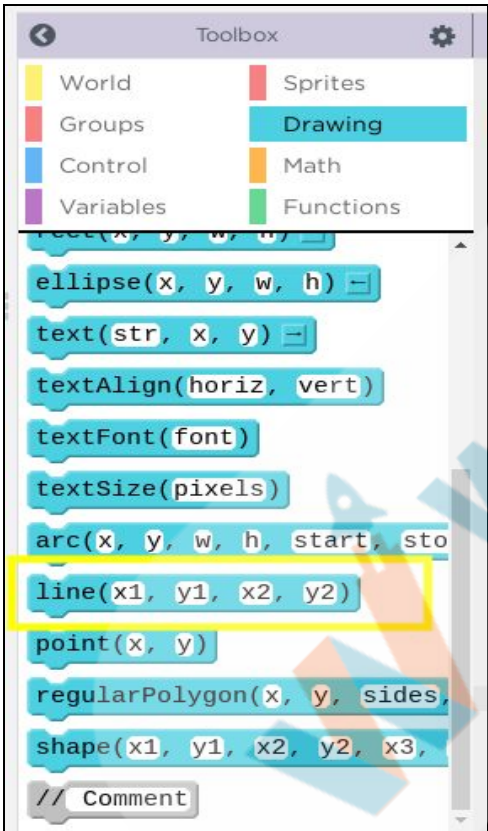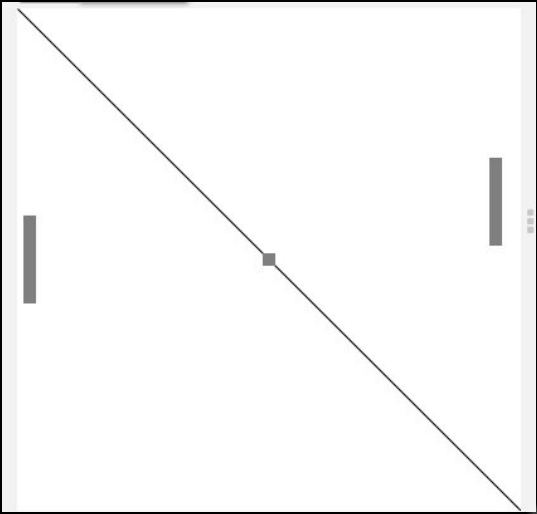| Topic	FUNCTIONS AND LOOPS
Class Description	Students learn to create abstractions in their code by declaring functions. Students also learn to replace repetitive code with a for-loop.
Class	PRO-C5
Class time	45 mins
Goal	● Write custom functions to serve the ball, reset the ball and draw the net. ● Draw the net using line instruction and for-loop.
Resources Required	● Teacher Resources 　○ Code.org login 　○ Laptop with internet connectivity 　○ Earphones with mic 　○ Notebook and pen ● Student Resources 　○ Code.org login 　○ Laptop with internet connectivity 　○ Earphones with mic 　○ Notebook and pen

Class structure	Warm Up - Slide show option	15 Mins
	Teacher-Led Activity	8 Mins
	Student-Led Activity	30 Mins
	Wrap Up - Slide show option	5 Mins

WARM UP SESSION - 15mins

Teacher starts slideshow **from slides 1 to 10**
Refer to speaker notes and follow the instructions on each slide.

Activity details	Solution/Guidelines
Hi, so good to see you again! How have you been? **Run the presentation from slide 1 to slide 10.** **Following are the warm up session deliverables:** ● Connecting students to the previous class. ● Explaining function and loop through real life connections. ● Definition of functions and loops.	**ESR**:Thanks, yes I am excited about it. Click on the slide show tab and present the slides.
QnA Session	
Question	**Answer**

What is the difference between the two:
 	
a)a=b
b)a===b
 	
A. a. Assigning value of b to a.
    b. To check if the two values are same or not(we use it as a condition in if-statement)
B. a.To check if the two values are the same or not(we use it as a condition in if-statement).
    b. Assigning value of b to a.
C. a. The correct way of writing the code.
    b. Incorrect code.
D. Both give us the same output.
	A

How many choices are possible when using a single if-else statement? A. 1 B. 2 C. 3 D. 4	**B**

| Continue the warm up session	
Activity details	**Solution/Guidelines**
Run the presentation from slide 11 to slide 14 to set the problem statement. **Following are the warm up session deliverables:** ● Introduce students to the coding environment - Workspace, blocks and output. ● Steps to write and run the code.	Narrate the story by using hand gestures and voice modulation methods to bring in more interest in students.
 Teacher ends slideshow	
TEACHER-LED ACTIVITY - 8mins	
Initiates Screen ShareTeacher	
CHALLENGE ● **Use function abstractions and loops to make code more readable.**	
Step 2: Teacher-led Activity (15 min)	"Let's look at the last version of the Pong Game we made in the last class." Teacher opens the project Pong Stage 2 "I have commented all my code. Can you read the code from the top and explain what we are doing here?"	*The student reads the comments and the code and explains what's happening in the code.*
	"Amazing! A good programmer should not only be able to write code but also read and explain code written by others. And you seem to have done a	*Student listens*

	good job in reading and explaining this code. Wonderful."	
	"Remember, the original Pong Game had a dotted line at the centre?" "How do you think we can draw the line? Do you see anything in the drawing toolbox, which can help us draw the line?"	ESR: Yes ESR: line() instruction?

