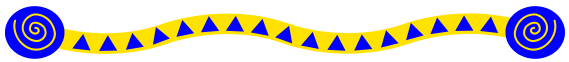
Arrays and Lists



What is a list?

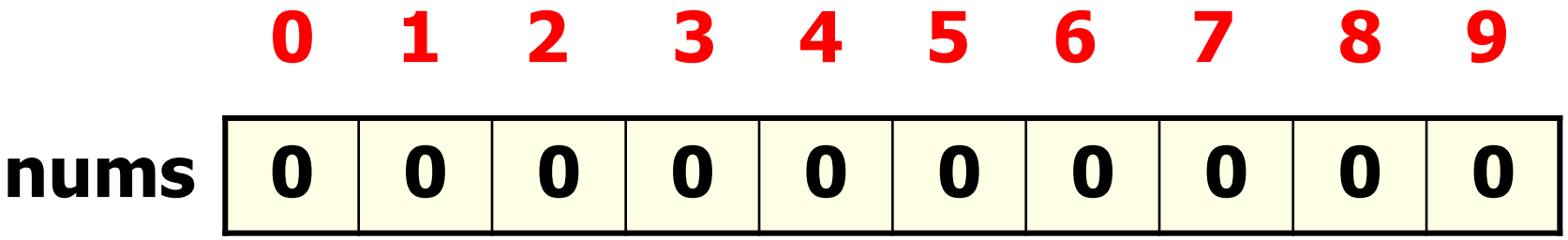
	Name	Time	Artist	Album
5	I Dare You to Move	4:08	Switchfoot	Learning to Breathe
6	I've Been Everywhere	3:20	Johnny Cash	Unchained
7	Brown Eyed Girl (Single Version)	3:05	Van Morrison	Super Hits
8	Born to Be Wild	3:31	Steppenwolf	Steppenwolf: All Time Greatest
9	Magic Carpet Ride	4:28	Steppenwolf	Steppenwolf: All Time Greatest
10	Crazy (Single Version)	2:42	Patsy Cline	Patsy Cline's Greatest Hits (Ren
11	Brick House	3:46	The Commodores	20th Century Masters - The Mill
12	Cleveland Rocks	2:33	The Presidents of the...	Pure Frosting
13	Chariots of Fire: Main Title Theme	3:32	Carl Davis & Royal Li...	Great Movie Themes
14	Dueling Banjos (From "Deliverance")	3:11	The Hit Crew	Smash Hit Dramas Movie Theme
15	Main Theme (From "Superman")	4:12	John Williams	The Music of John Williams - 40
16	Main Theme (From "Superman")	4:12	John Williams	The Music of John Williams - 40
17	I've Been Everywhere	3:20	Johnny Cash	Unchained
18	Born to Be Wild	3:31	Steppenwolf	Steppenwolf: All Time Greatest

What is an Array?

What is an array?

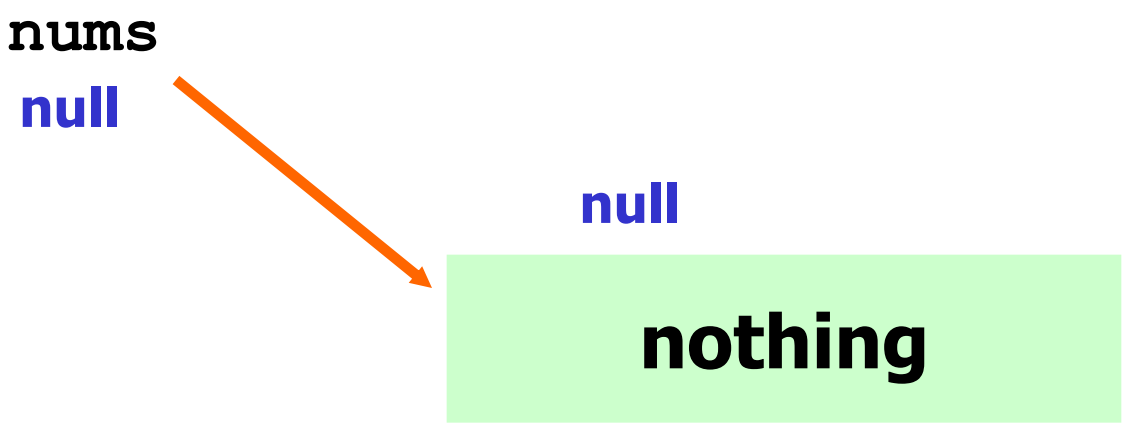
An array is a group of items all of the same type which are accessed through a single identifier.

```
int[] nums = new int[10];
```



