

What will we be learning in this Lesson?

- We will be reinforcing our knowledge of `if()` statements.
- We will learn how to give objects restraints using `if()` statements.
- Introduce more logic symbols that we can use in our code.

End Conditions:

All of the programs that we have made so far will run indefinitely. They won't stop unless we press the stop button. In this lesson, we're going to learn how to write an ending to our programs. We create these end conditions using `if()` statements and `booleans`.

Task:

In this task, we will use `if()` statements to make a ball move with the keys 'W' 'A' 'S' 'D' and make it stop when it hits the sides. The incomplete code is an example of an end condition, which stop the ball from going off the side of the screen,

1. Copy the incomplete program to the right. Add code so that a circle will move up the screen if the W key is pressed.

2. Add the rest of the direction controls, so the circle can move in all directions.

3. Finish off the end conditions for the sides. You'll need to do something similar to the if statement to the right, but adapt it for the other sides.

4. Make the background change colour when you click the mouse.

5. Make the circle change colour when it hits a wall.

```
float ballXPos = 100;
float ballYPos = 100;

void setup() {
  size(500, 500);
}

void draw() {
  if (ballYPos <= 50) {
    ballYPos = 50;
  }
}
```

Bonus Task:

Add a reset button to make the circle go back to the centre on a key press.

Logical symbols:

In the previous task, we were introduced to a new logic symbol. The \leq symbol is the “less than or equal to” symbol. The table below has some of the other common logic symbols.

Condition	Meaning	When is it true?
$==$	Equals	Both sides are equal
\neq	Not equals	Both sides aren't equal
$>$	Greater Than	The left hand side is greater than the right
$<$	Less Than	The left hand side is less than the right
\geq	Greater Than or equal to	The left hand side is greater or equals the right
\leq	Less than or equal to	The left hand side is less than or equals the right
$\&\&$	And	When the both conditions are true
$\ \ $	Or	When at least one of the conditions is true

The last two symbols are used for more complicated if statements. We won't use them much for now, but there's no harm in starting to familiarise yourself with them.

Task:

1. Create a program that will show an ellipse when a button is pressed and a rectangle when it's not being pressed. You must use some of the logic symbols above.
2. Make the shape move around the screen using the keys.
3. Change the colours of the shape depending on what side of the screen it's on. For example, if it on the right hand side it will be red, on the left it will be blue.

Bonus task:

If a circle is being drawn **and** it's on the left side of the screen, change the background colour. It may be helpful to use a boolean.

Questions for the end of the lesson?

- What is an end condition?
- Name some of the logic symbols used in processing.