	"Let's drag the line() instruction inside the draw()" What do you think will happen if we run the code?" "Where?"	**ESR:** It will draw a line. *The student tries to guess where the line would appear.*

	"Let's run the code and find out."	*Student observes the output.*

	"What do you think are the numbers inside the line()?" "Let's experiment and find out."	*Student takes a guess.*
	"Let's make changes to the first number and observe what happens to the line." *Teacher changes the first number and runs the code again.* "What changed?" "In which direction, horizontally or vertically?" "What do you think the first number stands for?"	*Student observes.* **ESR:** The starting point of the line shifted. **ESR:** Horizontally **ESR:** The horizontal position of the starting point of the line.

Code:

```
2   var ball = createSprite(200,200,10,10);
3   var playerPaddle = createSprite(380,200,10,70);
4   var computerPaddle = createSprite(10,200,10,70);
5
6
7
8 ▾ function draw() {
9     //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19
20    line(100, 0, 400, 400);
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
24    createEdgeSprites();
25    ball.bounceOff(topEdge);
26    ball.bounceOff(bottomEdge);
27
28    //make the ball bounce off the paddles
29    ball.bounceOff(playerPaddle);
30    ball.bounceOff(computerPaddle);
31
```

Output:
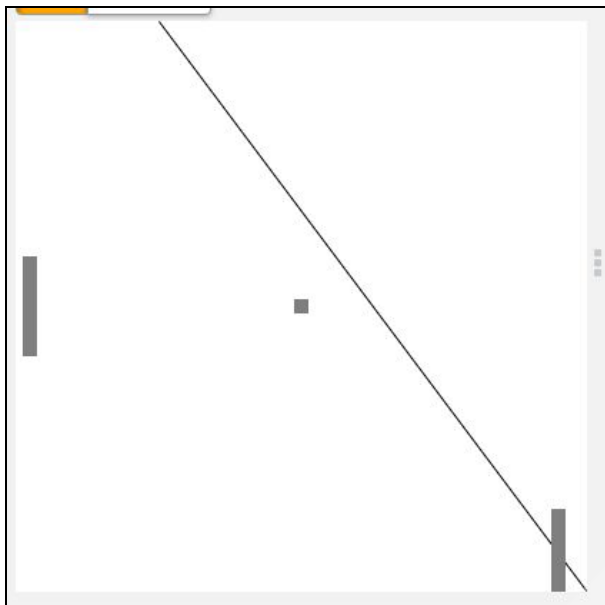
	"Let's make changes to the second number and run the code again"	*Student observes*
	Teacher changes the second number and runs the code.	
	"What happened to the line?"	**ESR:** The starting point of the line shifted - in the vertical direction.
	"What do you think the second number stands for?"	**ESR:** The vertical position of the starting point of the line.

Code:

```
 2  var ball = createSprite(200,200,10,10);
 3  var playerPaddle = createSprite(380,200,10,70);
 4  var computerPaddle = createSprite(10,200,10,70);
 5
 6
 7
 8- function draw() {
 9    //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19
20    line(100, 100, 400, 400);
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
```

Output:

	"Can we make a guess, what the third and fourth numbers stand for?"	**ESR:** The horizontal and vertical position of the end point of the line.
	"Let's check if your guess is right" Teacher modifies the third and the fourth numbers and runs the code.	*Student observes the output.*
	"I think our guess was right . So the first two numbers represent the x and y position of the starting point and the last two numbers represent the x and y position of the end point."	

Code:

```javascript
function draw() {
  //clear the screen
  background("white");

  //make the player paddle move with the mouse's y position
  playerPaddle.y = World.mouseY;

  //AI for the computer paddle
  //make it move with the ball's y position
  computerPaddle.y = ball.y;

  line(100, 100, 200, 400);

  //create edge boundaries
  //make the ball bounce with the top and the bottom edges
  createEdgeSprites();
  ball.bounceOff(topEdge);
  ball.bounceOff(bottomEdge);

  //make the ball bounce off the paddles
  ball.bounceOff(playerPaddle);
  ball.bounceOff(computerPaddle);

  //serve the ball when space is pressed
```
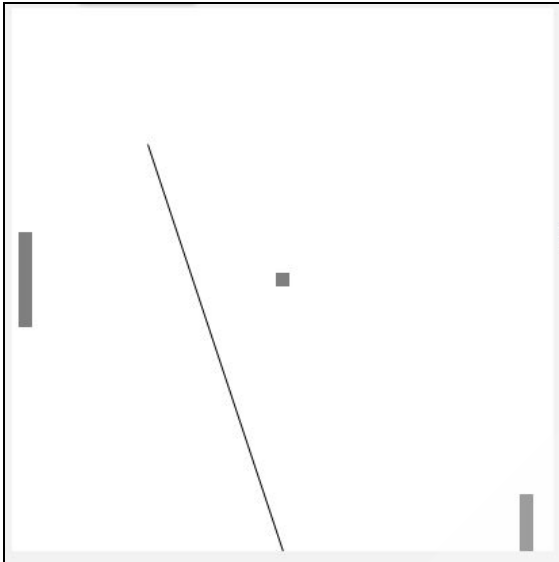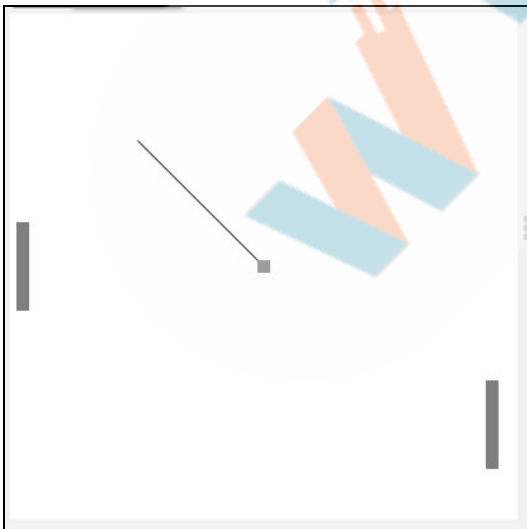
Output:

