

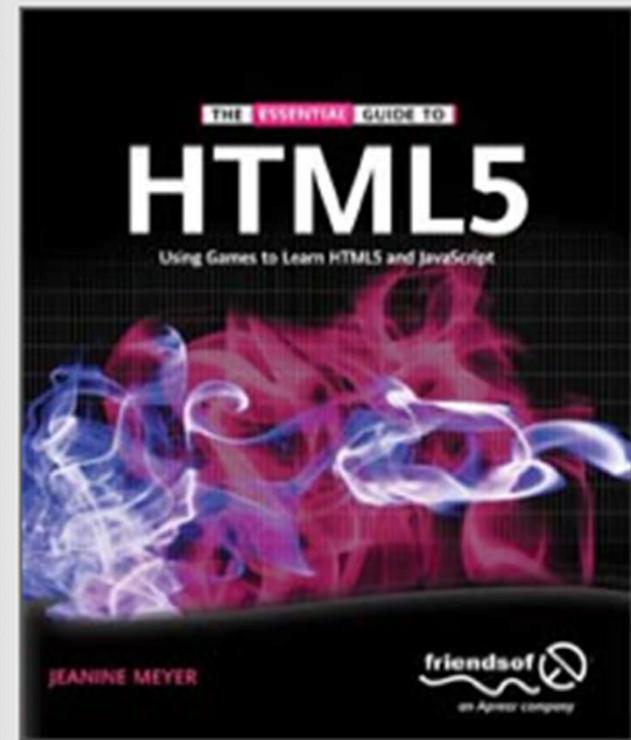
Animation with the HTML5 Canvas Tag

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**Based on the Publication:
The Essential Guide to HTML5,
Friends of ED, Apress
Jeanine Meyer, Professor
at Purchase College/SUNY**

Project Source

- **The Essential Guide to HTML5:
Using Games to learn HTML5
and JavaScript**