Array References

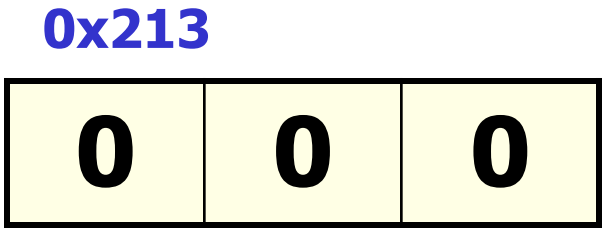
```
int[] nums;
```



nums is a reference to an integer array.

Array Instantiation

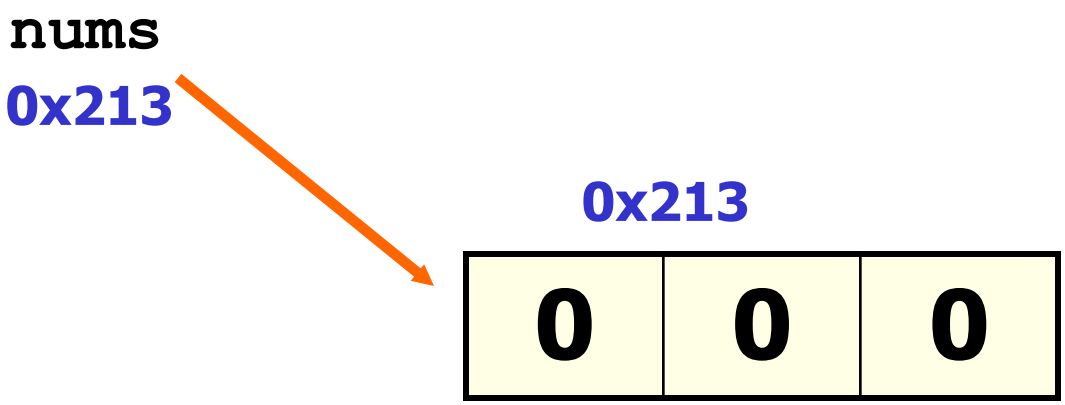
```
new int[3];
```



arrays are Objects.

Arrays

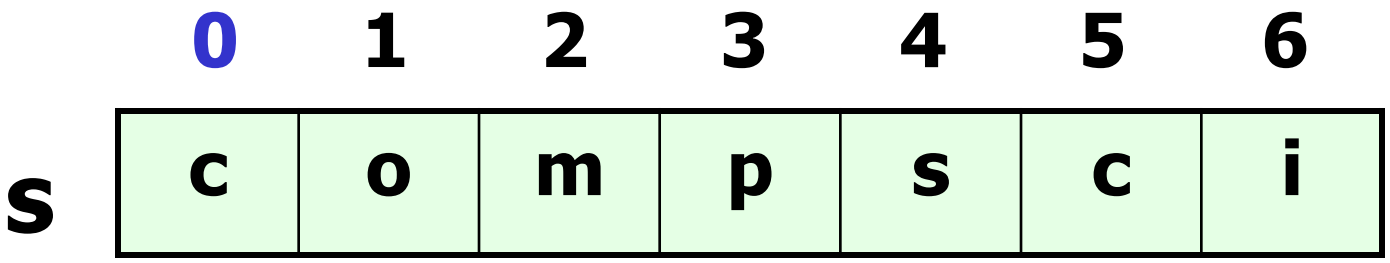
```
int[] nums = new int[3];
```



nums is a reference to an integer array.

