```
<html>
    <head>
        <title>Canvas</title>

        <script language="javascript">
            //makes variables for each circle
            var invaderSpeedX = 5;
            var invaderSpeedY = 40;

            var invaderHealth = 10;

            var colorOne = "#0000FF";
            var colorTwo = "#FF0000";

            //defines the boundaries of the canvas as varaibles to make it easier to hot swap
            var canvasBoundX = 700;
            var canvasBoundY = 500;

            var speed = 6;

            //places circles in random locations
            var xCoordOne = Math.floor(Math.random() * (canvasBoundX - 100)) + 50;
            var yCoordOne = Math.floor(Math.random() * (canvasBoundY - 100)) + 50;

            var xCoordTwo = Math.floor(Math.random() * (canvasBoundX - 100)) + 50;
            var yCoordTwo = Math.floor(Math.random() * (canvasBoundY - 100)) + 50;

            var xDef = 350;
            var yDef = 450;

            var xInvaders = 350;
            var yInvaders = 50;

            var currentMovement = "none";

            var bulletShot = false;
            var initialPositionX = 0;
            var bulletY = 0;

            var isOn = false;
            //used for timer to determine if it is on or not

            window.addEventListener("keydown", function(event){


                switch(event.key){
                    case "a":
                        currentMovement = "left";
                        break;
                    case "d":
                        currentMovement = "right";
                        break;
                    default:
                        currentMovement = "none";
                        break;
                }

            }, true);

            window.addEventListener("keyup", function(event){
                currentMovement = "none";

            }, true);


            function initialize(){
```

```
67                  var canvas = document.getElementById("myCanvas");
68                  var context = canvas.getContext("2d");
69
70                  context.fillStyle="#ADD8E6";
71                  context.fillRect(0, 0, canvasBoundX, canvasBoundY);
72
73                  turnOn();
74              }
75
76              function update(){
77                  resetBackground();
78                  writeText(invaderHealth);
79                  moveDef();
80                  moveBullet();
81                  moveInvaders();
82                  checkWinLoss();
83
84              }
85
86              function checkWinLoss(){
87                  if(invaderHealth <= 0){
88                          resetBackground();
89                          writeText("You Win!");
90                          toggleTimer();
91                      }
92
93                  if(yInvaders >= 400){
94                      resetBackground();
95                          writeText("You Lose!");
96                          toggleTimer();
97                  }
98              }
99
100             //for debugging
101             function writeText(text){
102                 var canvas = document.getElementById("myCanvas");
103                 var context = canvas.getContext("2d");
104
105                 context.font = "30px Arial";
106                 context.fillStyle = "#FF0000";
107                 context.fillText(text, 10, 50);
108             }
109
110             function moveBullet(){
111                 if(bulletShot == true){
112                     var canvas = document.getElementById("myCanvas");
113                     var context = canvas.getContext("2d");
114
115                     bulletY -= 10;
116
117                     context.lineWidth = 5;
118                     context.strokeStyle = "red";
119                     context.beginPath();
120                     context.moveTo(initialPositionX, bulletY);
121                     context.lineTo(initialPositionX, bulletY - 20);
122                     context.stroke();
123
124                     if(bulletY <= 10 || hitInvader()){
125                         context.strokeStyle = "#ADD8E6";
126                         context.stroke();
127                         bulletShot = false;
128                     }
129
130                     if(hitInvader())
131                         invaderHealth -= 1;
132                 }
133             }
```

```
134
135             function fireBullet(){
136                 if(!bulletShot){
137                     initialPositionX = xDef;
138                     bulletY = yDef;
139                 }
140
141                 bulletShot = true;
142
143             }
144
145             function moveDef(){
146                 switch(currentMovement){
147                     case "left":
148                         if(xDef > 20)
149                             xDef -= speed;
150                         moveDefender(xDef, yDef, -1);
151                         break;
152                     case "right":
153                         if(xDef < canvasBoundX - 20)
154                             xDef += speed;
155                         moveDefender(xDef, yDef, 1);
156                         break;
157                     default:
158                         moveDefender(xDef, yDef, 0);
159                         break;
160
161                 }
162             }
163
164             function resetBackground(){
165                 var canvas = document.getElementById("myCanvas");
166                 var context = canvas.getContext("2d");
167                 //paint the background of the canvas
168                 context.fillStyle="#ADD8E6";
169                 context.fillRect(0, 0, canvasBoundX, canvasBoundY);
170             }
171
172             function moveDefender(x, y, direction){
173                 var canvas = document.getElementById("myCanvas");
174                 var context = canvas.getContext("2d");