Code:

```
 7
 8 - function draw() {
 9      //clear the screen
10      background("white");
11
12      //make the player paddle move with the mouse's y position
13      playerPaddle.y = World.mouseY;
14
15      //AI for the computer paddle
16      //make it move with the ball's y position
17      computerPaddle.y = ball.y;
18
19
20      line(100, 100, 200, 200);
21
22      //create edge boundaries
23      //make the ball bounce with the top and the bottom edges
24      createEdgeSprites();
25      ball.bounceOff(topEdge);
26      ball.bounceOff(bottomEdge);
27
28      //make the ball bounce off the paddles
29      ball.bounceOff(playerPaddle);
30      ball.bounceOff(computerPaddle);
31
```

Output:

	"Let's now draw a simple line at the centre of the screen. Assist the student to get values using the grid. What do you think will be the x and y position of the starting point?"	**ESR:** x =200 y = 0
	What do you think will be the x and y position of the ending point?"	**ESR:** x = 200 y = 400
	"Let's put these numbers inside the line() instruction and run the code to see if we get the line at the centre." Teacher changes the numbers and runs the code.	*The student observes and learns.*
Code:		

```
 8 - function draw() {
 9    //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19
20    line(200, 0, 200, 400);
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
```

Output:
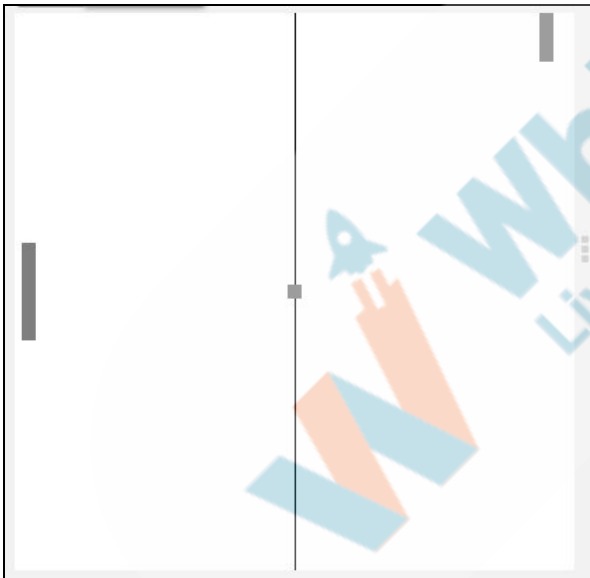
	"We have the line in the centre now....but we wanted a dashed line instead of a continuous line, didn't we? Like a net?"	**ESR:** yes
	"How do we do that?"	**ESR:** We use many lines.

|		
	"Let's try to draw the first dash. Let's make our dash line's height to be 10 and leave a gap of 10 after every dash line." "What will be the instruction to draw the first dash?" *Teacher modifies the line instruction to:* line (200,0,200,10); *Teacher runs the code to display the first dash.*	**ESR:** line (200, 0, 200, 10)
Code:		

```
4   var computerPaddle = createSprite(10,200,10,70);
5
6
7
8 ▾ function draw() {
9       //clear the screen
10      background("white");
11
12      //make the player paddle move with the mouse's y position
13      playerPaddle.y = World.mouseY;
14
15      //AI for the computer paddle
16      //make it move with the ball's y position
17      computerPaddle.y = ball.y;
18
19
20      line(200, 0, 200, 10);
21
22      //create edge boundaries
23      //make the ball bounce with the top and the bottom edges
24      createEdgeSprites();
25      ball.bounceOff(topEdge);
26      ball.bounceOff(bottomEdge);
27
28      //make the ball bounce off the paddles
29      ball.bounceOff(playerPaddle);
30      ball.bounceOff(computerPaddle);
31
32      //serve the ball when space is pressed
33      if (keyDown("space")) {
```

