Java for Beginners

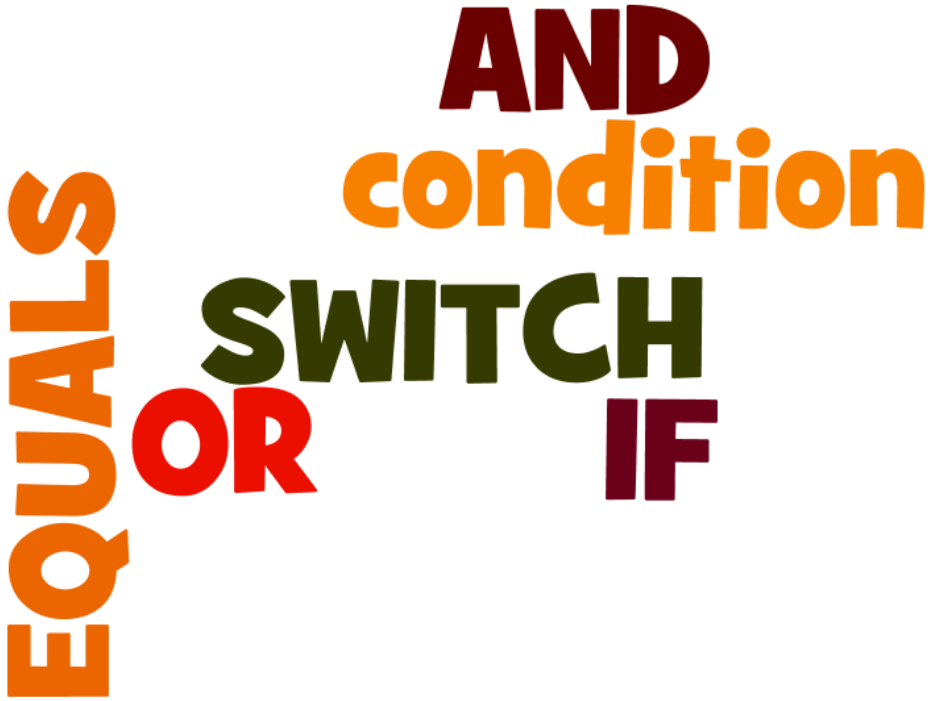
Level 4

Mr. Teasdale

Let’s review

- Show you teacher what you have done for the level 3 tasks
- Remember: comment your code as you work through the tasks. This will help develop your understanding of the different concepts as well as what each piece of code does

What do you learn last time?

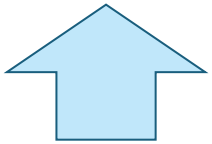


Wordle.org

Levels of Java coding

- 1: Syntax, laws, variables, output
- 2: Input, calculations, String manipulation
- 3: Selection (IF-ELSE)
- **4: Iteration/Loops (FOR/WHILE)**
- 5: Complex algorithms
- 6: Arrays
- 7: File management
- 8: Methods
- 9: Objects and classes
- 10: Graphical user interface elements

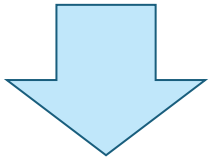
```
if(condition)
```



Condition is a logic check

something OPERATOR **something**

Example:



```
if(num == 3)
```

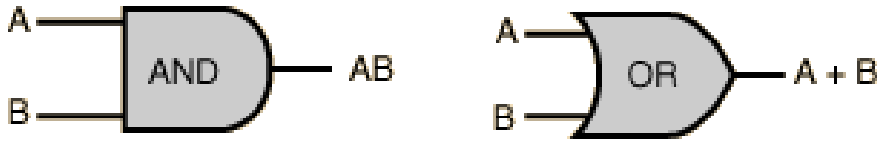
Logic operators in Java

Operator	Function	Example
`==`	equals (int, double, char, boolean)	`if(num==3)`
`.equals()`	equals (String)	`if(name.equals("Chris") )`
`>`	greater than	`if(num>20)`
`<`	less than	`if(num<15)`
`>=`	greater than or equal to	`if(age>=18)`
`<=`	less than or equal to	`if(age<=12)`
`!=`	not equal to	`if(married!=true)`

