# WHILE LOOP

zyBook 5.1, zyBook 5.2, zyBook 5.3, zyBook 5.10

# WHILE LOOPS

- Loop will execute 0 or many times.

- Indefinite Loops: do NOT know how many times the loop will run (repeat task)

- In order to avoid an infinite loop, within the controlled statements an update should occur such that test will eventually evaluate to false.

```
while (<test>) {
    <controlled statement>;
    <controlled statement>;
    ...
    <controlled statement>;
}
<statement>;
```

**Example:** Write a program prints the multiples of three that are less than or equal to 20.

```java
public class MultiplesOfThree {
  public static void main(String[] args) {
    int val = 3;
    while (val <= 20) {
      System.out.println(val);
      val += 3;
    }
    System.out.println("Done.");
  }
}
```

```
$ javac -d bin -cp bin
      src/MultiplesOfThree.java
$ java -cp bin MultiplesOfThree
3
6
9
12
15
18
Done.
```

val = 3

val <= 20 ? Yes, print out 3
val = val + 3    // 6

val <= 20 ? Yes, print out 6
val = val + 3    // 9

val <= 20 ? Yes, print out 9
val = val + 3    // 12

val <= 20 ? Yes, print out 12
val = val + 3    // 15

val <= 20 ? Yes, print out 15
val = val + 3    // 18

val <= 20 ? Yes, print out 18
val = val + 3    // 21

val <= 20 ? No, print out "Done."

# EXAMPLE – 1

How many times will the loop execute? Output?

```java
public class WhileExample {

    public static void main(String[] args) {
        int x = 1;
        while (x < 26) {
            System.out.print(x + " ");
        }
        System.out.println("!");
    }

}
```

x = 1
x < 26 ? Yes, print out 1

x = 1
x < 26 ? Yes, print out 1

x = 1
x < 26 ? Yes, print out 1

…

…

Infinite loop!

Output: 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 ……….

# EXAMPLE – 2

How many times will the loop execute? Output?

```java
public class WhileExample {

    public static void main(String[] args) {
        int x = 1;
        while (x < 26) {
            System.out.print(x + " ");
            x += 5;
        }
        System.out.println("!");
    }

}
```

Output: 1 6 11 16 21 !

Executed 5 times

x = 1

x < 26 ? Yes, print out 1
x = x + 5    // 6

x < 26 ? Yes, print out 6
x = x + 5    // 11

x < 26 ? Yes, print out 11
x = x + 5    // 16

x < 26 ? Yes, print out 16
x = x + 5    // 21

x < 26 ? Yes, print out 21
x = x + 5    // 26

x < 26 ? No, print out "!"