- By Jeanine Meyer
- [www.friendsofed.com/book.html
?isbn=9781430233831](http://www.friendsofed.com/book.html?isbn=9781430233831)
- [www.friendsofed.com/download
.html?isbn=1430233834](http://www.friendsofed.com/download.html?isbn=1430233834)



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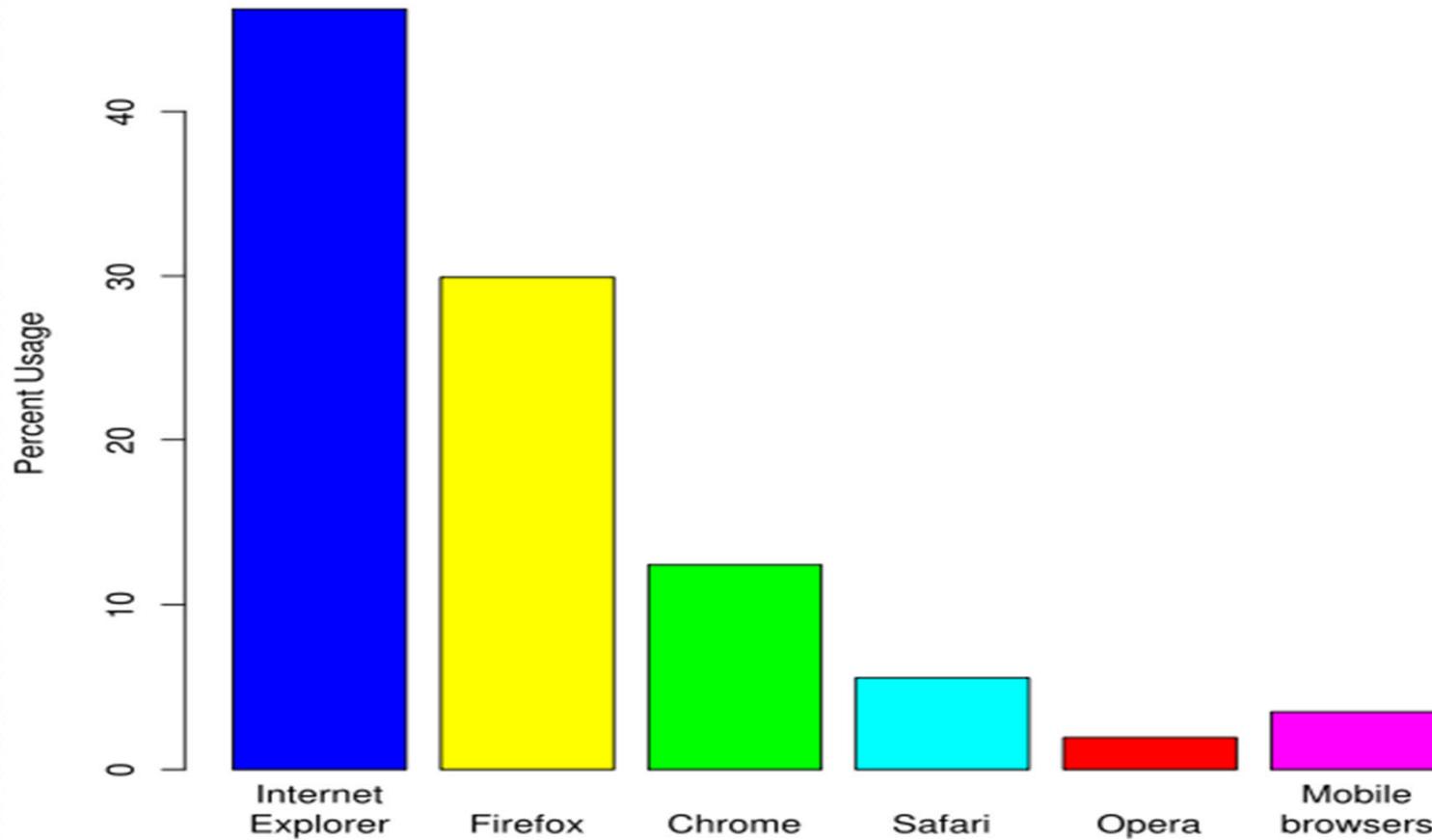
RRP: \$39.99 (USD)

