

2D Arrays

Sheet 2.4

A checkers game would be stored in a 2D grid.



Another
game in a
2D grid.



To add a dimension to an array, add a [] when you declare it!

```
int oneD [] =new int[8];
```

```
int twoD [][] = new int[8][8];
```

```
int threeD [][][] = new int[8][8][8];
```

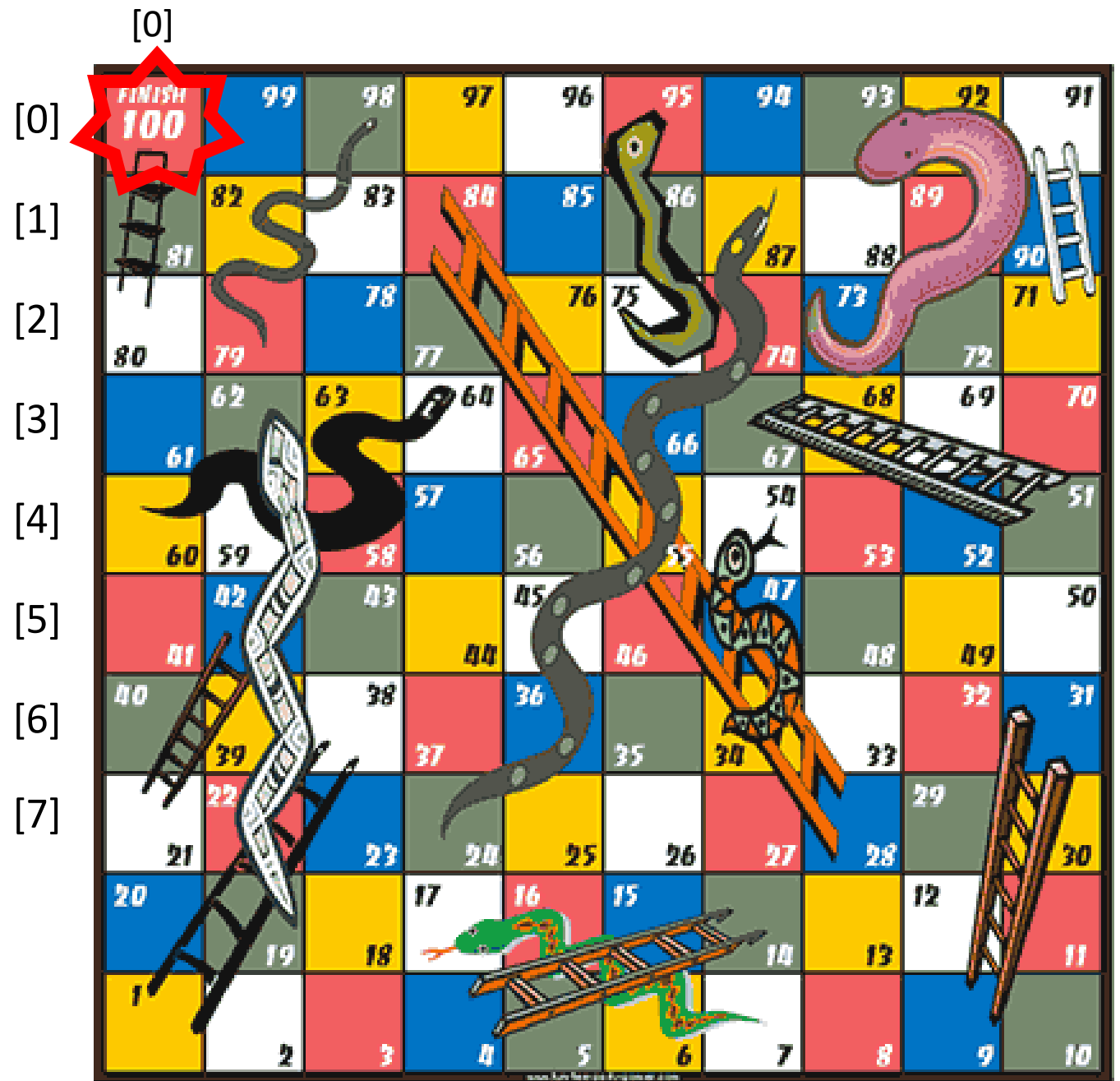
2 Dimensions = [] []