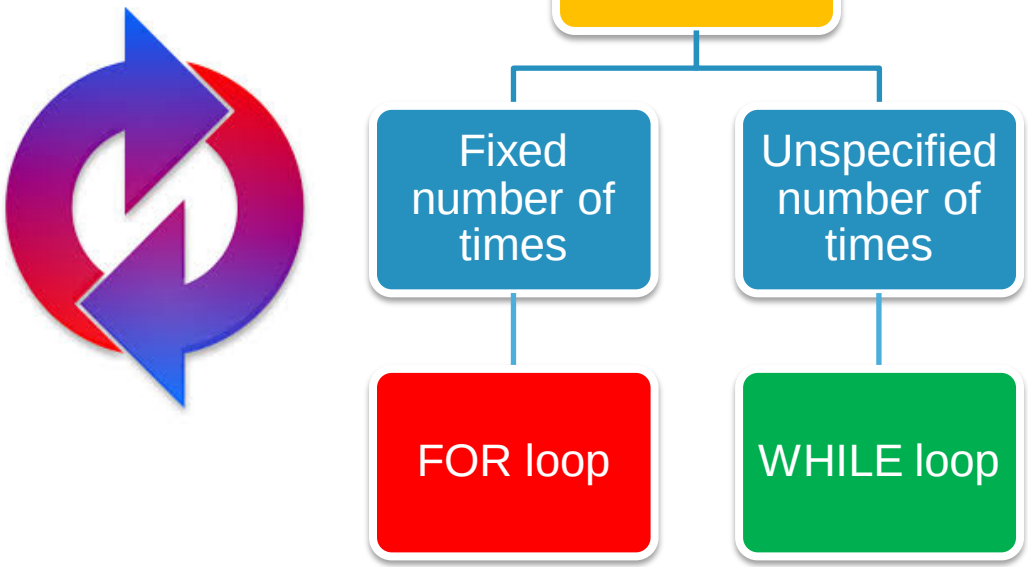
Warning! = does not mean ==

AND/OR

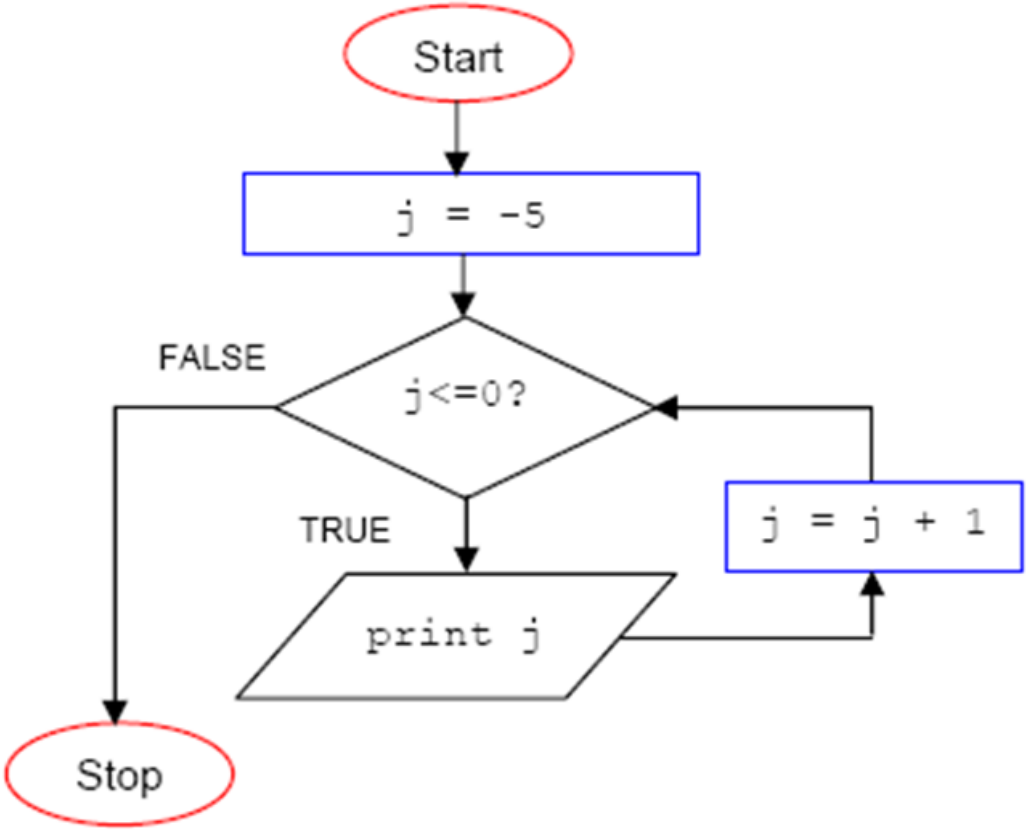
- AND in Java: **&&**
- OR in Java: **||**
- Used between conditions
  - **`if(num>3&&<12)`** ✗
  - **`if(num>3)&&(num<12)`** ✓



Types of iteration (loops)



Can you **predict** the **output**?



A simple variable (usually an int) that allows the loop to 'step through' Normally called "i"

A logic condition (like in IF) that has to be **true** for the loop to continue. **Something Operator Something** (usually involving the counter variable)

```
for(counter; condition; change)
```

What should happen to the **counter variable value** at the **end** of the loop Usually **i++** or **i--**

Typical example (*FOR loop*)

Create int called **i** Set **i** to **0**

Continue while **i** is **less than 3**

At end of for loop, **increase i by 1**

```
for(int i = 0; i<3; i++)
{
   System.out.println("X");
}
```

Output

```
X
X
X
```

Another example (*FOR loop*)

Create int called **i**
Set **i** to **0**

Continue while **i** is **less than 5**

At end of for loop, **increase i by 1**

```
for(int i = 0; i<5; i++)
{
   System.out.println(i);
}
```

Output

```
0
1
2
3
4
```

Predict the outcome (*FOR loop*)

What is the **counter** and **starting value**?

What is the **condition**?