350 Pages



Worldwide Web Browser Usage

Usage share of web browsers: November 2010

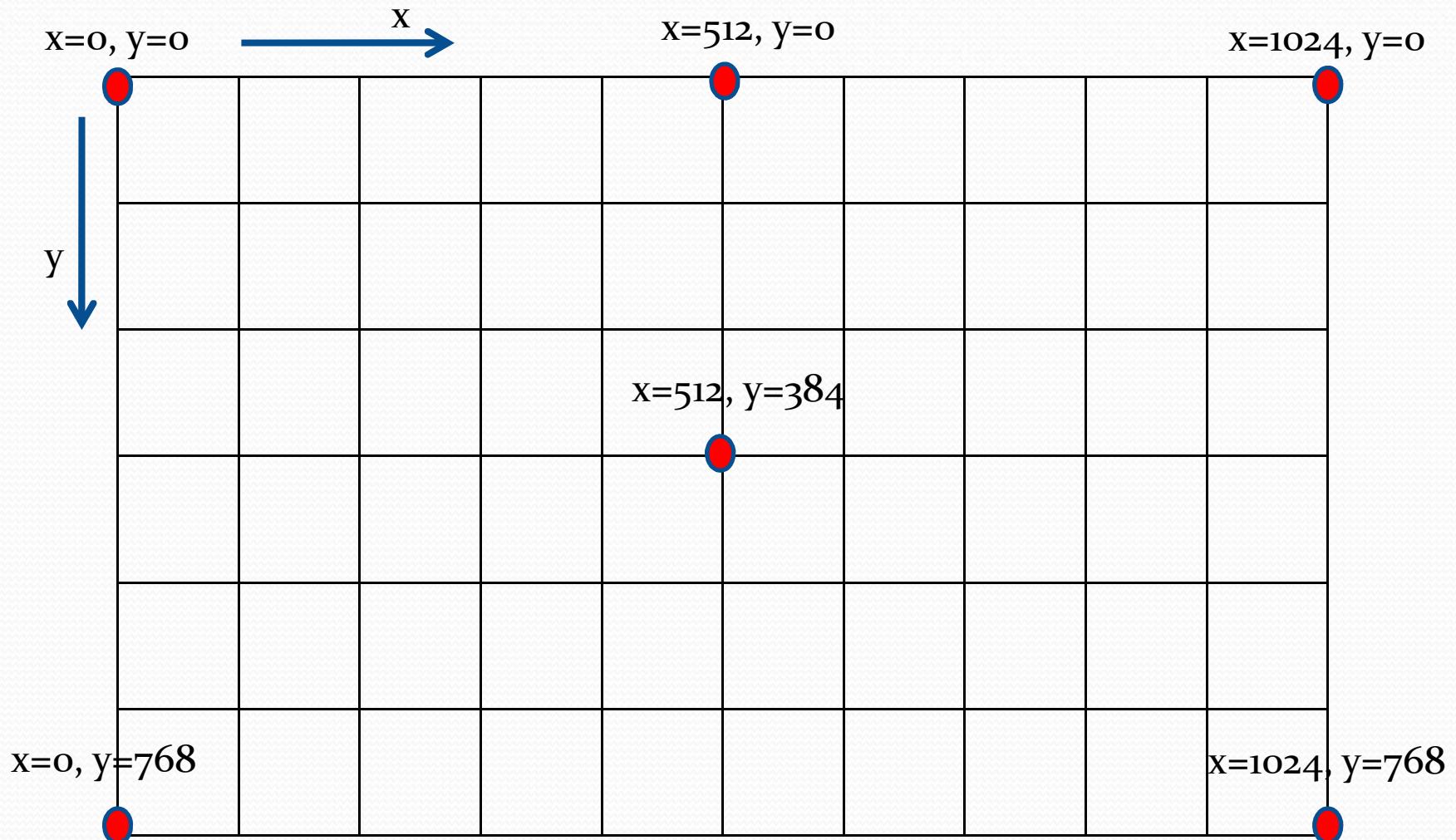


Source: <http://en.wikipedia.org/>

Web Browser Screen Sizes

Date	Higher	1024 x 768	800 x 600	640 x 480	Unknown
January 2010	76%	20%	1%	0%	3%
January 2009	57%	36%	4%	0%	3%
January 2008	38%	48%	8%	0%	6%
January 2007	26%	54%	14%	0%	6%
January 2006	17%	57%	20%	0%	6%
January 2005	12%	53%	30%	0%	5%
January 2004	10%	47%	37%	1%	5%
January 2003	6%	40%	47%	2%	5%
January 2002	6%	34%	52%	3%	5%
January 2001	5%	29%	55%	6%	5%
January 2000	4%	25%	56%	11%	4%