[row] [column]



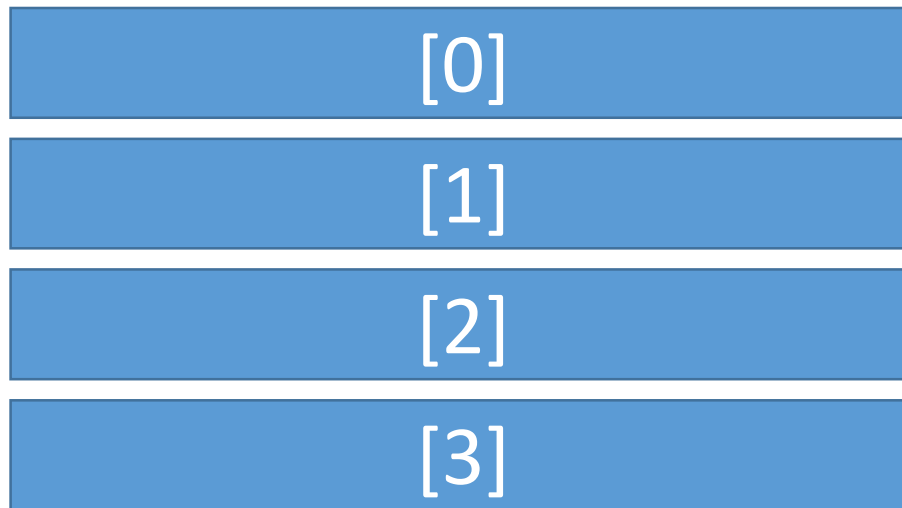
10 x 10 grid.

What is in [7][0]?



rows

h-ROW-zontal



4 rows

columns


verti-COL



6 cols

It is rows, then columns.

This comes from databases.

 ID	Firstname	Lastname	Gender	DOB
1	John	Lennon	M	9/10/1940
2	Ringo	Starr	M	7/7/1940
3	Paul	McCartney	M	18/6/1942
4	George	Harrison	M	25/2/1943

Record

Field

Customer Table

How many rows?

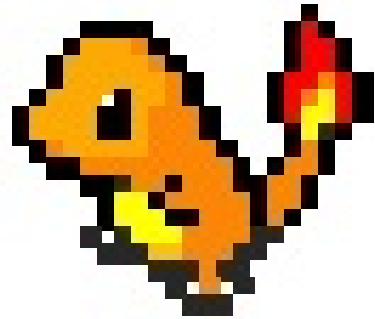
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

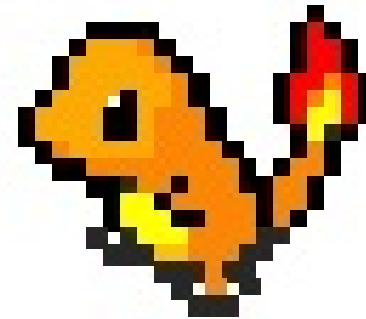
[1]



squirtle



bulbasaur



charmander



squirtle

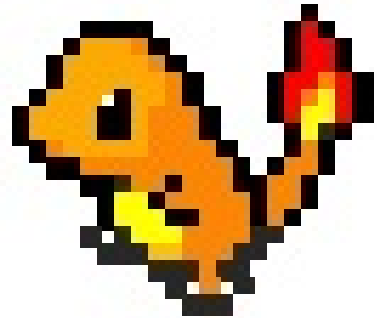
How many rows?

[0]

[1]

[2]

[3]



charmander



squirtle



bulbasaur



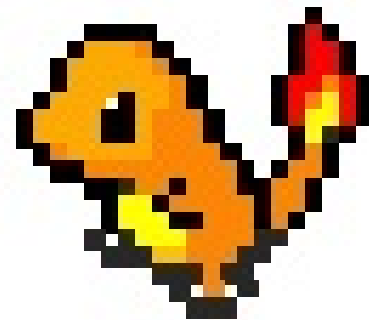
bulbasaur



squirtle



bulbasaur



charmander



squirtle

[0]

2

[1]

How many cols?

