Arrays

Ref Javascript

Making & changing arrays

An array holds a list of values in order, inside square brackets. Each item is an element, and the first index is `0`:

```
const scores = [72, 88, 95];
console.log(scores[0]);        // 72
console.log(scores.length);    // 3
scores[1] = 90;                // change one element
console.log(scores);           // [72,90,95]
```

- `const` stops you giving `scores` a whole new array, but you can still change what is inside it.
- Reading past the end gives `undefined`: `scores[3]` is `undefined`.

Add and remove at the end with `push` and `pop`:

```
const queue = ["Ann", "Ben"];
queue.push("Cai");             // add to the end
console.log(queue);            // ["Ann","Ben","Cai"]
const last = queue.pop();      // remove from the end and return it
console.log(last);             // Cai
console.log(queue.length);     // 2
```

An array can hold arrays. That makes a grid, read with two indexes, row first:

```
const grid = [
  [1, 2, 3],
  [4, 5, 6],
];
console.log(grid[1][2]);       // 6  (row 1, column 2)
```

map, filter & reduce

These methods take a function and apply it to the array elements. They return a **new** array (or value) without themselves replacing the original items. The function you pass in can still change the original array or its objects:

- `map` makes a new array by changing every element.
- `filter` keeps only the elements for which the function returns `true`.
- `reduce` combines all the elements into one value, such as a total.

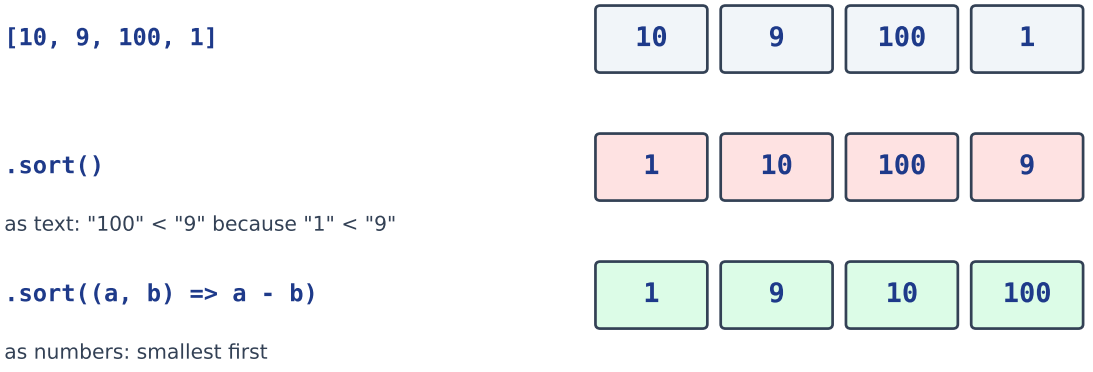
```
const prices = [4, 10, 25];
const withTax = prices.map((p) => p * 1.1);
console.log(withTax.map((p) => p.toFixed(2)));   //
↪  ["4.40","11.00","27.50"]

const cheap = prices.filter((p) => p < 20);
console.log(cheap);                               // [4,10]

const total = prices.reduce((sum, p) => sum + p, 0);
console.log(total);                               // 39
```

In `reduce`, `sum` is the accumulator. It starts at the last argument (`0`) and takes the function's result after each element.

Searching & sorting



Method	Gives back	Example with `[5, 8, 2]`	Result
`.includes(x)`	`true` or `false`	`.includes(8)`	`true`
`.indexOf(x)`	the first index of `x`, or `-1`	`.indexOf(2)`	`2`
`.find(f)`	the first element where `f` is true	`.find((n) => n > 6)`	`8`
`.findIndex(f)`	its index, or `-1`	`.findIndex((n) => n > 6)`	`1`

`sort` puts the elements in order. With no function, it sorts them **as text**, so numbers come out in the wrong order:

```
const nums = [10, 9, 100, 1];
console.log([...nums].sort());                    // [1,10,100,9]   (as
↪  text!)
console.log([...nums].sort((a, b) => a - b));     // [1,9,10,100]
console.log([...nums].sort((a, b) => b - a));     // [100,10,9,1]
```

- The compare function returns a negative number when `a` should come first, and a positive number when `b` should.
- `sort` changes the array itself. `[...nums]` makes a copy first, so `nums` keeps its order.

Common mistakes

- The last element is `arr[arr.length - 1]`, not `arr[arr.length]`.
- `map` and `filter` do not change the array: store their result.
- `nums.sort()` on numbers sorts them as text. Pass `(a, b) => a - b`.