**Explorations of Technology - Size and Location Assignment**

**Pixels**

A **pixel** is a single dot on your monitor, through which color can be shown. Your monitor is made up of thousands of these pixels and working together, they produce the image we see on our screens.

The **resolution** of a monitor is expressed in pixels. It tells how many pixels horizontally and vertically the monitor is using to draw. Obviously, the more pixels we have, the sharper the resolution. Your monitors are set to display 1280 pixels across and 1024 pixels from top to bottom. This gives over 1.3 million pixels on your monitor. So if we wanted to move our mouse pointer to the middle of our form, we would use the following code:

1280 pixels across



1024 pixels top to bottom

So if we wanted to move our mouse pointer to the middle of our form, we would want to go halfway across horizontally and vertically. The location there is (640, 512).

**Location on a Form**

It is important that we understand how size and location work in Visual Basic. Here are the basic rules:

1. The default *Size* of the form is 300 x 300 pixels. When specifying size, it is always expressed as (width, height).
2. An object's Location is specified as (X, Y), where (X, Y) is the point on the form where the object is drawn.
3. Contrary to what you learned in geometry, the *Location* (0, 0) is the upper left corner of the form.
	1. X behaves as normal. As you add to it, the object will move to the right.
	2. Y, however is the opposite. As you add to Y, the object will move **down** the form.
4. Objects can go off the form, so be careful to not choose X or Y values that are larger than the size of the form.
5. The location of an object is also determined by its upper left corner.



Location of an object is relative to its upper left corner.

Location (0,0)



**Horizontal Offset**

The right side of the form is actually 16 pixels less than the width of the form. Thus the last pixel that will appear on a form with a width of 300 is 284. Simply subtract 16 from the form's width and don't exceed that point on the screen or your object will be drawn partially or completely off screen.

**Vertical Offset**

The bottom side of the form is actually 40 pixels less than the height of the form. Thus the last pixel that will appear on a form with a height of 300 is at Y value of 260. Simply subtract 40 from the form's height and don't exceed that point on the screen or your object will be drawn partially or completely off screen.

**Centering an Object on the Form**

Step 1 - Find the center of the form. The location of the middle of the form is:

($\frac{Form width-16}{2}$ , $\frac{Form Height-40}{2}$)

\*Note: If the value calculated ends in .5, you can drop it off.

Step 2 - Using the object's width and height to position the center of the object at the location calculated in Step 1. Let's use CX to represent the X value of the center of the form and CY to represent the Y value of the center of the form. (Calculated in Step 1). The formula is :

$(CX- \frac{Object Width}{2}$, $CY- \frac{Object height}{2}$)

Example: We have a form with a size of (600,800). We want to center a button of size (100,40) on the form. What (X, Y) value should we set for the button's Location property?

Step 1 - Calculate the center of the form.

($\frac{600-16}{2}$ , $\frac{800-40}{2}$) = ($\frac{600-16}{2}$ , $\frac{800-40}{2}$) = **(292, 380)**

Step 2 - Calculate the Location that will center the button of size (100,40) on the form at Location (292,381)

 $(292- \frac{100}{2}$, $380- \frac{40}{2}$) = $(291-50$, $380-20$) = $(242$**,** $360$**)**

**So the button should have its Location property set to (242, 360) to be perfectly centered on a form of size (600, 800)**

**Applying Your Knowledge**

Given what you know about object location and visibility, you should be able to figure out how to:

* Position an object in any corner of the form
* Position an object vertically centered on the left edge of the form
* Position an object vertically centered on the right edge of the form
* Position an object horizontally centered on the top of the form.
* Position an object horizontally centered on the bottom of the form.

**Size and Location Problems**

**Part I** - The form size and object size are provided. You must calculate for each:

1. The (X, Y) value of the form's center

2. The (X, Y) Location value for the Object for it to be perfectly centered on the form.

3. The (X, Y) Location of the last viewable pixel located in the bottom, right corner of the form.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Form Size** | **Object Size** | **Center of Form** | **Location of Centered Object** | **Location of Bottom Right Corner of Form** |
| (1024, 1280) | (200,200) |  |  |  |
| (500, 450) | (60, 200) |  |  |  |
| (300,380) | (200, 20) |  |  |  |
| (946,742) | (126, 278) |  |  |  |

**Part II. Apply Your Knowledge**

Understanding how an object's location is determined and the horizontal and vertical offsets, try to fill out the table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Object Size** | **Form Size** | **Desired Position** | **Object Location (X, Y)** |
| (50, 30) | (300,300) | Absolute Center |  |
| (60, 20) | (400, 500) | Absolute Center |  |
| (100,100) | (1024, 768) | Absolute Center |  |
| (144,288) | (800,600) | Absolute Center |  |
| (75, 108) | (540, 336) | Absolute Center |  |
| (50, 30) | (300,300) | Top Right Corner |  |
| (60, 20) | (400, 500) | Bottom Right Corner |  |
| (100,100) | (1024, 768) | Lower Left Corner |  |
| (144,288) | (800,600) | Upper Left Corner |  |
| (75, 108) | (540, 336) | Top Middle |  |
| (30, 70) | (306,720) | Bottom Middle |  |
| (82, 120) | (400, 500) | Left Middle |  |
| (250,140) | (1024, 768) | Right Middle |  |