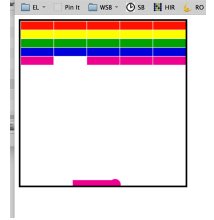


Break Out

Canvas Tutorial continue Simple Game: Break Out

⦿ Animate, Game Elements

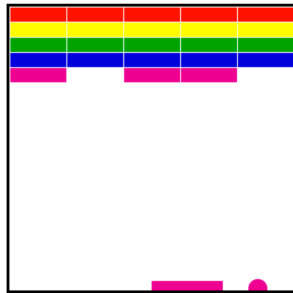
- ✦ Breakout
- ✦ Bill Mill
 - Modified Tutorial
 - Software developer in Maryland



What it Looks Like

⦿ Elements:

- ✦ Color
- ✦ Collision Detection
- ✦ Interaction with User
 - Mouse
 - Keyboard



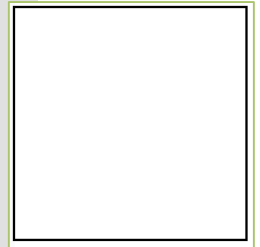
11.bricks-really-pretty.html

Review: Rough Structure

```
<!DOCTYPE html>
<html>

<head>
  <style type="text/css">
    canvas { border: 3px solid black; }
  </style>
  <script type="text/javascript">
    .
    .
    .
  </script>
</head>

<body>
  <canvas id="canvas" width="300" height="300">
    Your browser does not support the canvas element.
  </canvas>
</body>
</html>
```



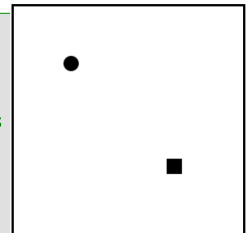
JavaScript Structure (Finished Code)

```
// Global variables
// Initialization methods
// Mouse & Keyboard specifications
// Shapes
// draw routines more course grained
// Game logic
```

Review: Step 1 : JavaScript Simple Shapes Ball in Break out (a circle), Bricks 'rectangle'

```
<script type="text/javascript">
var x=200;
var y=200;
window.onload=function()
{
  var c = document.getElementById( "canvas" );
  var ctx = c.getContext( "2d" );

  //draw a circle
  ctx.beginPath();
  ctx.arc(75, 75, 10, 0, Math.PI*2, true);
  ctx.closePath();
  ctx.fill();
  </script>
```



```
// draw a rectangle
ctx.beginPath();
ctx.rect( x, y, 20, 20);
ctx.fill();
ctx.closePath();
}
```

1.intro.html

Adding Action

- ⊙ Create a function that
 - (1) clears canvas, and
 - (2) then draws objectsin a repeatable manner (e.g., a draw() function).
- ⊙ Primitive:
 - ✦ setInterval(function, timeout) in the init()
 - Using : setInterval() for now
 - CAVEAT: HW read below links (use RequestAnimationFrame())

<http://stackoverflow.com/questions/13935262/settimeout-or-setinterval-or-requestanimationframe>
<http://creativejs.com/resources/requestanimationframe/>

Example Animation

```
var x = 150;
var y = 150;
var dx = 2;
var dy = 4;
var ctx;

function init() {
  ctx = $('#canvas')
  [0].getContext("2d");
  return setInterval(draw, 10);
}

function draw() {
  ctx.clearRect(0,0,300,300);
  ctx.beginPath();
  ctx.arc(x, y, 10, 0, Math.PI*2, true);
  ctx.closePath();
  ctx.fill();
  x += dx;
  y += dy;
}
init();
```

3.action.html

Exercises: How would you make it continue to animate?

How about changing dx, dy?

Modularize

```
//BEGIN LIBRARY CODE
var x = 150;
var y = 150;
var dx = 2;
var dy = 4;
var WIDTH;
var HEIGHT;
var ctx;

function init() {
  ctx = $('#canvas')
  [0].getContext("2d");
  WIDTH = $('#canvas').width();
  HEIGHT = $('#canvas').height();
  return setInterval(draw, 10);
}

function circle(x,y,r) {
  ctx.beginPath();
  ctx.arc(x, y, r, 0, Math.PI*2,
true);
  ctx.closePath();
  ctx.fill();
}

function rect(x,y,w,h) {
  ctx.beginPath();
  ctx.rect(x,y,w,h);
  ctx.closePath();
  ctx.fill();
}

function clear() {
  ctx.clearRect(0, 0, WIDTH, HEIGHT);
}
//END LIBRARY CODE
```

Circle Code
Rectangle Code
Clear

```
function draw() {
  clear();
  circle(x, y, 10);
  x += dx;
  y += dy;
}

init()
```

3.library.html

Bounce

- ⊙ Detect when the ball is 'beyond' the canvas boundaries.

```
function draw()
{
  clear();
  circle(x,y,10);

  // if outside the width canvas, change direction of ball.
  if (x + dx > WIDTH || x + dx < 0)
    dx = -dx;
  if (y + dy > HEIGHT || y + dy < 0)
    dy = -dy; // -.5;

  x += dx;
  y += dy;
}
```

6.bounce-mills.html

- ⊙ Linear Motion
 - ✦ More realistic accelerates while descending, (b/c of gravity, and slows down while bouncing up).

