Fundamentals of Java

Iteration

The "while" loop

```
while (condition)
{
     statement1;
     statement2;
     statement3;
}
```

As long as the **condition** is true, repeatedly execute the statements.

While loop example

```
while (person.isHungry())
{
    person.eat();
}
```

While loop example

```
while (true)
{
    System.out.println("gobble gobble");
}
```

Will print "gobble gobble" repeatedly, forever.

Count-controlled loops

How can we print "gobble gobble" 10 times, and then stop?

We need some way of counting...

Shorthand statements

Shorthand	Equivalent to...
x++;	x = x + 1;
++x;	x = x + 1;
x--;	x = x - 1;
--x;	x = x - 1;
x += n;	x = x + n;
x -= n;	x = x - n;
x *= n;	x = x * n;
x /= n;	x = x / n;
x %= n;	x = x % n;

x++;	increases the value of x by 1
x += 9;	increases the value of x by 9

Printing 10 times

```
int i = 1;

while (i != 11)
{
    System.out.println("gobble gobble");
    i++;
}
```

Printing 1 to 10

```
int i = 1;

while (i != 11)
{
    System.out.println(i);
    i++;
}
```

What does this loop do?

```
int i = 1;

while (i != 11)
{
    System.out.println(i);
    i += 2;
}
```

What does this loop do?

```
int i = 1;

while (i != 11)
{
    System.out.println(i);
    i += 3;
}
```

Safer approach

```
int i = 1;

while (i < 11)
{
    System.out.println(i);
    i += 3;
}
```

This loop will definitely ***not*** continue beyond 11.

The "for" loop

Shortcut for writing "count-controlled" loops.

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

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

Examples of "for" loops

```
for (int i = 4; i <= 10; i++)
    System.out.println(i);

________________________________
for (int i = 4; i <= 10; i += 2)
    System.out.println(i);

________________________________
for (int i = 10; i >= 0; i--)
    System.out.println(i);

________________________________
int x = 0;
for (int i = 1; i <= 10; i++)
    x += i;
System.out.println(x);
```

The "do-while" loop

```
do
{
     statement1;
     statement2;
     statement3;
}
while (condition);
```

Same as the while loop, except that condition is not checked until ***after*** executing the statements.

The "do-while" loop

```
while (person.isHungry())
{
    person.eat();
}
```

```
do
{
    person.eat();
}
while (person.isHungry());
```

What is the difference?

Breaking out of a loop

```
while (true)
{
    statement3;
    statement4;
    statement5;

    if (condition)
        break;
}
```

As soon as the condition becomes true, the loop will stop.

Summary of loop syntax

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

```
int i = 0;
do
{
    System.out.println
("hello");
    i++;
}
while (i < 5);
```

```
int i = 0;
while (true)
{
    System.out.println
("hello");
    i++;
    if (i >= 5)
        break;
}
```

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