Strings are arrays

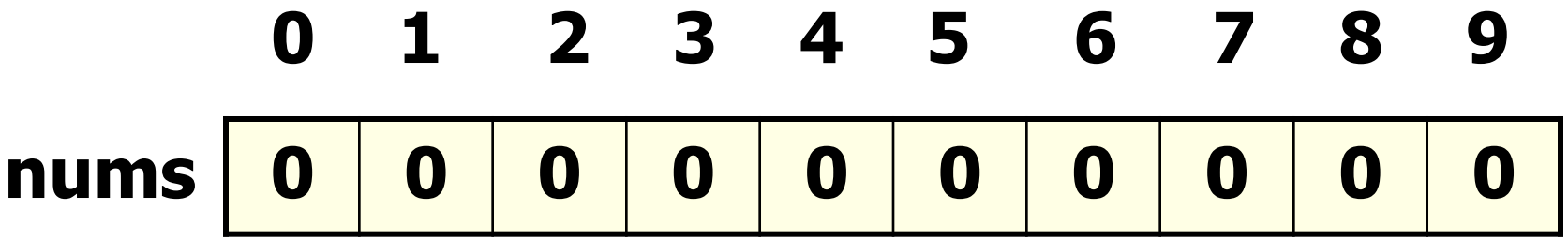
```
String s = "compsci";      //Strings are arrays
```



The first index position in a String is 0.
A String is an array of characters.

Arrays

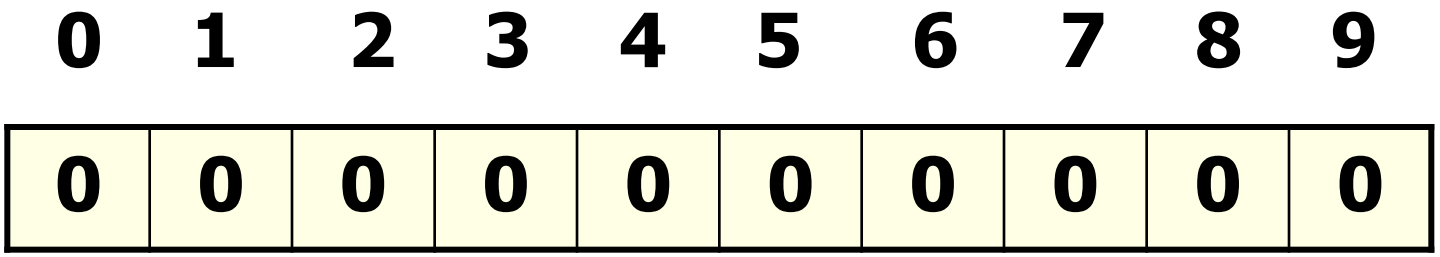
```
int[] nums = new int[10];        //Java int array
```



Arrays are filled with 0 values when instantiated. The exact value of each spot in the array depends on the specified type for the array.

