For Loop

- The most useful iterative loop

```plaintext
for (initialization; test; processing) {
    statement
}
```
For vs While Loop

```
for (initialization; test; processing)
{
    statement;
}
```

```
initialization;
while (test)
{
    statement;
    processing;
}
```
For Loop

- Example

```java
int i;
for (i = 0; i < 10; i++)
{
    System.out.println(i);
}
```
For Loop

Example

```java
int i = 0;
for (; i < 10; i++)
{
    System.out.println(i);
}
```
For Loop

- Example

```java
int i = 0;
for (; ;) {
    System.out.println(i);
    if (++i >= 10)
        break;
}
```
For Loop

- Example

```java
int i, j;
for (i = 0, j = 0; i < 10; i++, j++)
{
    System.out.printf("%d, %d\n", i, j);
}
```
For Loop

- Example

```java
int i, j;
for (i = 0; i < 10; i++)
    for (j = 0; j < 10; j++)
        System.out.printf("%d, %d\n", i, j);
```
Example

```java
int i, j, k;
for (i = 0; i < 10; i++)
    for (j = 0; j < 10; j++)
        for (k = 0; k < 10; k++)
            System.out.printf("%d, %d, %d\n", i, j, k);
```
Break and Continue

- **Break**
  - Stop the iteration

- **Continue**
  - In the for, control passes to the increment step

```java
int i;
for (i = 0; i < 50; i++)
{
    if (i % 2) // skip odd numbers
        continue;
    // do something for even numbers
    System.out.println(i);
}
```
Do-while Loop

- While **WHILE** and **FOR** loop test the termination condition at the top, **DO-WHILE** loop tests at the bottom after making statements.

```c
do
{
    statement
}while(expression);
```
Do-while Loop

```
statement

TRUE

test

FALSE
```
For vs While vs Do-while Loop

**For Loop**

```plaintext
for (initialization; test; processing) {
    statement;
    processing;
}
```

**While Loop**

```plaintext
while (test) {
    statement;
    processing;
}
```

**Do-while Loop**

```plaintext
Initialization;
if (test) {
    Do {
        statement;
        processing;
    }while(test);
}
```
Do-while Loop

- Example

```java
int i = 0;
do {
    System.out.println(i += 2);
} while (i < 10);
```
Do-while Loop

Example

```java
int i = 0;
do
    System.out.println(i += 2);
while(i < 10);
```
Do-while Loop

Example

// Display all odd numbers between 0 and 10
// something wrong
int i = 0;
do
{
    if (i % 2 == 1)
        System.out.println(i++);
    i++;
} while (i < 10);
Exercise

- Display ASCII characters with For loop
  ```java
  System.out.printf("%d, %X, %o, %c", c, c, c, c);
  ```

- Guess it with For loop
  - Random number between 1 and 10
Exercise

- Display all even numbers only between 1 and 10
  - While
  - For
  - Do While
Exercise

- Add all numbers that the user enters until the user types zero.
Exercise

- Count vowels and consonants
  - Assume letters A, E, I, O, and U as the vowels. Write a program that prompts the user to enter a string and displays the number of vowels and consonants in the string.

Enter a string: Programming is fun
The number of vowels is 5
The number of consonants is 11
Exercise

- Longest common prefix

  Write a program that prompts the user to enter two strings and displays the largest common prefix of the two strings.

  Enter the first string: Welcome to JAVA
  Enter the second string: Welcome to programming
  The common prefix is Welcome to