A two dimensional array can be used to manipulate data. For example, imagine if you had a table of student test scores.

The table may look something like this:

| Test 1 | Test 2 | Test 3 | Test 4 | Test 5 |
|--------|--------|--------|--------|--------|
| 98 | 100 | 75 | 89 | 77 |
| 100 | 95 | 97 | 85 | 80 |
| 67 | 77 | 79 | 80 | 89 |
| 100 | 99 | 95 | 87 | 95 |
| 100 | 95 | 90 | 85 | 100 |

The first step in creating a two dimensional array to hold this table is to create two constants for holding the number of rows and columns of the table.

```
static final int ROWS = 5;
static final int COLS = 5;
```

By declaring the number of rows and columns as static final, you make your program more easily modifiable later on.

You can create your two dimensional array.

```
Integer [] testScores = new Integer[ROWS][COLS];
```

This works if your plan is to read in the values into your table from a text file or calculate the values later on using a method that traverses the array and populates it.

If you want to preload the array with values, then you create the array this way:

```
    Integer[][] testScores = {  {98, 100, 75, 89, 77},
                                {100, 95, 97, 85, 80},
                                {67, 77, 79, 80, 89},
                                {100, 99, 95, 87, 95},
                                {100, 95, 90, 85, 100} };
```

Now that we have our array, we can manipulate however we want. Typically, you would use two for loops when manipulating the array; however, you can just use one in certain instances.

For example, let's say the instructor wanted to be able to curve a test; you could use a method like the one below to allow the user to specify the test number and the value of the curve.

```java
public static void curveTest(Integer[][] scores, int testNum, int value)
{
    int col = testNum -1;
    for(int row = 0; row < ROWS; row++)
    {
        scores[row][col] += 5;
    }

}
```

Note that this only modifies one test score by fixing the column number accessed and then using the loop to go through the table, row by row.

Often you will need a method to traverse your two dimensional array, such as when printing out the table of test scores. You can do that using two for loops (which is the traditional way of traversing a two dimensional array).

```java
public static void printScores(Integer[][] scores)
{
    for(int row = 0; row < ROWS; row ++)
    {
        for(int col = 0; col < COLS; col ++)
        {
            System.out.print(scores[row][col] + " ");
        }
        System.out.println();
    }

}
```

**printScores** walks through the array the use of two for loops one row at a time. The outer loop steps through the table row by row. When on a particular row, the inner loop steps through each column for that row.

You should now download the **test2D.java** Demo program and step through it to make sure that you understand how to work with two dimensional arrays.