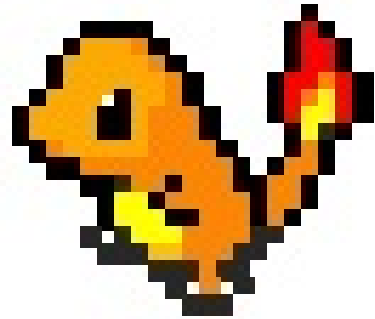
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

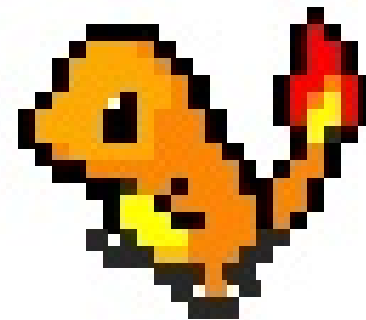
[1]



squirtle



bulbasaur



charmander



squirtle

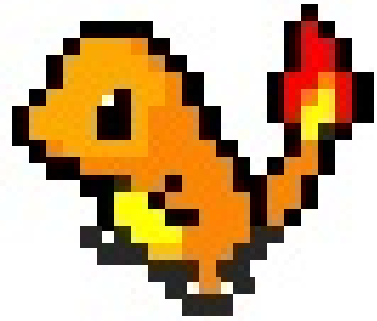
How many cols?

[0]

[1]

[2]

[3]



charmander



squirtle



bulbasaur



bulbasaur

[0]

4

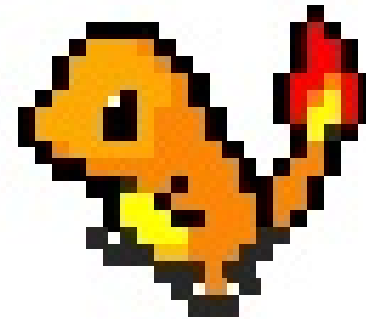
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[0][1]?

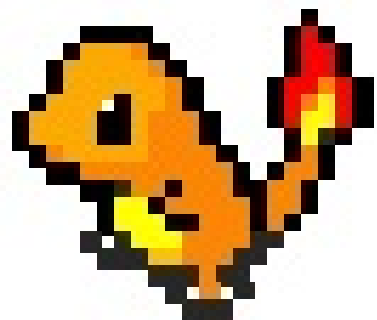
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

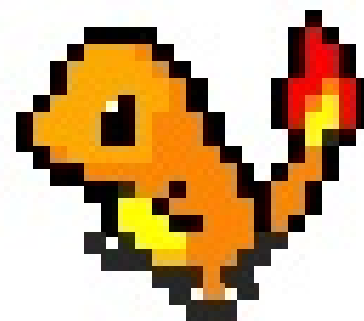
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[0][1]?

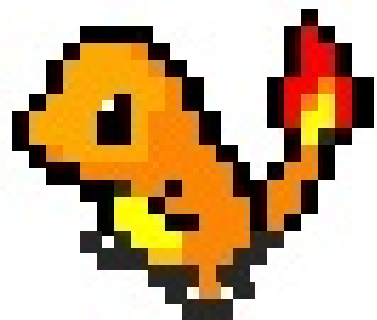
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

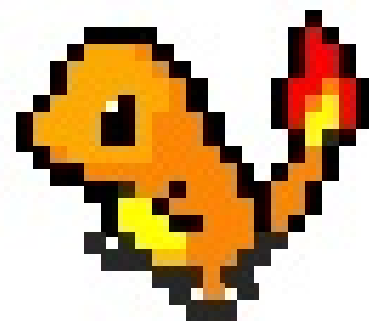
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[1][3]?