Gravity

- ⊙ Reading Assignment:
 - ✦ Rishabh's Code Theory Web Site
 - ✦ Freelance Web & Mobile Developer from India:
- ⊙ <http://codetheory.in/basics-of-implementing-gravity-with-html5-canvas/>

... add Paddle

- ⊙ Add a non-moving 'paddle' (rectangle)
 - ✦ Allow ball only to bounces off the paddle, otherwise ball is out of bound.
 - (only 'beyond floor')

... add **User Interaction:** KeyBoard Control

- ⊙ Allow the paddle to move
 - ✦ Left Arrow Input
 - ✦ Right Arrow Input
 - http://www.w3schools.com/jsref/event_key_charcode.asp
 - <http://www.asquare.net/javascript/tests/KeyCode.html>
- ⊙ Key UP, Key Down
- ⊙ 'Who' monitors input:
 - ✦ Canvas, Browser, Window Manager

8.keyboard-pxaddle.html

... add **User Interaction:** Mouse Control

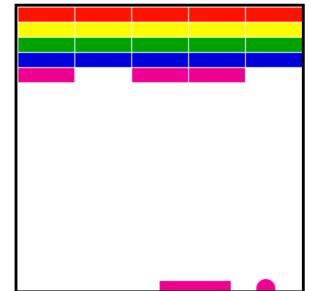
- ⊙ mouseMove event to a user specified function:
 - ✦ onMouseMove function,
 - ✦ Checks to see if the mouse is within the borders of the paddle, and move the paddle if it is.
 - ✦ Movement and Distance of paddle

... Brick and Collisions

- ✦ See code, simple 'collision detection' (looks for overlaps)
- ✦ More in-depth collision discussion next week.

What Game Looks Like ...

- ⊙ Features:
 - ✦ Color
 - ✦ Animation
 - ✦ Collision Detection
 - ✦ Interaction with User
 - Mouse
 - Keyboard



11.bricks-really-pretty.html

Collision

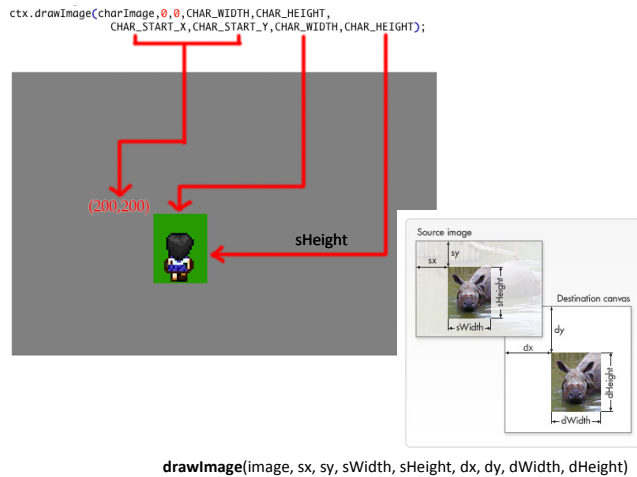
- ⊙ Will return to this with more fancy collision

Next Up

- ⊙ Sprite:
 - ✦ What is a sprite?
 - ✦ Sprite movements.
- ⊙ Parallax:
 - ✦ What is a parallax
 - ✦ From Simple Parallaxing to ...

Sprite

- ◎ **Step 1: Load Image from disk**
 - ✦ Need a reference so it can load it in, not possible to use URL path to them.
 - ✦ Create image object in java script, then give a reference to the image (e.g., name of file using full path name).
- ◎ **Step 2: Draw Image onto Canvas by using:**
 - ✦ DrawImage() {reference image on sheet and canvas}
- ◎ **Step 3: Animate Sprite**
 - ✦ Sprites are typically on a 'sprite sheet' so you need to 'animate' over the sprite sheet as well...

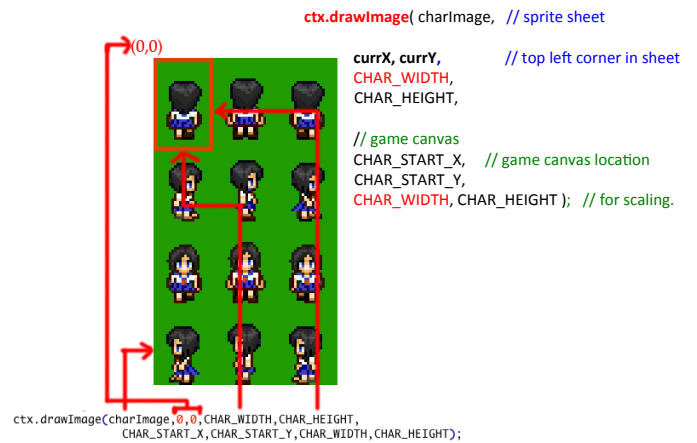


Example:

- ◎ `ctx.drawImage(img,j*50,i*38,50,38);`

Sprite Sheet Reference

- ◎ 120-spritesheet
 - ✦ (don't worry how this is implemented Yet)
- ◎ Animate Sprite Tutorial
 - ✦ We want this:
 - <file:///Users/ingrid/Desktop/CLS/4070/00a-HTML5-2014/animate-sprite/index.html>



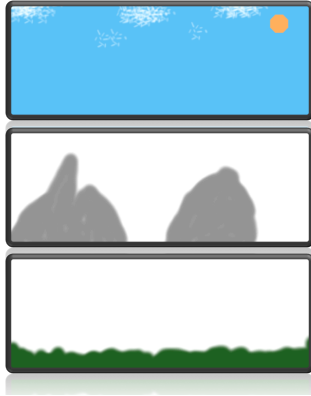
Parallax

- ◎ http://en.wikipedia.org/wiki/Parallax_scrolling
- ◎ <http://javacoffee.de/?p=866>



Layers

```
function Layer  
(  
  s, // path to image  
  x, y  
)  
{  
  this.img = new Image();  
  this.img.src = s;  
  this.x = x;  
  this.y = y;  
}
```



Next week

- ⦿ More about collision (elastic, non elastic)
- ⦿ Physics
- ⦿ Modularizing data with Javascript (Kandi.js)