Arrays

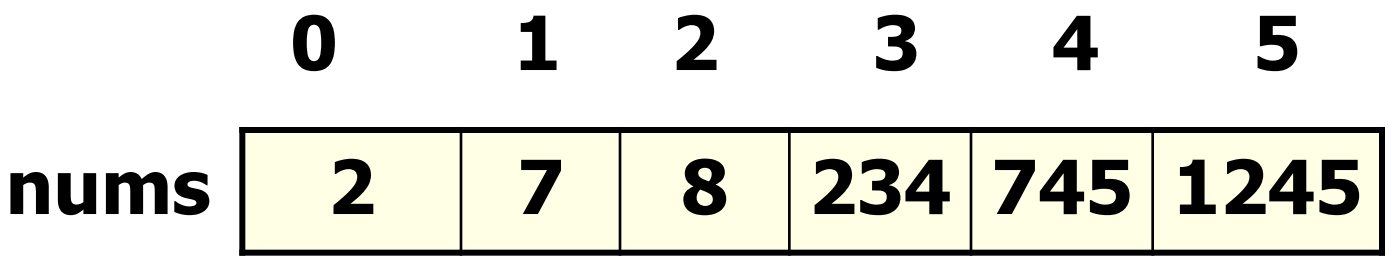
```
new int[10];     //Java int array
```



Once an array object has been instantiated, the size many never change. To increase or decrease the size, a new array would need to be instantiated and all old value copied.

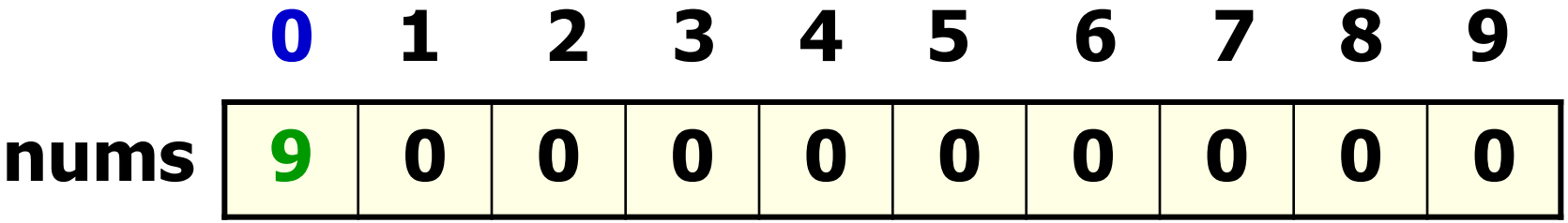
Arrays

```
int[] nums = {2,7,8,234,745,1245};
```



An array can be initialized with values.

Indexes

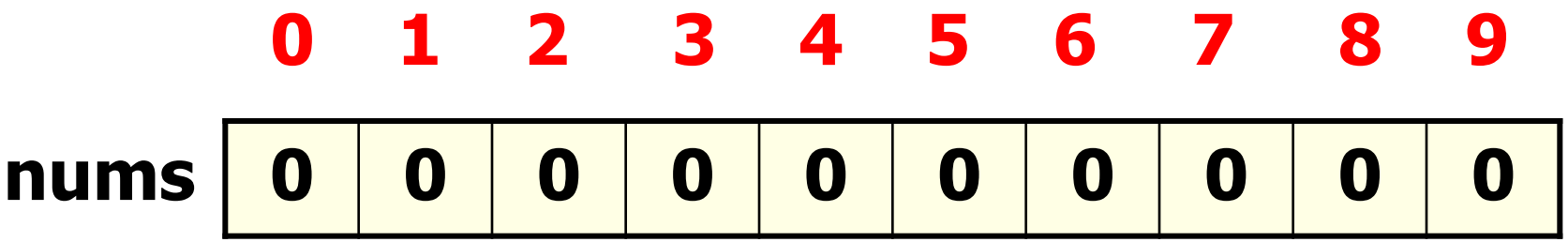


The [spot/index] indicates which value in the array is being manipulated.

nums[0] = 9;
The 0 spot is being set to 9.