Web Browser Screen Coordinates

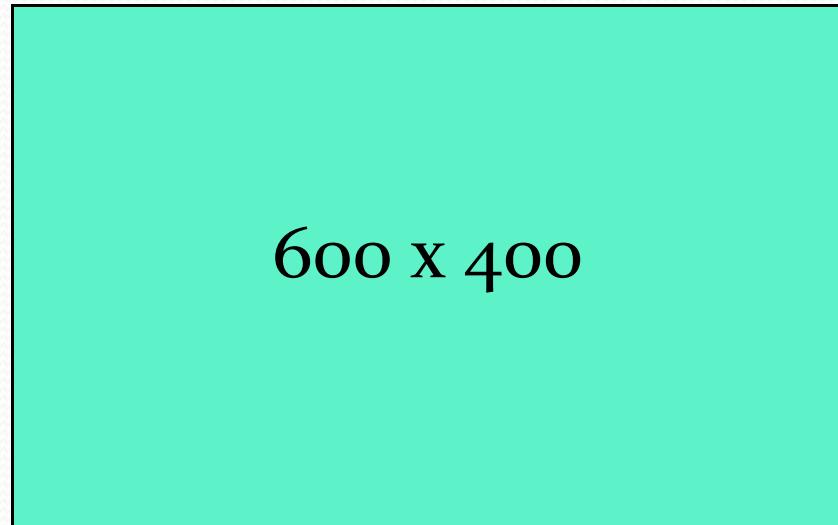


For: 1024 x 768

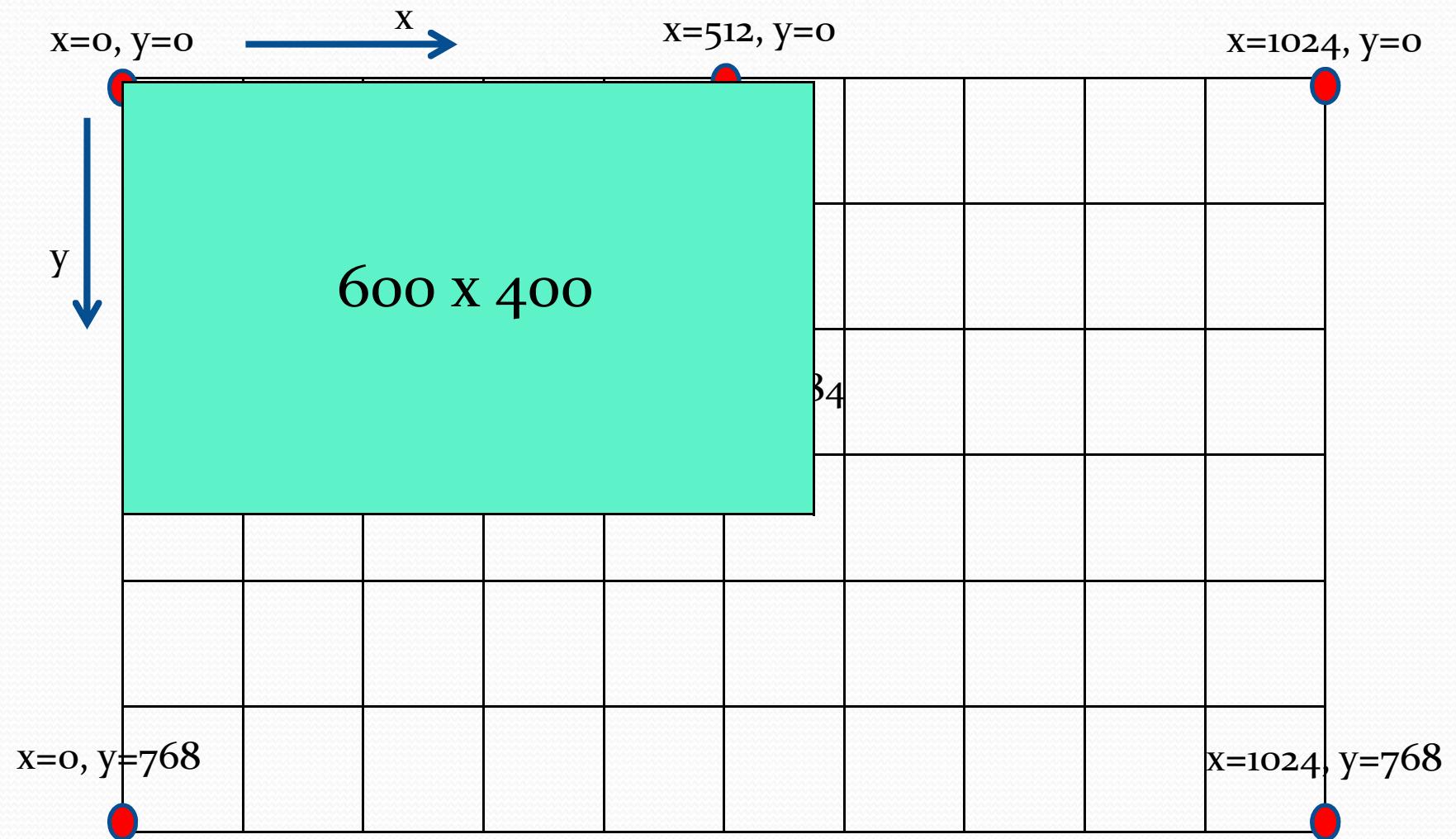
Canvas Tag

```
<canvas id="canvas" width="600" height="400">  
/</canvas>
```