Output:
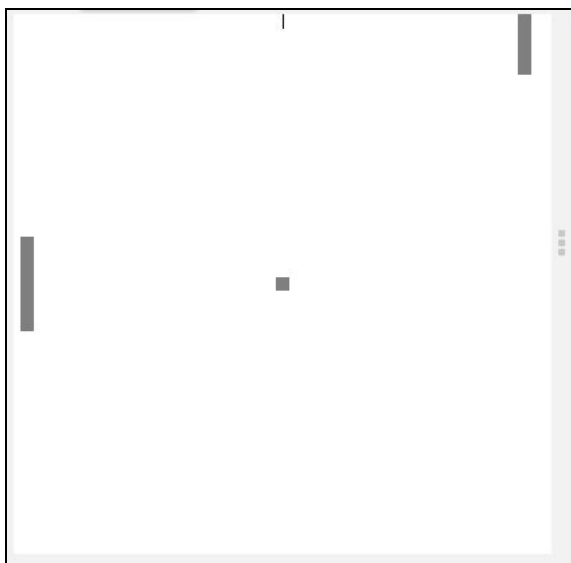
	"How will we display the second dash?"	**ESR:** We will use a second line instruction.
	"What will be x and y position of the starting point and the end point? Remember we are leaving a gap of 10 after the first dash"	**ESR:** line(200, 20, 200, 30)
	"We can also write: line(200, 0+20, 200, 0+20+10)"	
	"The computer will do the calculation for us. Let's run the code and see if we get the second dash in the right place."	*Student observes the output.*
	Teacher writes and runs the code.	
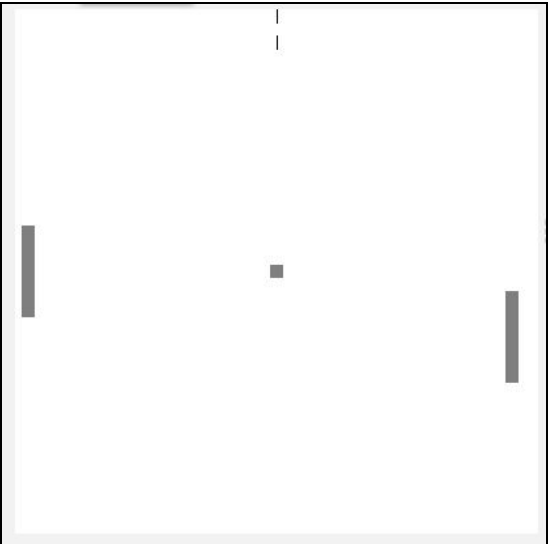
Code:

```
10     background("white");
11
12     //make the player paddle move with the mouse's y position
13     playerPaddle.y = World.mouseY;
14
15     //AI for the computer paddle
16     //make it move with the ball's y position
17     computerPaddle.y = ball.y;
18
19
20     line(200, 0, 200, 10);
21     line(200,0+20,200,0+20+10);
22
23     //create edge boundaries
24     //make the ball bounce with the top and the bottom edges
25     createEdgeSprites();
26     ball.bounceOff(topEdge);
27     ball.bounceOff(bottomEdge);
28
29     //make the ball bounce off the paddles
30     ball.bounceOff(playerPaddle);
31     ball.bounceOff(computerPaddle);
32
33     //serve the ball when space is pressed
34 -   if (keyDown("space")) {
35       ball.velocityY = 3;
36       ball.velocityX = 4;
37     }
38
```

Output:

	"Let's draw the third dash. What should be the instruction to the computer? Remember we need a dash which is after a gap of 10 and has a 10 height" "Let's try and see if we get the third dash using this instruction." *Teacher writes and runs the code.*	**ESR:** line(200, 0+20+20, 200, 0+20+20+10)
Code:		

```
  /
8 - function draw() {
9     //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19
20
21    line(200,0,200,0+10);
22    line(200,0+20,200,0+20+10);
23    line(200,0+20+20,200,0+20+20+10);
24    |
25
26    //create edge boundaries
27    //make the ball bounce with the top and the bottom edges
```

Output:
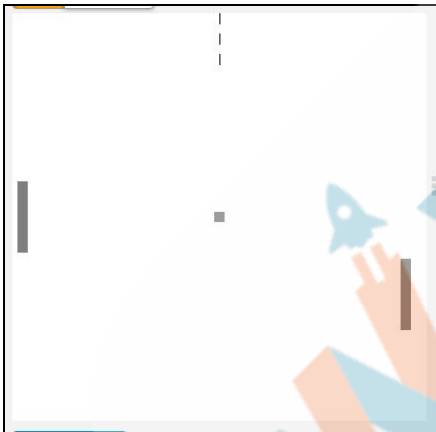
	"If you observe carefully, what's happening is that we are just adding 20 to the y position for both the starting and ending point for drawing each new dash. Do you see that?" Let's add some more dashes using this:	**ESR:** Yes!