Indexes

Java indexes must always be *integers* and the first index will always be 0.



arrayinit.java

Printing Array Values

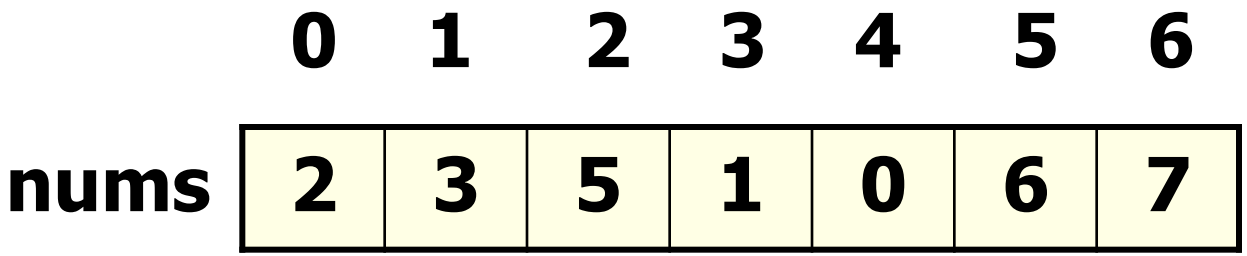
Printing Array Values

```
int[] nums = {2,3,5,1,0,6,7};

out.println(nums[0]);
out.println(nums[2]);
out.println(nums[5]);
```

OUTPUT

```
2
5
6
```



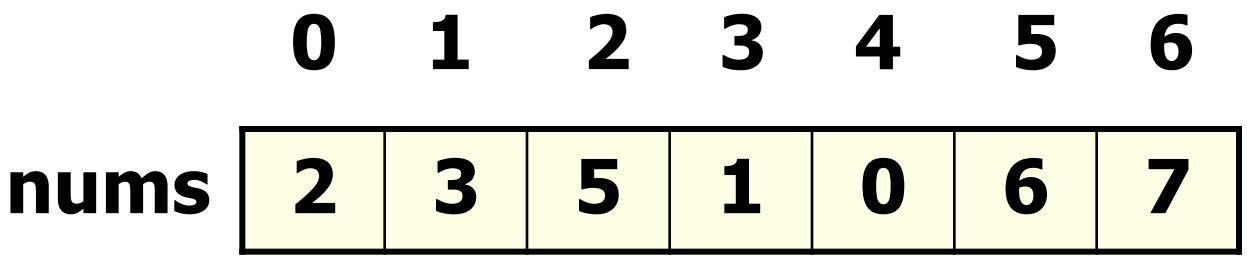
Printing Array Values

```
int[] nums = {2,3,5,1,0,6,7};

out.println( nums[ 1 + 3 ] );
out.println( nums[ 7 / 2 ] );
out.println( nums[ 6 ] );
```

OUTPUT

```
0
1
7
```



open arrayprintone.java arrayprinttwo.java

Setting Array Spots

Setting array spots

```
int[] nums = new int[10];

nums[0] = 231;
nums[4] = 756;
nums[2] = 123;

out.println(nums[0]);
out.println(nums[1]);
out.println(nums[4]);
out.println(nums[4/2]);
```

OUTPUT

```
231
0
756
123
```

Setting array spots

```
double[] nums = new double[10];

nums[0] = 10.5;
nums[3] = 98.6;
nums[2] = 77.5;

out.println(nums[0]);
out.println(nums[3]);
out.println(nums[7]);
```

OUTPUT

```
10.5
98.6
0.0
```

Setting array spots

```
String[] words = new String[10];

words[0] = "dog";
words[3] = "cat";
words[2] = "pig";

out.println( words[0] );
out.println( words[3] );
out.println( words[7] );
```

OUTPUT

```
dog
cat
null
```

open arraysetone.java arraysettwo.java

Accessing Arrays with Loops

Accessing Arrays with Loops

```
int[] nums = {3,2,5,1,0,6};
for(int spot=0; spot<nums.length; spot++)
{
    out.println(nums[spot]);
}
```

