explains efficiency

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Sorting Showdown is a sample activity from the EduTrend Contents Edutech Technology programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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