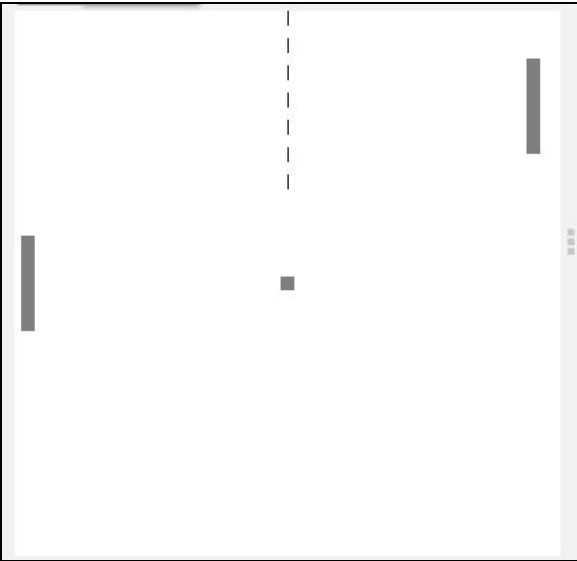| | | *Teacher adds 5 new dashes* | |

Code:

```
12     //make the player paddle move with the mouse's y position
13     playerPaddle.y = World.mouseY;
14
15     //AI for the computer paddle
16     //make it move with the ball's y position
17     computerPaddle.y = ball.y;
18
19
20
21     line(200,0,200,0+10);
22     line(200,0+20,200,0+20+10);
23     line(200,0+20+20,200,0+20+20+10);
24     line(200,0+20+20+20,200,0+20+20+20+10);
25     line(200,0+20+20+20+20,200,0+20+20+20+20+10);
26     line(200,0+20+20+20+20+20,200,0+20+20+20+20+20+10);
27     line(200,0+20+20+20+20+20+20,200,0+20+20+20+20+20+20+10);
28
29     //create edge boundaries
30     //make the ball bounce with the top and the bottom edges
31     createEdgeSprites();
32     bounceOff(topEdge, bottomEdge, playerPaddle,computerPaddle);
33
34
35     //serve the ball when space is pressed
36 -   if (keyDown("space")) {
37       ball.velocityY = 3;
38       ball.velocityX = 4;
39     }
40
```

Output:

| | "We can keep doing this, but I am getting a familiar unpleasant feeling similar to writing 'I will never be late to school.' Why is that?"

"Yes! We are repeating ourselves. And remember in programming we have an important principle - DRY - Do not repeat yourself. A good code avoids repetition.

Let us be good programmers and avoid repetition." | **ESR:**
Because we are repeating ourselves? |
| | "What if we had a number which would automatically increase itself by 20, then we could just write:
line(200, num, 200, num +10)

Explanation:
Assume **num** (y position of the starting point) automatically increases by 20
num + 10 (y position of the end point) makes the line of length 10. | - |

We would want the number to keep increasing till we reach the end of the screen and we would want the line() instruction to run for each increase. "
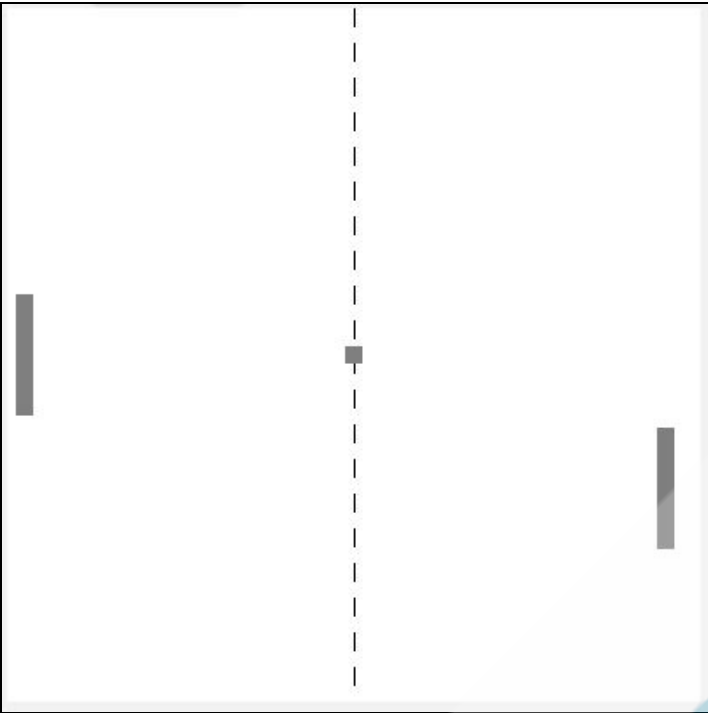
```
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19
20
21    line(200,num, 200, num+10);
22
23    //create edge boundaries
24    //make the ball bounce with the top and the bottom edges
25    createEdgeSprites();
26    bounceOff(topEdge, bottomEdge, playerPaddle,computerPaddle);
27
28
29    //serve the ball when space is pressed
30 -  if (keyDown("space")) {
31      ball.velocityY = 3;
32      ball.velocityX = 4;
33    }
34
35
36    //reset the ball to the centre if it crosses the screen
37 -  if(ball.x > 400 || ball.x <0) {
38      ball.x = 200;
39      ball.y = 200;
40      ball.velocityX = 0;
41      ball.velocityY = 0;
```

"We have something in our toolbox to give this instruction to a computer! We use something called for-loop to do it."

Teacher drags and drops the for-loop inside draw().

Inside for loop:
"We tell the computer:

- Store the number 0 in num
  var num = 0;
- Keep increasing the number in num by 20
  num = num + 20;
- Each time the number is increased in num, run the instruction: line(200, num, 200, num+10)
  line(200, num, 200, num + 10);
- Stop increasing the number when the number inside num becomes 400
  num < 400"

"This is called a for-loop because the computer keeps running the same instructions inside the curly brackets (again and again and again) till the condition num < 400 is true."

What do you think will happen if we run the code?

Allow the student to experiment with the different numbers and see what happens or how the output changes.

Student takes a guess at what the output would be.

Code:

```
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19 ▾  for (var num = 0; num < 400; num = num +20) {
20      line(200,num, 200, num+10);
21    }
22
23
24
25    //create edge boundaries
26    //make the ball bounce with the top and the bottom edges
27    createEdgeSprites();
28    bounceOff(topEdge, bottomEdge, playerPaddle,computerPaddle);
```

	"Let's run the code and find out..."	*The student observes and learns.*
	"We have what we want!!"	