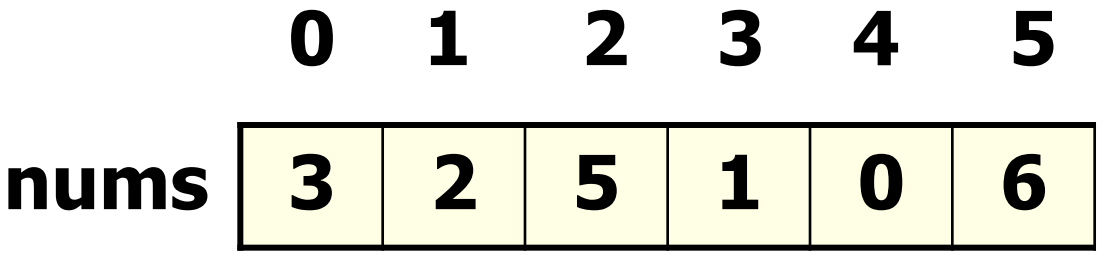
length returns the # of elements/items/spots in the array!!!

OUTPUT

```
3
2
5
1
0
6
```

Accessing Arrays with Loops

```
int[] nums = {3,2,5,1,0,6};
for(int  item  :  nums)
{
    out.println(item);
}
```

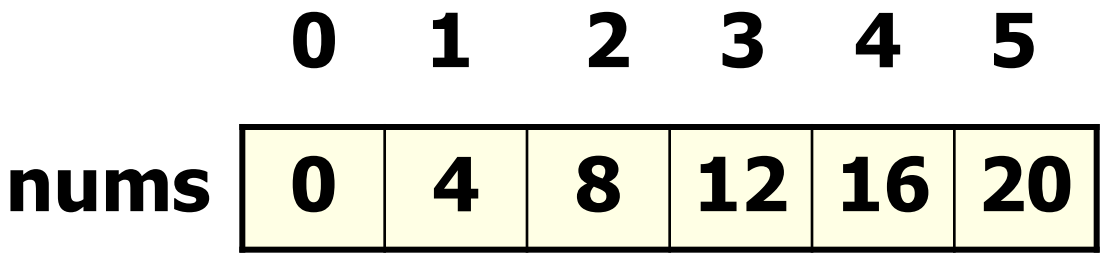


OUTPUT

```
3
2
5
1
0
6
```

Accessing Arrays with Loops

```
int[] nums = new int[6];
for(int spot=0; spot<nums.length; spot++)
{
   nums[spot] = spot*4;
}
```

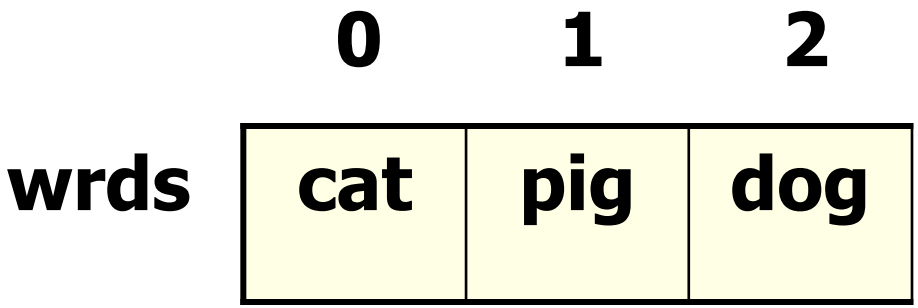


Accessing Arrays with Loops

```
String[] wrds = {"cat","pig","dog"};
for(String  item  :  wrds)
{
    out.println(item);
}
```

OUTPUT

cat
pig
dog



open arrayloopone.java

arraylooptwo.java

Complete the code

Counting Array Values

Counting Array Values

In order to count the number of occurrences of a particular value, you must use a loop to access all items in the array.

You must also include an if statement to check for the specified value and a variable with which to count each of the variable's occurrences.