600 pixels wide
400 pixels high

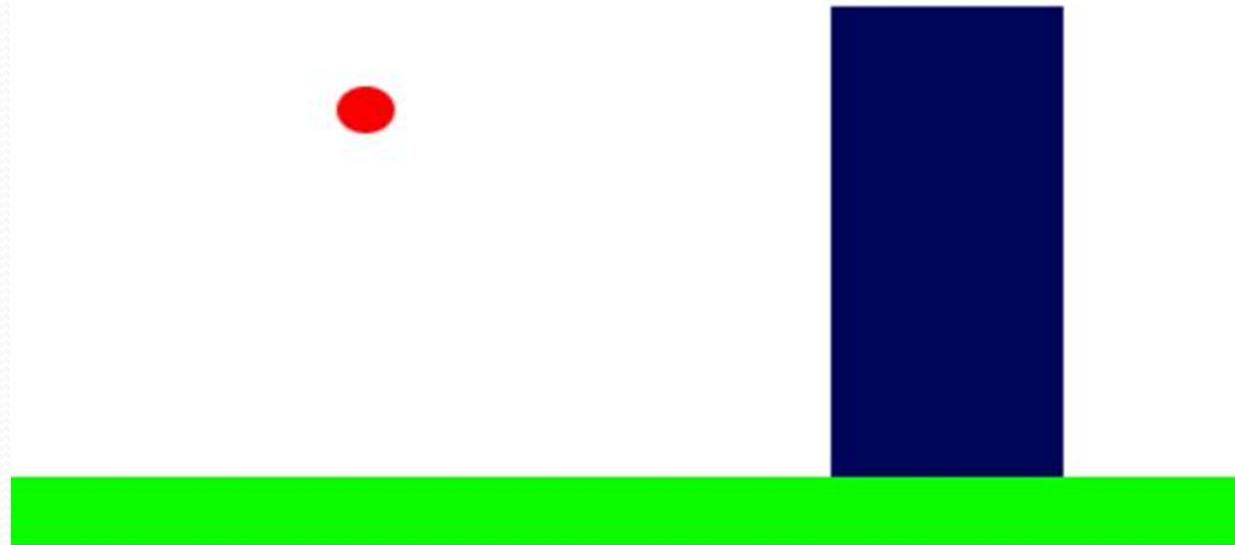


Canvas in the Web Browser Screen

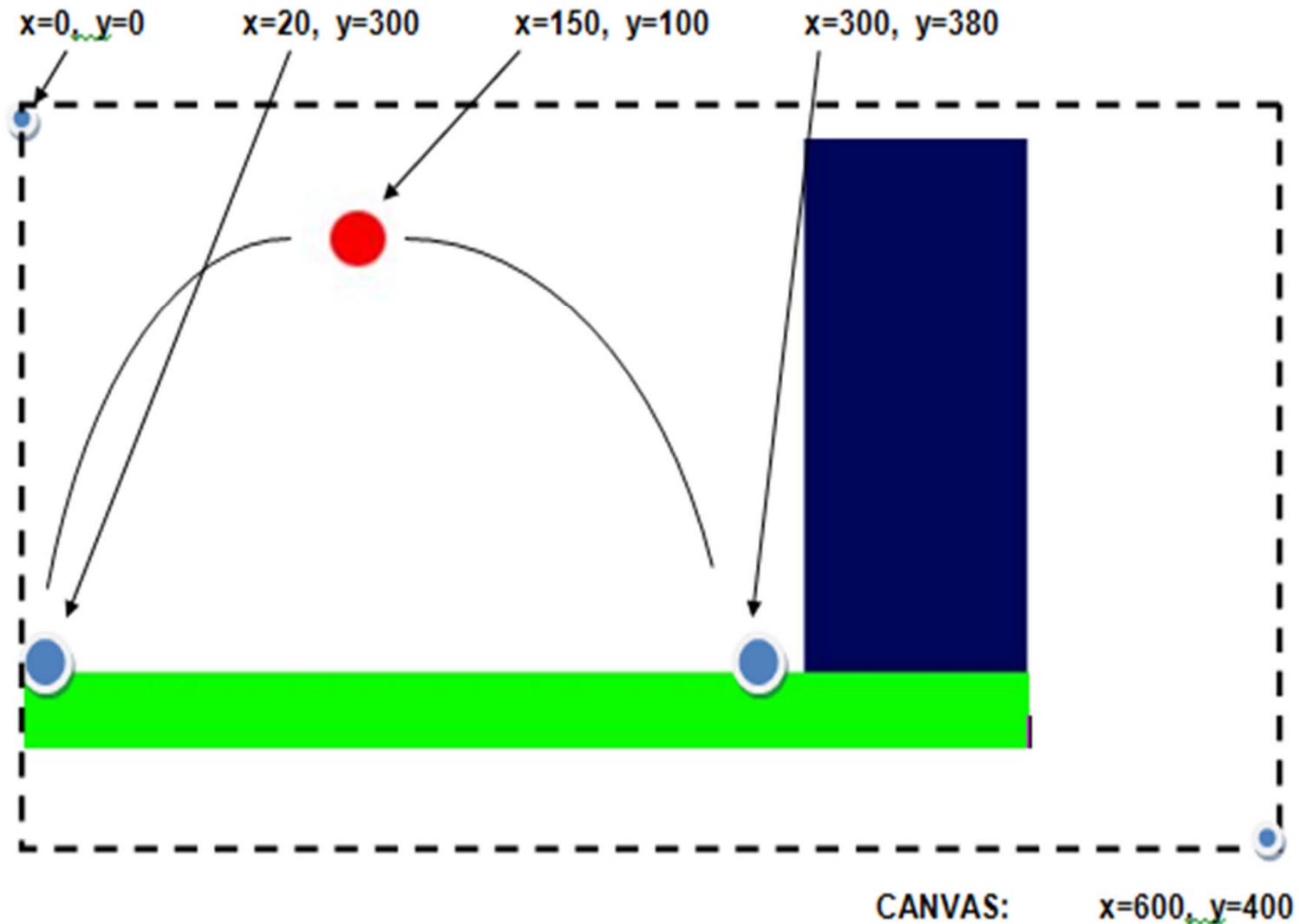


For: 1024 x 768

Cannonball Javascript Program



Coordinates in the Canvas



Stepping Through The Code

- 1) Initial var variables get set.
- 2) The Ball gets created with initial values of x and y:

```
var cball = new Ball (iballx, ibally, 10, "rgb(250,0,0)");
```

- 3) The Target and the Ground rectangles get set.

```
var target = new Myrectangle (300, 100, 80, 200, "rgb(0,5,90)");  
var ground = new Myrectangle (0, 300, 600, 30, "rgb(10,250,0)");
```

- 4) The Target, the Ground and the Ball are added to the array.

```
everything.push (target);  
everything.push (ground);  
everything.push (cball);
```

Javascript Functions

- 5) The function `init()` executes. It finds the canvas and names it as “ctx”.
- 6) The function `drawball()` executes.
- 7) When you click the FIRE button, `fire()` gets executes.
- 8) Horizontal and vertical velocities get set.
- 9) `setInterval()` creates a timed animation