Output:

| | "One final thing. Remember, our code should read like a story? Right now, this for-loop is not very readable. If someone else reads this - would they know that this draws a net?" | ESR: No |
| | "Wouldn't it be nice, if we could just tell the computer - drawnet() - and it draws the net?" | ESR: Yes / Will the computer understand? |

```
 8 ▾ function draw() {
 9     //clear the screen
10     background("white");
11
12     //make the player paddle move with the mouse's y position
13     playerPaddle.y = World.mouseY;
14
15     //AI for the computer paddle
16     //make it move with the ball's y position
17     computerPaddle.y = ball.y;
18
19   drawnet();
20
21 ▾ for (var num = 0; num < 400; num = num +20) {
22     line(200,num, 200, num+10);
23   }
24
25   |
```

	"We can actually teach the computer to draw the net using drawnet(). We do that by defining a function drawnet which tells the computer how to draw the net."	*The student listens, observes and learns.*
	We define a function for a computer like this:	
	Teacher defines the drawnet() function.	
	We put instructions to draw the net inside this function.	

```
26    //serve the ball when space is pressed
27-   if (keyDown("space")) {
28      ball.velocityY = 3;
29      ball.velocityX = 4;
30    }
31
32
33    //reset the ball to the centre if it crosses the screen
34-   if(ball.x > 400 || ball.x <0) {
35      ball.x = 200;
36      ball.y = 200;
37      ball.velocityX = 0;
38      ball.velocityY = 0;
39    }
40
41    ball.bounceOff(topEdge);
42    ball.bounceOff(bottomEdge);
43    ball.bounceOff(playerPaddle);
44    ball.bounceOff(computerPaddle);
45
46    drawSprites();
47  }
48
49-  function drawnet() {
50
51-    for (var num = 0; num < 400; num = num +20) {
52      line(200,num, 200, num+10);
53    }
54
55  }
```

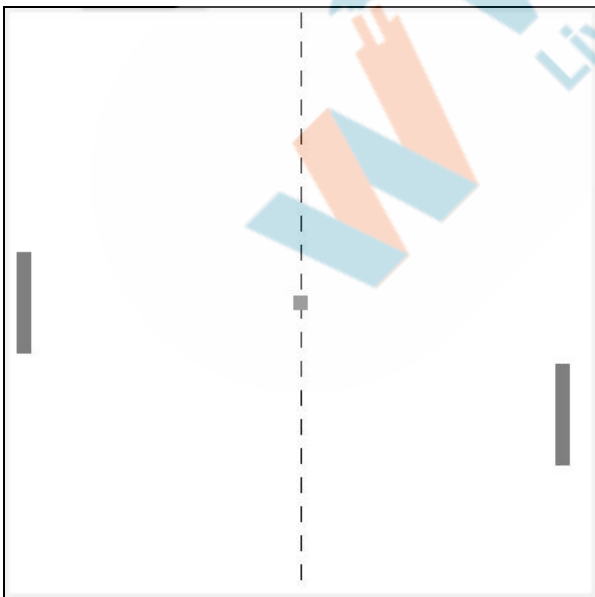| | "What do you think will happen if we run the code now?" | *Student takes a guess.* |
| | "Let us run and find out" | |
| | Our computer knows how to draw a net using drawnet() now. It also makes our code more readable. Don't you think so? | **ESR:**
Yes! |

Code:

```
8 ▾ function draw() {
9     //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19    drawnet();
20
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
24    createEdgeSprites();
25
26    //serve the ball when space is pressed
27 ▾  if (keyDown("space")) {
28      ball.velocityY = 3;
29      ball.velocityX = 4;
30    }
```

Output:

	Ok! Now I want you to draw the net on your own using for-loop. Also, I want you to define functions for drawnet(), serveball() and resetball() and use it in your code to make it more readable. Ready for the challenge?	**ESR:** Yes!

<div style="background:red">

Teacher Stops Screen Share

</div>

<div style="background:green">

Teacher starts slideshow 🖼️ **:Slides 15-17**

</div>

Run the presentation for slides 15-17 to set the student activity context.

Now it's your turn. Please share your screen with me.

<div style="background:green">

Teacher ends slideshow 🖼️

</div>

<div style="background:yellow">

- **Ask Student to press ESC key to come back to panel**
- **Guide Student to start Screen Share**
- **Teacher gets into Fullscreen**

</div>

<div style="background:peach">

ACTIVITY
- **Implement for-loop to draw the net at the centre of the screen.**
- **Write custom functions to draw the net, serve the ball and reset the ball.**

</div>

Step 3: Student-Led Activity (20 min)	Guide the student to draw the net using for-loop. Observe the student for typos.	*Student opens Student Activity Link* *The student writes for-loop to draw the net.*

Code:

```
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19 ▾  for (var num = 0; num < 400; num = num +20) {
20      line(200,num, 200, num+10);
21    }
22
23
24
25    //create edge boundaries
26    //make the ball bounce with the top and the bottom edges
27    createEdgeSprites();
28    bounceOff(topEdge, bottomEdge, playerPaddle,computerPaddle);
29
```

	Guide the student to write a function drawnet() and use it in their program.	*The student writes the drawnet() function and uses it in their code.*
	Observe the student for typos.	*Student runs the code and sees the output.*

