

# Introduction to Programming

*with Java, for Beginners*

Loops (while & for)

## A "Loop"

- A simple but powerful mechanism for "making lots of things happen!"
- Performs a statement (or block) over & over
- Usually set up to repeat an action until some condition is satisfied
- Computing Scenarios Examples
  - Run an application until user hits "quit" button
  - Deal card hands until game over

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## Syntax of the *while* statement

```
while (condition){  
    statement(s)  
}
```

- *condition* is a true/false (boolean) expression
- If *condition* is initially false, the statement is never executed
- If *condition* is true, *statement* is executed and *condition* is re-evaluated
- The *statement* should eventually make the loop stop

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## A *while* Loop to Print Numbers

```
// Print the numbers 1 thru 10  
int x = 1;  
while (x <= 10){  
    System.out.println(x);  
    x = x + 1;  
}
```

- What happens if you forget the statement  $x = x + 1$  ?
  - We print value 1 forever
  - Known as *infinite* loop

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## More *Infinite* Loops

```
// Some infinite loops are intentional
while (true){
    statement(s)
}

// Others are not
int x = 5;
while (x < 10){
    statement(s) which don't change x
}
```

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## Compute Square of first 10 numbers

```
//In Square.java
int num = 1;
int sqNum = 0;
while (num <= 10) {
    sqNum = num * num;
    System.out.println(num + " " + sqNum);
    num = num + 1;
}
```

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## *For* Loop

```
for (init; end-test; re-init){
    statement
}
```

- Executes loop body (statements within {}) as long as *end-test* evaluates to TRUE
- Initialization and re-initialization code included in loop statement
- Note: Test is evaluated **before** executing loop body

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## While vs. For

Code	Explanation
<pre>int x = 1; while (x &lt;= 10){     System.out.println(x);     x = x + 1; }</pre>	An example of a while loop that has this pattern
<pre>for (int x = 1; x &lt;= 10; x = x + 1){     System.out.println(x); }</pre>	A for loop that does the same thing

Note: *For* loops are used generally for bounded iteration

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## Summary of Loops

Type of Loop	Syntax
while	<pre>while (condition){     statement(s) }</pre>
for	<pre>for (expr1; condition; expr3){     statement(s) }</pre>