What **change** happens?

```
for(int j = 2; j<10; j=j+2)
{
   System.out.println(j);
}
```

Output

```
2
4
6
8
```

Students struggle with…

EVERYTHING ABOUT LOOPS

Loops are an abstract construct. Lower ability students will need a LOT of simple practice.

Most common mistake:

```
for(int i = 0; i<5; i++);
```

FOR example

```
1  import java.util.*;
2  public class NumberCrunch
3  {
4      public static void main(String[] args)
5      {
6          Scanner kb = new Scanner (System.in);
7          System.out.print("Enter your favourite word > ");
8          String word = kb.nextLine();
9          System.out.println("Here is " + word + " 3 times!");
10         for (int i = 0; i < 4; i++)
11         {
12             System.out.println(word);
13         }
14         System.out.println("That's all folks!");
15     }
16 }
```

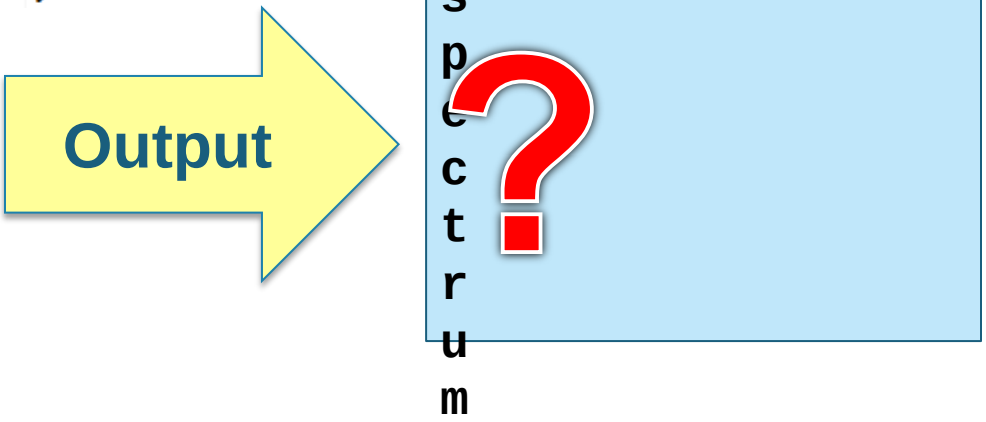
Can you spot the mistake?

Output

```
Enter your favourite word >
Cheese
Here is Cheese 3 times!
Cheese
Cheese
Cheese
Cheese
That's all folks!
```

FOR with .charAt(x)

```
1
2  public class NumberCrunch
3  {
4      public static void main(String[] args)
5      {
6          String word = "spectrum";
7          int size = word.length();
8          for (int i = 0; i < size; i++)
9          {
10             System.out.println(word.charAt(i));
11         }
12     }
13 }
```



Detour: **random numbers**

It can be very useful to make a random number in program.

Java has a many ways to do this.

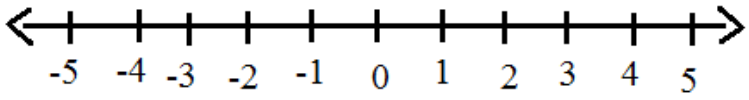
Most common way is **`Math.random()`**

Note: This is NOT an examinable bit, but it does teach logical thinking which IS examinable.

Making random numbers

`Math.random()` generates a random double number between **`0`** and **`1`**.
e.g. **`0.34212`**… or **`0.93813`**

To make **random int numbers** between say **1** and **10** (both included), we need to use a bit of maths.



Useful formula:

```
Min+(int)(Math.random()*((Max - Min) + 1))
```

Write down the **minimum number** and **maximum number** you need, and use the formula!

So let's make numbers between 1 and 10:

```
1 +(int)(Math.random()*((10 - 1) + 1))
```

FOR with random ints (A)

```
1  import java.util.*;
2
3  public class NumberCrunch
4  {
5      public static void main(String[] args)
6      {
7          int randint = 5 + (int) (Math.random() * ((20-5) + 1 ) );
8          for (int i = 0; i < 3; i++)
9          {
10             System.out.println(randint);
11         }
12     }
13 }
```

Output

17
?
17

FOR with random ints (B)

```
1  import java.util.*;
2
3  public class NumberCrunch
4  {
5      public static void main(String[] args)
6      {
7          for (int i = 0; i < 3; i++)
8          {
9              int randint = 5 + (int) (Math.random() * ((20-5) + 1 ) );
10             System.out.println(randint);
11         }
12     }
13 }
```

Output

19

12

?

Example task (advanced)

Write a java program that will generate a **random letter** of the alphabet 5 times.

Example output: **g u l x e**

```
1  import java.util.*;
2
3  public class NumberCrunch
4  {
5      public static void main(String[] args)
6      {
7          String alphabet = "abcdefg jklmnopqrstuvwxyz";
8
9          for (int i = 0; i < 5; i++)
10         {
11             int randint = 0 + (int) (Math.random() * ((26-0) + 1 ) );
12             System.out.print(alphabet.charAt(randint)+" ");
13         }
14     }
15 }
```

Over to you…

- Now it is your turn.
- Complete the tasks in your workbook
- Do tasks 1 and 2
- Complete extension iif finished