Arrays

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int NumPoints = 5000;
int W = 800;
int H = 800;
int [ ] X;
int [ ] Y;
int [ ] R;
int [ ] G;
int [ ] B;

Total number of points
The arrays that will hold the points and the colors. They have only been declared. They don't yet have any memory given to them.

Declaring Arrays

void setup( )
{
X = new int [NumPoints];
Y = new int [NumPoints];
R = new int [NumPoints];
G = new int [NumPoints];
B = new int [NumPoints];
size(800, 800);
for( int i = 0; i < NumPoints; i = i + 1 )
{
X[i] = int( random(0, W));
Y[i] = int( random(0, H));
R[i] = int( random(0, 255));
G[i] = int( random(0, 255));
B[i] = int( random(0, 255));
}
}

Allocate the arrays to hold the random points and the random colors. At this point, memory has been given to them, but they don't have any values assigned.

Allocating and Filling Arrays

Each point is assigned a random location.
Each point is assigned a random color. There is no significance to each point's specific color — it is to look cool!

Using the Arrays in a for-loop

void draw( )
{
background(200, 200, 255);
stroke(0, 0, 0);
for( int i = 0; i < NumPoints; i = i + 1 )
{
fill( R[i], G[i], B[i] );
ellipse( X[i], Y[i], 8, 8 );
}
}

Draw each point with its color.

Using the Arrays in a for-loop

A Cool Pattern

A Cool Pattern will be made even Cooler

For our next trick, during each frame we are going move each point halfway towards one of three target triangle vertices.
### Declaring Arrays

- **int NumPoints = 5000;**
  - Total number of random points
- **int TARGET_SIZE = 40;**
  - Size of the target vertices
- **int W = 800;**
- **int H = 800;**
- **int[] X;**
- **int[] Y;**
- **int[] R;**
- **int[] G;**
- **int[] B;**
- **int[] XC = { 50, W/2, W-50 };**
- **int[] YC = { H-50, 50, H-50 };**
  - The arrays that will hold the points and the colors. They have only been declared. They don’t yet have any memory given to them.
- **The arrays that hold the three center points. Because of the way this was coded, these arrays do have memory given to them.**

### Allocating and Filling Arrays

```java
void setup()
{
  X = new int[NumPoints];
  Y = new int[NumPoints];
  R = new int[NumPoints];
  G = new int[NumPoints];
  B = new int[NumPoints];
  size(W, H);
  for (int i = 0; i < NumPoints; i++)
  {
    X[i] = int(random(0, W));
    Y[i] = int(random(0, H));
    R[i] = int(random(0, 255));
    G[i] = int(random(0, 255));
    B[i] = int(random(0, 255));
  }
  frameRate(2);
}
```

- **Each point is assigned a random location.**
- **Each point is assigned a random color.**
- **There is no significance to each point’s specific color – it is to look cool!**
- **Perform the animation at 2 frames per second so that we can actually see it. Otherwise, it will be too fast.**

### Using the Arrays in a for-loop

```java
void draw()
{
  background(200, 200, 255);
  fill(255, 0, 0);
  ellipse(XC[0], YC[0], TARGET_SIZE, TARGET_SIZE);
  fill(0, 255, 0);
  ellipse(XC[1], YC[1], TARGET_SIZE, TARGET_SIZE);
  fill(0, 0, 255);
  ellipse(XC[2], YC[2], TARGET_SIZE, TARGET_SIZE);
  stroke(0, 0, 0);
  for (int i = 0; i < NumPoints; i++)
  {
    fill(R[i], G[i], B[i]);
    ellipse(X[i], Y[i], 8, 8);
  }
  for (int i = 0; i < NumPoints; i++)
  {
    int randTarget = int(random(0.000, 2.999));
    X[i] = (X[i] + XC[randTarget]) / 2;
    Y[i] = (Y[i] + YC[randTarget]) / 2;
  }
}
```

- **Draw the three targets.**
- **Draw each point with its color.**
- **Re-compute each point’s position by randomly picking one of the targets (0, 1, or 2) and moving halfway towards it.**

### A Surprising Result

- **Mathematicians call shapes like this “attractors.”**