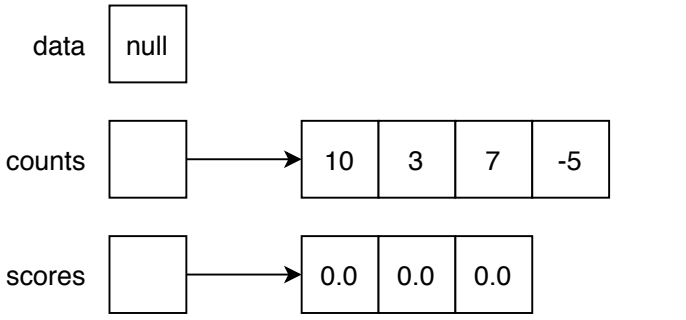
Model 1 Arrays

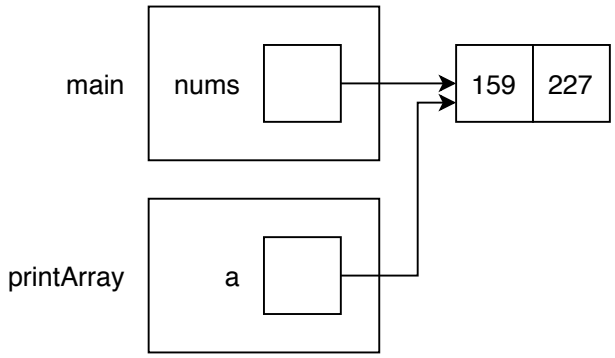
An array variable stores a ***reference*** to an array object. We draw references as arrows, because they "point" to other memory locations.

```
int[] data = null;

int[] counts = {10, 3, 7, -5};

double[] scores = new double[3];
```



When passing an array to a method, only the reference is copied:

```
public static void printArray(int[] a) {
    System.out.print("{" + a[0]);
    for (int i = 1; i < a.length; i++) {
        System.out.print(", " + a[i]);
    }
    System.out.println("}");
}

public static void main(String[] args) {
    int[] nums = {159, 227};
    printArray(nums);
}
```



Questions (15 min) Start time:

1. What is the length of each array?

a) `counts`? 4

b) `scores`? 3

c) `nums`? 2

d) `a`? 2

2. Looking at both diagrams above:

a) How many array variables were declared? 5

b) How many array objects were created? 3

3. Based on the top diagram, what is different about the variable named `data`?

The variable is `null`, so there is no reference and no array object.

4. Based on `counts` and `scores`, describe two ways that array objects can be created. How are these two ways different from each other?

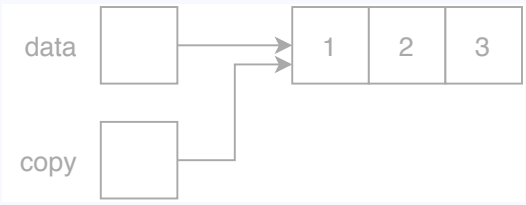
Arrays can be created either with curly braces or with the `new` keyword. The curly braces specify the initial values of array elements. The `new` keyword creates an array of specified length and initializes its elements to zero.

5. If the `printArray` method were to modify the array contents, would that change be visible in the `main` method? Explain your reasoning.

Yes, because the variable `nums` and the variable `a` reference the same object.

6. Draw (or describe) a diagram of the following source code:

```
int[] data = {1, 2, 3};
int[] copy = data;
```



7. (Optional) Paste the contents of *Arrays.java* into Java Visualizer. What differences do you notice between the diagram in Java Visualizer and those in Model 1?

Answers might include:

- The variables are drawn in (method) frames.
- The array objects show the index of each cell.