to execute the function `change()` at equal intervals.
- 10) The function `drawall()` executes.
- 11) `change()` function keeps moving the ball at the set intervals.

Style

```
<html>
<head>
    <title>Cannonball</title>
    <style type="text/css">
        form {
            width: 330px;
            margin: 20px;
            background-color: brown;
            padding: 20px;
        }
    </style>
```

Variables

```
<script type="text/javascript">
```

```
var cwidth = 600;  
var cheight = 400;  
var ctx;
```

← CONTEXT

```
var everything = [ ];  
var tid;  
var horvelocity;  
var verticalvel1;  
var verticalvel2;
```



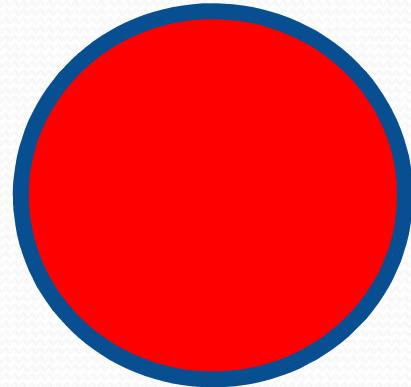
← AN ARRAY

HORIZONTAL & VERTICAL
VELOCITIES

```
var gravity = 2;  
var iballx = 20;  
var ibally = 300;
```

The Ball Function Creates The Ball

```
function Ball (sx, sy, rad, stylestring)
{
    this.sx = sx;
    this.sy = sy;
    this.rad = rad;
    this.draw = drawball;
    this.moveit = moveball;
    this.fillstyle = stylestring;
}
```



It assigns functions for Draw, Move events and a Style string.