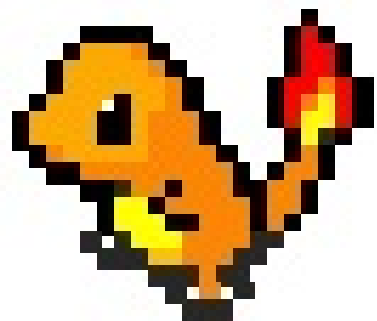
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

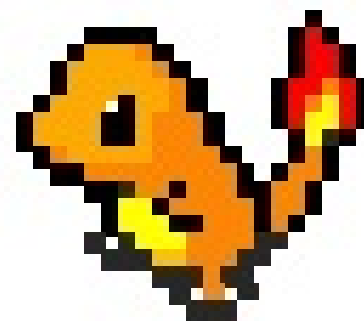
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[1][3]?

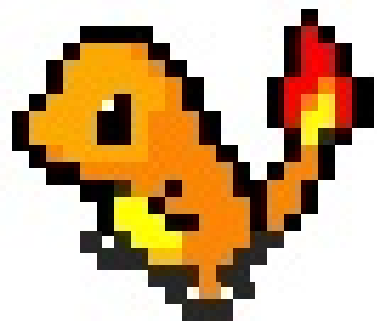
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

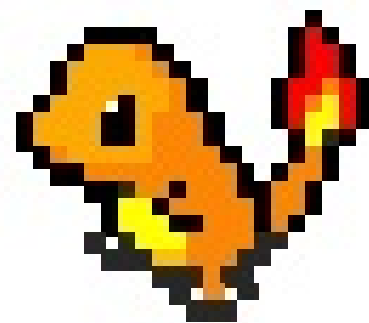
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[1][0]?

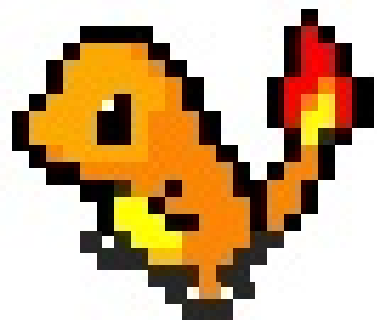
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

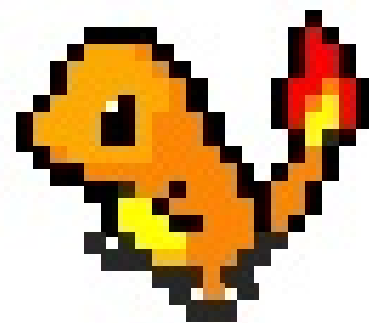
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[1][0]?

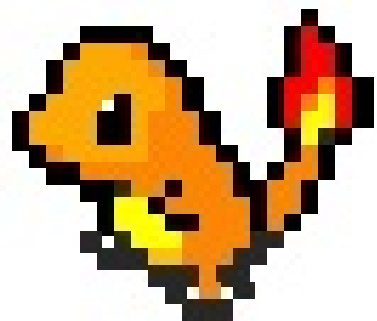
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

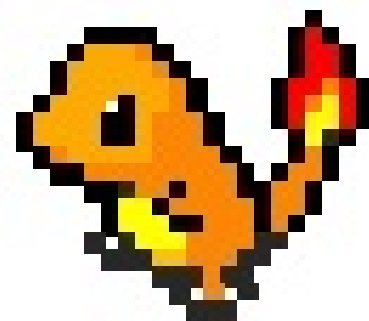
[1]



squirtle



bulbasaur



charmander



squirtle

What is
in
[3][2]?

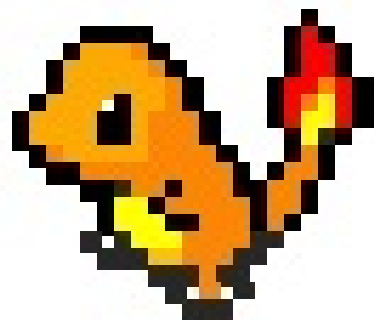
[0]

[1]

[2]

[3]