Counting Array Values

```
loop through all array items

   if current item == search value

      increase the count by 1
```

Counting Array Values

```
//assume nums is an array with values

int count = 0;
for( int  item  :  nums )
{
    if ( item matches provided value )
       count = count + 1;
}

//return or print count
```

arraycount.java

Complete the code

Deleting Array Values

Deleting Array Values

Once instantiated, the size of an array can never change.

```
int[] nums = {1,7,8,7,4,3,7};
```

Deleting Array Values

To delete values, a new array must be instantiated.

```
int[] newRay = new int[ size ];
```

Deleting Array Values

Values must be copied from the old array to the new one.

```
int[] nums = {1,7,8,7,4,3,7};
int[] newRay = new int[ size ];

loop through nums
   copy stuff to newRay
```

Deleting Array Values

```
int[] nums = {1,7,8,7,4,3,7};
```

To delete all 7s

Count the 7s

Create an array set to count of non 7s

Copy all non 7s to new array

arraydelete.java

Complete the code

Arrays as Instance Variables

Instance Variables

```
public class Array
{
   private int[]  nums;      //has the value null

   public Array(){
      nums = new int[10];    //sizes the array
   }

   //other methods not shown
}
```

arrayinstancevars.java

Complete the code

toString()

```
public class Array
{
  //instance vars and other methods not shown

  public String toString()
  {
     String output= "";
     for(int spot=0; spot<nums.length; spot++)
     {
        output=output+nums[spot]+" ";
     }
     return output;
  }
}
```

toString()

```
public class Array
{
  //instance vars and other methods not shown

  public String toString()
  {
     String output= "";
     for(  int val  :  nums  )
     {
        output = output + val + " ";
     }
     return output;
  }
}
```

arrayinstancevarstwo.java

InstanceVarsTwo

```
String list = "7 6 3 4 9 1 3 5";
int[] nums = new int[8];

Scanner chopper = new Scanner(list);
int spot=0;

while(chopper.hasNextInt())
{
  nums[spot++]=chopper.nextInt();
}
```

The Arrays Class

sort

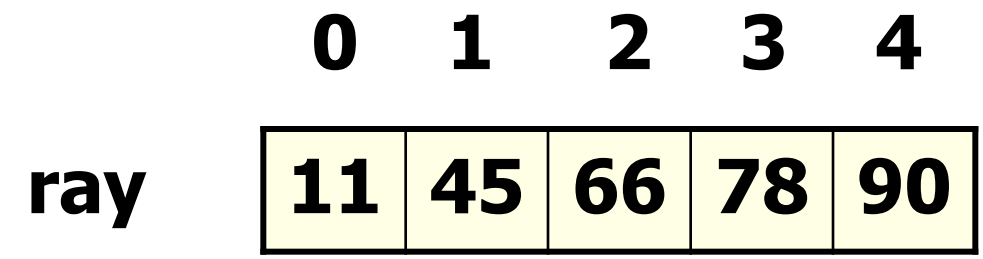
```
int nums[] = {45,78,90,66,11};

Arrays.sort(nums);

for(int item : nums)
   out.println(item);
```

OUTPUT

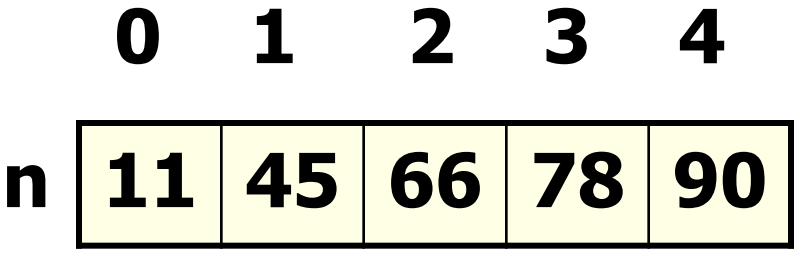
```
11
45
66
78
90
```



toString

```
int[] n = {45,78,90,66,11};

System.out.println( Arrays.toString(n));
```



OUTPUT

```
[45, 78, 90, 66, 11]
```

open arrays_class.java

Start work

On the labs