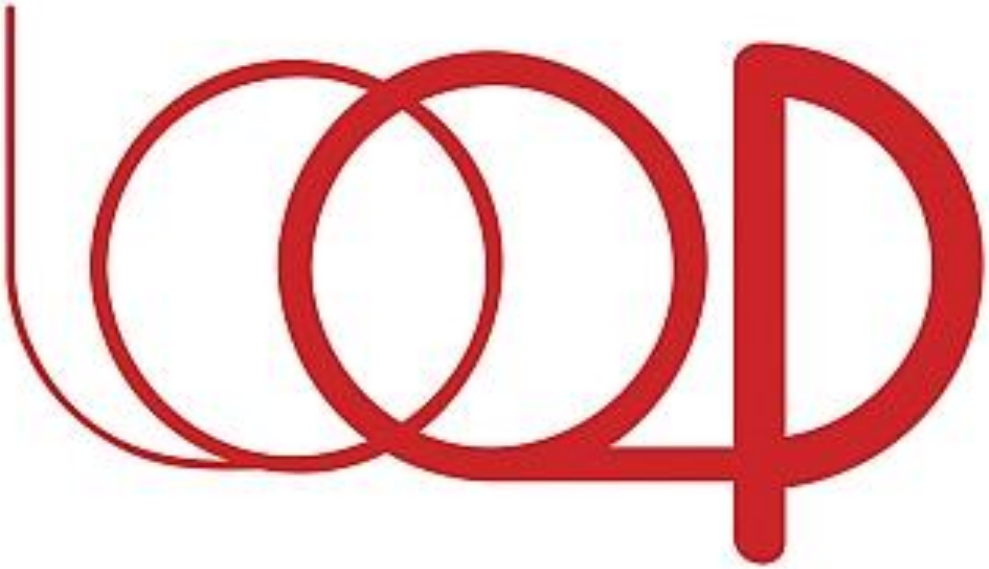


Specifically, For Loops!

Loops

- Repetition statements (unlike ifs; ifs decide things, loops repeat them)
- Control structures (like ifs, both have Boolean expressions that change the flow of the code)
- Inside of cutting and pasting our code over and over, we use a loop. It will run the code multiple times.
- There is no such thing as an ifloop. There are ifs and there are loops.

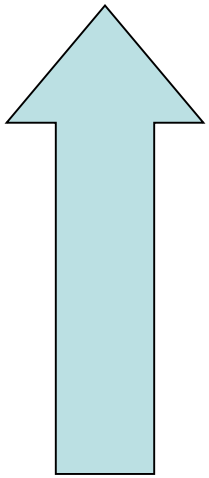
Java's Loops

Java has three kinds:

- For Loops (for a set number of times)
- While Loops (until something happens)
- Do While Loops (discover on your own for the project)

THIS is a loop:

```
for (int i = 0 ; i < 10 ; i++)
{
      System.out.print (i + " ");
}
```



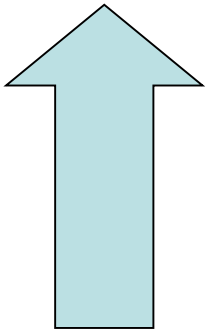
That thing = Loop

THIS is a loop:

```
for (int i = 0 ; i < 10 ; i++)
{
        System.out.print (i + " ");
}
```

It prints THIS on the screen.

```
0 1 2 3 4 5 6 7 8 9
```



THIS is a loop:

Start

End

```
for (int i = 0 ; i < 10 ; i++)
{
        System.out.print (i + " ");
}
```

Up by one

It prints THIS on the screen.

Here is another:

```
for (int i = 1 ; i < 6 ; i++)
{
      System.out.print (i + " ");
}
```

Here is another:

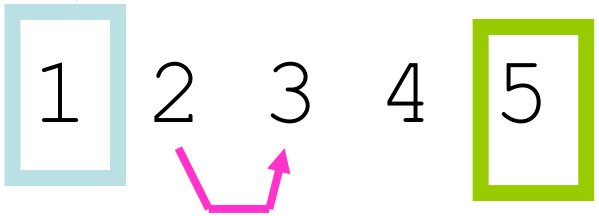
Start

End

```
for (int i = 1 ; i < 6 ; i++)
{
        System.out.print (i + " ");
}
```

Up by one

It prints THIS on the screen.



Here is yet another:

```
for (int i = 10 ; i > 0 ; i--)
{
      System.out.print (i + " ");
}
```

Here is yet another:

Start End

```
for (int i = 10 ; i > 0 ; i--)
{
        System.out.print (i + " ");
}
```

Down by one

It prints THIS on the screen.

THE loop

OK, another:

```
for (int i = 1 ; i < 20 ; i+=3)
{
      System.out.print (i + " ");
}
```

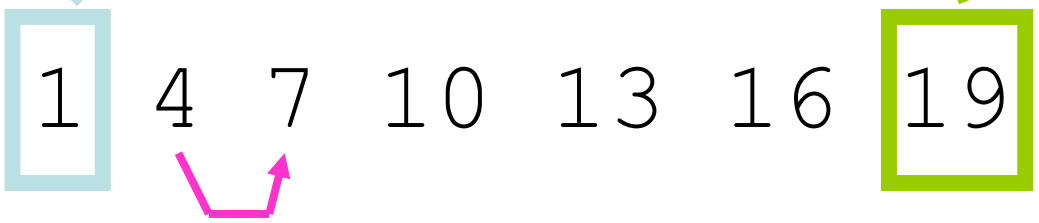
OK, another:

Start End

```
for (int i = 1 ; i < 20 ; i+=3)
{
        System.out.print (i + " ");
}
```

Up by three

It prints THIS on the screen.




The
pieces
of a
loop

The pieces of a loop

```
for ( int i = 1 ; i < 20 ; i+=3 )
{
    System.out.print (i + " ");
}
```

1. **Initialize the loop variable**
2. **Test the stopping condition**
3. **Move towards the stopping condition**
4. **Steps to repeat**

Errors in the Parts of a Loop

- All of the parts of a loop have to be present and they have to work together.
- If they aren't then,
  - The loop might not run at all.
  - The loop might become an infinite loop and run forever


Tracing the
Running of
a Loop

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	

Output:

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T

Output:

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T

Output:

```
1
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	

Output:

```
1
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T

Output:

```
1
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T

Output:

```
1
6
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	

Output:

```
1

6
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T

Output:

```
1

6
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T

Output:

```
1
6
11
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	

Output:

```
1

6

11
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T

Output:

```
1

6

11
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T

Output:

```
1
6
11
16
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T
21	

Output:

```
1

6

11

16
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T
21	21<23 = T

Output:

```
1

6

11

16
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T
21	21<23 = T

Output:

```
1
6
11
16
21
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T
21	21<23 = T
26	

Output:

```
1
6
11
16
21
```

```
for (int i = 1 ; i < 23 ; i+=5)
{
      System.out.println (i + " ");
}
```

i's value	Test?
1	1<23 = T
6	6<23 = T
11	11<23 = T
16	16<23 = T
21	21<23 = T
26	26<23 = F

Output:

```
1

6

11

16

21
```