175
176                 context.fillStyle = colorOne;
177                 context.beginPath();
178                 context.arc(x, y, 15, 0, 2 * Math.PI, true);
179                 context.closePath();
180                 context.fill();
181
182                 context.fillStyle = colorOne;
183                 context.beginPath();
184                 context.arc(x + (15 * direction), y, 7.5, 0, 2 * Math.PI, true);
185                 context.closePath();
186                 context.fill();
187             }
188
189             function moveInvaders(){
190                 var canvas = document.getElementById("myCanvas");
191                 var context = canvas.getContext("2d");
192
193                 context.fillStyle = "#FFFFFF";
194                 context.beginPath();
195                 context.arc(xInvaders, yInvaders, 40, 0, 2 * Math.PI, true);
196                 context.closePath();
197                 context.fill();
198
199                 if(xInvaders >= canvasBoundX - 40 || xInvaders <= 40){
200                     invaderSpeedX *= -1;
```

```
201                     yInvaders += invaderSpeedY;
202                 }
203                 xInvaders += invaderSpeedX;
204             }
205
206             function hitInvader(){
207                  return (Math.abs(xInvaders - initialPositionX) <= 40 && Math.abs(
                     yInvaders - bulletY) <= 40)
208             }
209
210             //paints a circle on the canvas
211             function drawCircle(){
212                 var canvas = document.getElementById("myCanvas");
213                 var context = canvas.getContext("2d");
214                 //paint the background of the canvas
215                 context.fillStyle="#ADD8E6";
216                 context.fillRect(0, 0, canvasBoundX, canvasBoundY);
217
218                 //draw the circle one
219                 context.fillStyle = colorOne;
220                 context.beginPath();
221                 context.arc(xCoordOne, yCoordOne, 15, 0, 2 * Math.PI, true);
222                 context.closePath();
223                 context.fill();
224
225                 //draw circle two
226                 context.fillStyle = colorTwo;
227                 context.beginPath();
228                 context.arc(xCoordTwo, yCoordTwo, 15, 0, 2 * Math.PI, true);
229                 context.closePath();
230                 context.fill();
231             }
232
233
234             function move(){
235                 //momves circle ~10px
236
237                 //if circle hits horizontal edge then change x direction
238                 if(xCoordOne > (canvasBoundX - 15) || xCoordOne < 15){
239                     //moveXOne = -Math.sign(moveXOne) * Math.floor(Math.random() * 10);
240                     moveXOne *= -1;
241                 }
242
243                 //if circle hits vertical edge then change y direction
244                 if(yCoordOne > (canvasBoundY - 15) || yCoordOne < 15){
245                     //moveYOne = -Math.sign(moveYOne) * Math.floor(Math.random() * 10);
246                     moveYOne *= -1;
247                 }
248
249                 if(xCoordTwo > (canvasBoundX - 15) || xCoordTwo < 15){
250                     //moveXOne = -Math.sign(moveXOne) * Math.floor(Math.random() * 10);
251                     moveXTwo *= -1;
252                 }
253
254                 if(yCoordTwo > (canvasBoundY - 15) || yCoordTwo < 15){
255                     //moveYOne = -Math.sign(moveYOne) * Math.floor(Math.random() * 10);
256                     moveYTwo *= -1;
257                 }
258
259                 //if the circle contact then change direction for both circles and
                    toggle the color
260                 if(contact()){
261                     moveXOne *= -1;
262                     moveYOne *= -1;
263                     moveXTwo *= -1;
264                     moveYTwo *= -1;
265
```

```
                    toggleColor();
                }

                //change the coordinates of the circles
                xCoordOne += moveXOne;
                yCoordOne += moveYOne;

                xCoordTwo += moveXTwo;
                yCoordTwo += moveYTwo;

                //moves cirlces to new coordinates
                drawCircle();
            }

            function contact(){
                //if the circles are within a circle threshold then return true
                return Math.abs(xCoordOne - xCoordTwo) <= 20 && Math.abs(yCoordOne -
                yCoordTwo) <= 20;
            }

            function toggleColor(){
                //if the color is blue then make it green, if no then make it blue
                (colorOne == "#0000FF") ? colorOne = "#008000" : colorOne = "#0000FF";

                //if the color is red then make it purple, if not then make it red
                (colorTwo == "#FF0000") ? colorTwo = "#800080" : colorTwo = "#FF0000";
            }

            function toggleTimer(){
                //if the timer is on the turn it off, if its not then turn it on
                isOn ? turnOff() : turnOn();
            }

            function turnOn(){
                //turns the timer on
                timer = setInterval("update()", 20);
                isOn = true;
            }

            function turnOff(){
                //turns the timer off
                clearInterval(timer);
                isOn = false;
            }
        </script>
    </head>

    <body onload="initialize()" onclick="fireBullet()">
        <center>
            <h1>Basic Animations</h1>

    </br>
    </br>

        <canvas id="myCanvas" width="700" height="500"
            style="border:2px solid rgb(195, 195, 195);">
            Your browser does not suppport the canvas element
        </canvas>

    </br>
    </br>
        </center>
    </body>
</html>
```