[0]



charmander



squirtle



bulbasaur



bulbasaur

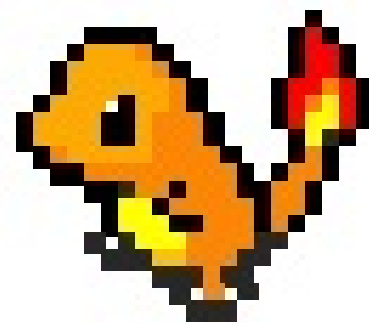
[1]



squirtle



bulbasaur



charmander



squirtle

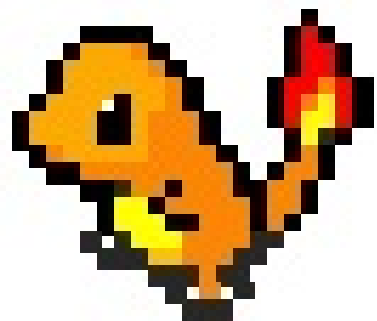
What is in [3][2]?

[0]

[1]

[2]

[3]



charmander



squirtle



bulbasaur



bulbasaur

[0]

Error! Array out of bounds.

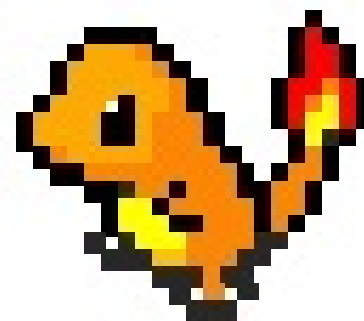
[1]



squirtle



bulbasaur



charmander



squirtle

A 1D array is a list of elements, separated by commas.

```
String oneD[] = {"charmander", "squirtle", "bulbasaur", "bulbasaur"};
```

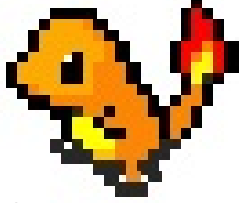
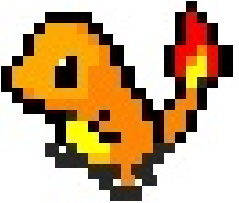
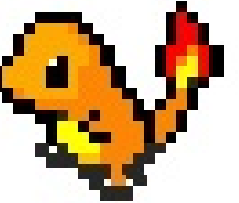


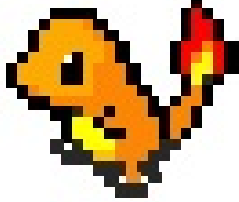





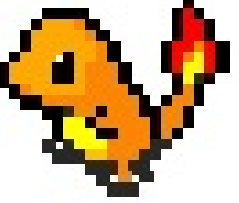

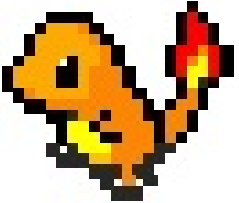
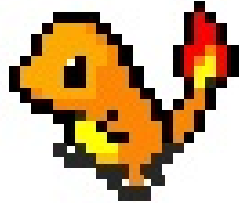
A 2D array is declared as an array of arrays.

```
String poke[][] = {  
    {"charmander", "squirtle", "bulbasaur", "bulbasaur"},  
    {"squirtle", "bulbasaur", "charmander", "squirtle"}  
};
```

An array ↓

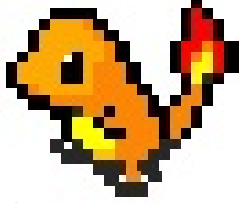
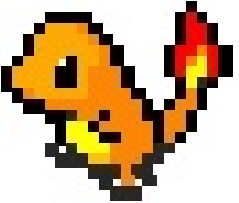
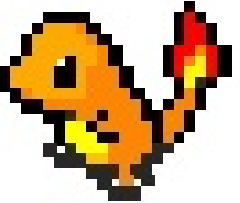


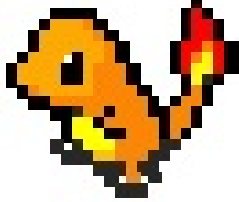





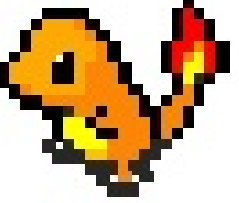

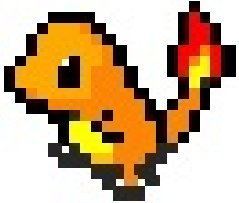
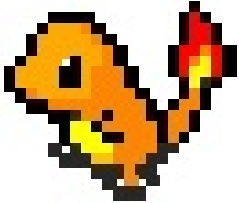
Another array ↑

How many rows?