Code:

```
//serve the ball when space is pressed
if (keyDown("space")) {
    ball.velocityY = 3;
    ball.velocityX = 4;
}


//reset the ball to the centre if it crosses the screen
if(ball.x > 400 || ball.x <0) {
    ball.x = 200;
    ball.y = 200;
    ball.velocityX = 0;
    ball.velocityY = 0;
}

ball.bounceOff(topEdge);
ball.bounceOff(bottomEdge);
ball.bounceOff(playerPaddle);
ball.bounceOff(computerPaddle);

drawSprites();
}
function drawnet() {

    for (var num = 0; num < 400; num = num +20) {
    line(200,num, 200, num+10);
    }

}
```

Calling the function:

```
1   //create the ball, playerPaddle and computerPaddle as sprite
2   var ball = createSprite(200,200,10,10);
3   var playerPaddle = createSprite(380,200,10,70);
4   var computerPaddle = createSprite(10,200,10,70);
5
6
7
8 - function draw() {
9     //clear the screen
10    background("white");
11
12    //make the player paddle move with the mouse's y position
13    playerPaddle.y = World.mouseY;
14
15    //AI for the computer paddle
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19  drawnet();
20
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
24    createEdgeSprites();
25
26    //serve the ball when space is pressed
27 -  if (keyDown("space")) {
28      ball.velocityY = 3;
29      ball.velocityX = 4;
30    }
```

	"Let's write functions to serveball() and resetball() and use it in our code so that our code becomes more readable."	
	"Can you locate the place where we serve the ball in the game?"	
	Help the student locate the place in the game where the ball is served.	*The student tries to locate the place where the ball is served in the game.*

```
16    //make it move with the ball's y position
17    computerPaddle.y = ball.y;
18
19   drawnet();
20
21
22    //create edge boundaries
23    //make the ball bounce with the top and the bottom edges
24    createEdgeSprites();
25
26    //serve the ball when space is pressed
27 -  if (keyDown("space")) {
28      ball.velocityY = 3;
29      ball.velocityX = 4;
30    }
31
32
33    //reset the ball to the centre if it crosses the screen
34 -  if(ball.x > 400 || ball.x <0) {
35      ball.x = 200;
36      ball.y = 200;
37      ball.velocityX = 0;
38      ball.velocityY = 0;
39    }
40
41    ball.bounceOff(topEdge);
42    ball.bounceOff(bottomEdge);
43    ball.bounceOff(playerPaddle);
44    ball.bounceOff(computerPaddle);
45
```

	"Let's put serveball() there and define a function to serve the ball "	*The student writes a function to serve the ball and uses it in the code.*
	Guide the student to write the function serveball() and use it in their program. Observe the student for typos.	*Student runs the code and sees the output.*

Code:

```
30
31
32      //reset the ball to the centre if it crosses the screen
33 ▾    if(ball.x > 400 || ball.x <0) {
34        ball.x = 200;
35        ball.y = 200;
36        ball.velocityX = 0;
37        ball.velocityY = 0;
38      }
39
40      ball.bounceOff(topEdge);
41      ball.bounceOff(bottomEdge);
42      ball.bounceOff(playerPaddle);
43      ball.bounceOff(computerPaddle);
44
45      drawSprites();
46    }
47
48 ▾ function drawnet() {
49
50 ▾    for (var num = 0; num < 400; num = num +20) {
51        line(200,num, 200, num+10);
52      }
53
54    }
55
56 ▾ function serveball() {
57      ball.velocityY = 3;
58      ball.velocityX = 4;
59    }
```

Using the function inside the program:

```
 8 - function draw() {
 9      //clear the screen
10      background("white");
11
12      //make the player paddle move with the mouse's y position
13      playerPaddle.y = World.mouseY;
14
15      //AI for the computer paddle
16      //make it move with the ball's y position
17      computerPaddle.y = ball.y;
18
19    drawnet();
20
21
22      //create edge boundaries
23      //make the ball bounce with the top and the bottom edges
24      createEdgeSprites();
25
26      //serve the ball when space is pressed
27 -    if (keyDown("space")) {
28        serveball();
29      }
30
31
32      //reset the ball to the centre if it crosses the screen
33 -    if(ball.x > 400 || ball.x <0) {
34        ball.x = 200;
35        ball.y = 200;
36        ball.velocityX = 0;
37        ball.velocityY = 0;
```

	"Let's locate the place where we reset the ball in the game" *Help the student locate the place in the game where the ball is reset.*	*The student tries to locate the place where the ball is reset in the game.*

Code:

```
17      computerPaddle.y = ball.y;
18
19    drawnet();
20
21
22      //create edge boundaries
23      //make the ball bounce with the top and the bottom edges
24      createEdgeSprites();
25
26      //serve the ball when space is pressed
27 -    if (keyDown("space")) {
28        serveball();
29      }
30
31
32      //reset the ball to the centre if it crosses the screen
33 -    if(ball.x > 400 || ball.x <0) {
34        ball.x = 200;
35        ball.y = 200;
36        ball.velocityX = 0;
37        ball.velocityY = 0;
38      }
39
40      ball.bounceOff(topEdge);
41      ball.bounceOff(bottomEdge);
42      ball.bounceOff(playerPaddle);
43      ball.bounceOff(computerPaddle);
44
45      drawSprites();
46    }
```