Functions: drawball, moveball

```
function drawball()
{
    ctx.fillStyle = this.fillstyle;
    ctx.beginPath ();
    ctx.arc (this.sx, this.sy, this.rad, 0, Math.PI*2,true);
    ctx.fill();
}

function moveball (dx, dy)
{
    this.sx += dx;
    this.sy += dy; }           INCREMENTS X and Y
}
```

Create a Ball with a Radius of 10

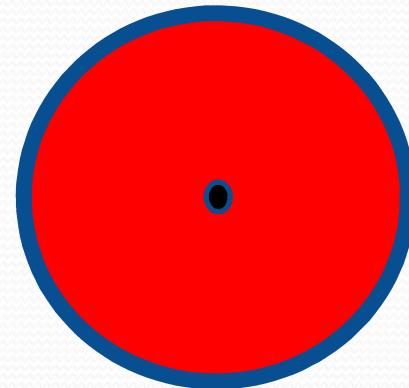
```
var cball = new Ball  
        (iballx, ibally, 10, "rgb (250,0,0)");
```

BALL ID

COLORS:

RGB = RED, GREEN, BLUE

250, 0, 0



10 pixels

Myrectangle Function

```
function Myrectangle  
    (sx, sy, swidth, sheight, stylestring)  
{  
    this.sx = sx;  
    this.sy = sy;  
    this.swidth = swidth;  
    this.sheight = sheight;  
    this.fillstyle = stylestring;  
    this.draw = drawrects;  
    this.moveit = moveball;  
}
```

drawrects Function

```
function drawrects()
{
    ctx.fillStyle = this.fillstyle;
    ctx.fillRect
        (this.sx, this.sy, this.swidth, this.sheight);
}
```

Creating the Rectangles

```
var target = new Myrectangle (300, 100, 80, 200, "rgb(0,5,90)");
var ground = new Myrectangle
              (0, 300, 600, 30, "rgb(10,250,0)");
everything.push (target);
everything.push (ground);
everything.push (cball); } PUTS SHAPES INTO THE ARRAY
```

```
function init()
{
    ctx = document.getElementById ('canvas').getContext('2d');
    drawball();
}
```

fire Function

```
function fire()
{
    cball.sx = iballx;
    cball.sy = ibally;
    horvelocity = Number (document.f.hv.value);
    verticalvel1 = Number (document.f.vv.value);
    drawall();
    tid = setInterval (change,100);
    ↩ SETS THE TIMER FOR ANIMATION
    return false;
}
```

drawall Function

```
function drawall()
{
    ctx.clearRect (0, 0, cwidth, cheight);
    var i;
    for (i= 0 ; i < everything.length ; i++)
    {
        everything [i].draw();
    }
}
```

 DRAW ALL ELEMENTS IN THE ARRAY

change Function

```
function change() {  
    var dx = horvelocity;  
    verticalvel2 = verticalvel1 + gravity;  
    var dy = (verticalvel1 + verticalvel2) * .5;      ← MULTIPLIES BY 0.5  
    verticalvel1 = verticalvel2;  
    cball.moveit (dx, dy);  
    var bx = cball.sx;  
    var by = cball.sy;  
  
    if ((bx >= target.sx) && (bx <= (target.sx+target.swidth)) &&  
        (by >= target.sy) && (by <= (target.sy + target.sheight)))  
    {  
        clearInterval (tid);  
    }  
    if (by >= ground.sy)  
    {  
        clearInterval (tid);  
    }  
    drawall();  
}
```

HTML Page Body

```
<body onload = "init();">
```



INITIALIZES THE PAGE WHEN LOADING

```
<canvas id= "canvas" width= "600" height= "400">
```

Your browser doesn't support the HTML5 element canvas.

```
</canvas>
```

```
<br />
```

RUNS THE fire() FUNCTION WHEN CLICKED

```
<form name= "f" id= "f" onsubmit= "return fire();">
```

Set velocities and fire cannonball.

Horizontal displacement

```
  <input name="hv" id="hv" value="10" type="number" min="-100" max="100" />
```

```
  <br />
```

Initial vertical displacement

```
  <input name="vv" id="vv" value="-25" type="number" min="-100" max="100" />
```

```
  <input type="submit" value="FIRE" />
```

```
</form>
```

```
</body>
```

```
</html>
```



FIRE