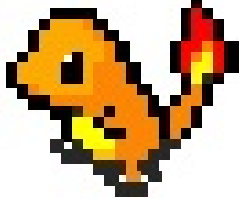
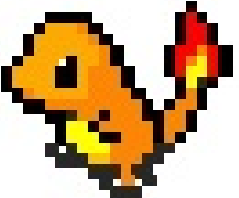
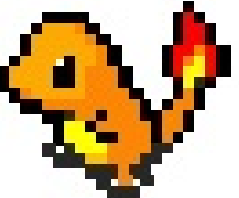


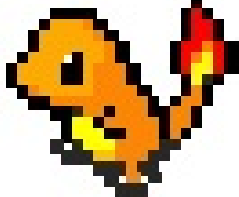








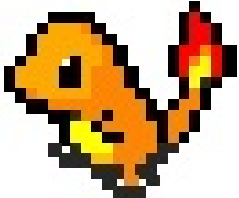
	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

How many rows?

3

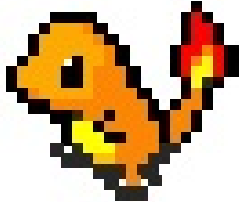
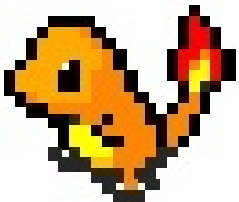



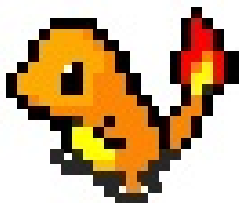





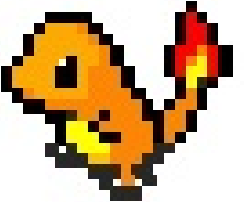

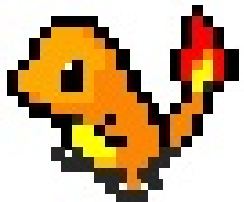
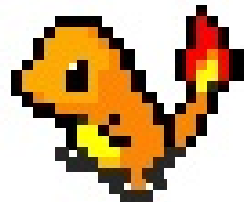
	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

How many cols?

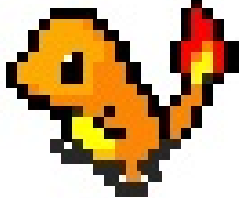
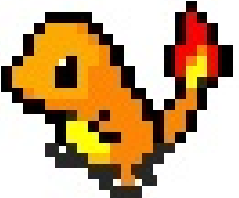
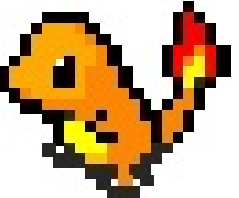










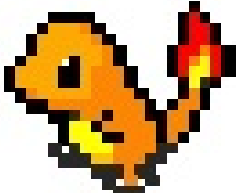

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

How many cols?

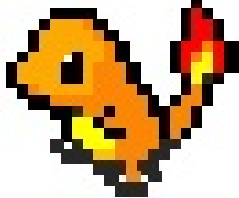
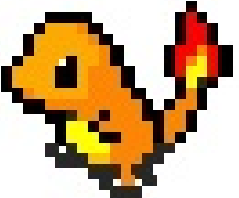









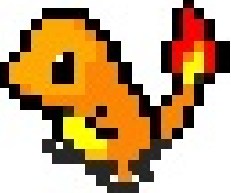

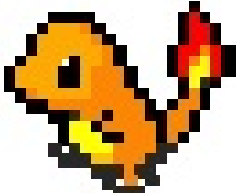
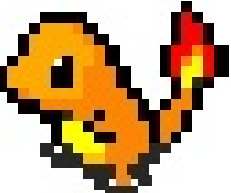
5

