# Lesson 2.1 Making Decisions; Boolean Expressions

A programming language needs to be able to make decisions based on a condition: "if *this* is true, execute *that* block of code."

In this section we'll learn how to evaluate boolean expressions, and see how they can be used in a program to execute code conditionally.

## Overview -

The `if` and `if-else` statements are *the* way for a program to make a decision: "if something is true, do these things; otherwise, do these other things."

## The `if` statement

Most computer programs need to make a decision at some point, taking one action or another based on a *condition*.

**The `if` statement**

The **`if`** statement consists of a *condition* (an expression that evaluates to either **`true`** or **`false`**) and an instruction or *body* of code to be executed in the event that the condition is true.

```
if ( Boolean expression )
    statement1;
statement2;

if ( Boolean expression )
{
    statement1;
    statement2;
}
statement3;
```

Either way, after the **`if`** statement is executed, the program's execution proceeds to the instruction following the statement.

Look at these snippets of code from a **BarBouncer** program to see how this works. Note how we've indented the code to indicate that it is the body of the conditional statement that is to be executed. This isn't required by Java's syntax, but it's smart to do, and required by just about anyplace you'll be that uses Java, including this course.

```
// checking identity cards at the club
// the value of age has already been entered

int ageLimit = 21;
if (age >= ageLimit)
    System.out.println("You can enter the club.");

if (age < ageLimit)
    System.out.println("No admittance.");
```

These two sets of statements work fine, but it's more efficient and safer to write them using an **`if-else`** statement.

## The `if-else` statement

**The `if-else` statement**

The **`if-else`** statement consists of a standard **`if`** condition (with a body of code to be executed if the condition is true), followed by they keyword **`else`**, and a corresponding body of code to be executed if the condition is false.

```
if ( Boolean expression )
{
    statement1;
    statement2;
}
else
{
    statement3;
    statement4;
}
statement5;
```

So….**Barbouncer** program again

```
int ageLimit = 21;
if (age >= ageLimit)
    System.out.println("You can enter the club.");
else
    System.out.println("No admittance.");
```

Why is this "safer?" There's only a single comparison being made, as opposed to two separate comparisons (**<=** and **>**) that have to be coordinated.

If there's more than a single statement that's going to be executed as the body of an **`if`** statement, it needs to be enclosed in curly braces **`{ }`** to make it a code block:

```
// checking identity cards at the club
// the value of age has already been entered
int ageLimit = 21;
double entranceFee = 0;
if (age >= ageLimit)
{
    entranceFee = 10.00;    // fee to be collected
    System.out.println("You can enter the club.");
}
else
{
    entranceFee = -1;      // error code indicating no entrance
    System.out.println("No admittance.");
}
```

With this in mind, what's wrong with the following code?

```
if (age >= ageLimit)
    entranceFee = 10.00;    // fee to be collected
    System.out.println("You can enter the club.");
```

Although it *looks* like **`System.out.println("You can enter the club.");`** is part of the code block, it's not—it's just another statement in the program. When this runs, if **`age`** is less than **`ageLimit`**, the **`entranceFee`** will not be set to $10, and the under-age person will be told to enter the club with a fee of $0. That's probably not what we wanted to do.

How *should* this snippet be written?

**Recommendation (required in this class)**

To make your code as clean and easy to understand as possible, *always* use curly braces to enclose code for **`if-else`** statements, even if each block is only a single line:

```
int ageLimit = 21;
if (age >= ageLimit)
{
    System.out.println("You can enter the club.");
}
else
{
    System.out.println("No admittance.");
}
```