	"Let's put resetball() there and define a function to reset the ball "	The student writes a function to reset the ball and uses it in the code.
	Guide the student to write the function resetball() and use it in their program. Observe the student for typos.	*Student runs the code and sees the output.*

Code:

```
34        resetball();
35      }
36
37      ball.bounceOff(topEdge);
38      ball.bounceOff(bottomEdge);
39      ball.bounceOff(playerPaddle);
40      ball.bounceOff(computerPaddle);
41
42      drawSprites();
43  }
44
45 - function drawnet() {
46
47 -    for (var num = 0; num < 400; num = num +20) {
48       line(200,num, 200, num+10);
49    }
50
51  }
52
53 - function serveball() {
54      ball.velocityY = 3;
55      ball.velocityX = 4;
56  }
57
58 - function resetball() {
59      ball.x = 200;
60      ball.y = 200;
61      ball.velocityX = 0;
62      ball.velocityY = 0;
63  }
```

Using the function in the program:

```
18
19   drawnet();
20
21
22   //create edge boundaries
23   //make the ball bounce with the top and the bottom edges
24   createEdgeSprites();
25
26   //serve the ball when space is pressed
27-  if (keyDown("space")) {
28     serveball();
29   }
30
31
32   //reset the ball to the centre if it crosses the screen
33-  if(ball.x > 400 || ball.x <0) {
34     resetball();
35   }
36
37   ball.bounceOff(topEdge);
38   ball.bounceOff(bottomEdge);
39   ball.bounceOff(playerPaddle);
40   ball.bounceOff(computerPaddle);
41
42   drawSprites();|
43 }
44
45- function drawnet() {
46
47-   for (var num = 0; num < 400; num = num +20) {
48
```

	"Do you think our code is more readable now?" "We have learned a great deal in today's class. Let's wrap up the class for today."	ESR: Yes
Teacher Guides Student to Stop Screen Share		

Quiz time - Click on in-class quiz	
Question	**Answer**

What is the correct syntax of for-loop
 	
A. for (condition test;initialization; increment or decrement) {
//Statements to be executed repeatedly
}
 	
B. for (initialization; condition test;increment or decrement)
{
//Statements to be executed repeatedly
}
 	
C. for (condition test;increment or decrement)
{
//Statements to be executed once
}
 	
D. for (initialization; increment or decrement)
{
//Statements to be executed repeatedly
}
	B

What must the change be so that the following fragment prints out the even integers 0 5 10 15 20?
for (int j = 0; j <= 20; _____){
console.log(j + " ");
}
 	
A. j+5
B. j = j+5
C. J+++++
	B

D. j	

WRAP UP SESSION - 5 Mins

Teacher starts slideshow **Slide 18-24**

Activity details	Solution/Guidelines
Run the presentation from slide 18 to slide 24 **Following are the warm up session deliverables:** ● **Explain the facts and trivias** ● **Next class challenge** ● **Project for the day** ● **Additional Activity**	Guide the student to develop the project and share with us.

Teacher ends slideshow

| Project Overview | **Note:** This is a tiered project with multiple tasks. All students must do the main task. The main task is very similar to the projects that are already live. Each tiered project has two or more additional tasks which are optional.

VEGETABLE GARDEN - 1

Goal of the Project:
In todays you learned to create abstractions in your code by declaring functions. You also learned to replace repetitive code with a for-loop. | *Students engage with the teacher over the project.* |

	In this project, you will have to practice and apply what you have learned in the class and create the layout of a farm.	
	Story:	
	Richard is a hardworking and dedicated farmer. He is always experimenting with new farming methods and now he wants to grow new crops on his farm.	
	Help Richard set the locations of the plants in rows as shown in the image on the right. Each gray square is the position of a plant.	
	I am very excited to see your project solution and I know you will do really well.	
	Bye Bye!	

Teacher Clicks

× End Class

Additional Activities	"Let's start a new project and write "I will never repeat myself" - 20 times using for-loop. This might help us remember the Do Not Repeat Yourself (DRY) principle of writing code."	*The student tries to write code for writing "I will never repeat myself" - 20 times on the screen using for-loop.*
	Guide the student to write the code for "I will never repeat myself" - 20 times - using for loop.	

Code:

```
1  function draw() {
2    for (var i=0; i<20; i++) {
3      text("I will never repeat myself", 0 ,15+ (20*i));
4    }
5  }
6
```

Output:

```
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
I will never repeat myself
```

Activity	Activity Name	Links
Teacher Activity 1	Pong Stage 2	https://studio.code.org/projects/gamelab/pI8hRqjNi-eUH11vHtPFDAOwWvjIUU350S5Thk-57Zc/edit
Student Activity 1	Pong Stage 2	https://studio.code.org/projects/gamelab/pI8hRqjNi-eUH11vHtPFDAOwWvjIUU350S5Thk-57Zc/edit
Additional Activity 1	Empty Activity	https://studio.code.org/projects/gamelab/D2YMjkHmDuWWRAnFULECsNU6_XQ-Ca58I7hmgSXuEGQ/edit
Teacher Reference visual aid link	Visual aid link	https://curriculum.whitehatjr.com/Visual+Project+Asset/PRO_VD/C5withclue.html
Teacher Reference In-class quiz	In-class quiz	https://curriculum.whitehatjr.com/Visual+Project+Asset/PRO_VD/PRO-C5_Jayshree.docx.pdf