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

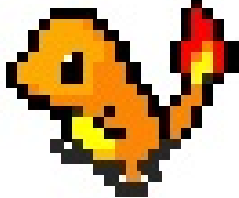
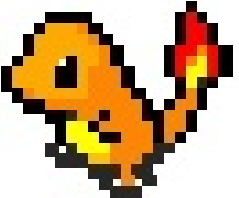
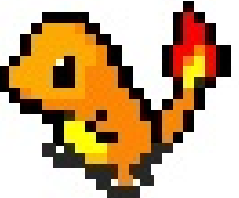


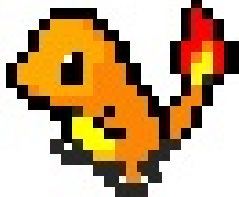







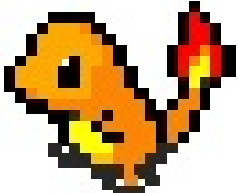
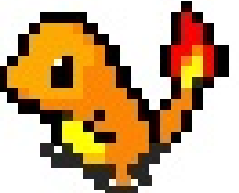
What is in [0][2]?

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

What is in [0][2]?

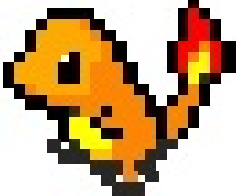




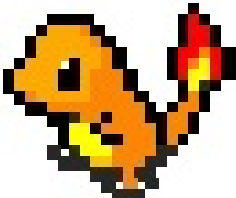





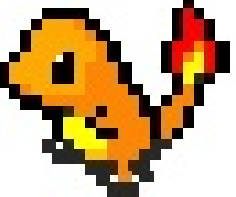

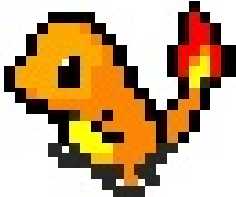

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

What is in [5][0]?

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

What is in [5][0]?

Error! Array out of bounds.

	[0]	[1]	[2]	[3]	[4]
[0]	 charmander	 charmander	 charmander	 bulbasaur	 squirtle
[1]	 charmander	 bulbasaur	 squirtle	 squirtle	 bulbasaur
[2]	 squirtle	 charmander	 bulbasaur	 charmander	 charmander

```
char a[][] =
```

```
'c', 'c', 'c', 'b', 's'
```

```
'c', 'b', 's', 's', 'b'
```

```
's', 'c', 'b', 'c', 'c'
```

Add in the curly
brackets and
commas to make the
2D array.

```
char a[][] = { {'c', 'c', 'c', 'b', 's'},  
               {'c', 'b', 's', 's', 'b'},  
               {'s', 'c', 'b', 'c', 'c'} };
```

```
int row = 3;  
int col = 5;
```

This is the code to print a two-dimensional array. Adapt it so it prints a one-dimensional array.

```
for(int i=0; i<row; i++) {  
    for(int j=0; j<col; j++) {  
        System.out.print(a[i][j]+"\\t");  
    }  
    System.out.println();  
}
```

This is the code to print a two-dimensional array. Adapt it so it prints a one-dimensional array.

```
int row = 3;  
int col = 5;
```

```
for(int i=0; i<row; i++) {  
    for(int j=0; j<col; j++) {  
        System.out.print(a[i][j]+"\t");  
    }  
    System.out.println();  
}
```

```
int row = 3;
int col = 5;
char min = a[0][0];
for(int i=0; i<row; i++) {
    for(int j=0; j<col; j++) {
        if(min>a[i][j])
            min=a[i][j];
    }
}
System.out.println("Min="+min);
```

This is the code to find the minimum in a 2D array. Make it find the minimum for a 1D array.

```
int row = 3;
int col = 5;
char min = a[0][0];
for(int i=0; i<row; i++) {
    for(int j=0; j<col; j++) {
        if(min>a[i][j])
            min=a[i][j];
    }
}
System.out.println("Min="+min);
```

This is the code to find the minimum in a 2D array. Make it find the minimum for a 1D array.

Arrays can also have more dimensions.

Undo Button

Series of Levels

