Lesson 2.2 Comparing Numbers

We'll often want to perform operations conditionally based on comparing two numerical values. With integer values, this is easily done using one of the six *relational operators*.

Relational Operators

Relational Operators

The *relational operators* are used to compare two values to each other, and have a value of **`true`** or **`false`**, depending on the relationship.

`==`	"is equal to"
`<`	"less than"
`>`	"greater than"
`<=`	"less than or equal to"
`>=`	"greater than or equal to"
`!=`	"not equal to"

Example:

```
Scanner in = new Scanner(System.in);
System.out.print("Enter your age: ");
double age = in.nextDouble();
if (age >= 18)
{
    System.out.println("You can vote!");
}
else
{
    System.out.println("You can't vote (yet).");
}
```

Logical Operators

In addition to the *relational operators* that compare two values there are *logical operators* that allow you to form more complex logical relationships.

Logical Operators

The *logical operators* produce a value of **`true`** or **`false`** based on evaluating boolean values.

`&&`	"and": true if both expressions are true
`||`	"or": true if either expression is true
`!`	"not": true if the expression is false, and false if the expression is true

AND Example:

```
if (age >= 13 && age < 20)
    System.out.println("You're a teenager.");
```

OR Example:

```
if (age < 0 || age > 110)
    System.out.println("I don't think I believe you.");
```

NOT Example:

```
System.out.print("Enter a positive number");
double value = in.nextDouble();
if (!(value > 0))
    System.out.println("ERROR: Positive number expected");
```

You might notice that in the NOT example above we could have re-written the **`if`** statement so that it doesn't require a negation:

```
if (value <= 0)...
```

While this is correct, and you may even choose to write it without the **`!`** in there, there will be occasions where using the *not* operator will allow your code to make more sense, and be more readable to you and others.

Common Mistakes

Common mistakes: you can't say **`if (0 < age < 21)...`**

and you can't say **`if (roll == 7 || 11)...`**

Each individual Boolean expression has be complete:

```
if (0 < age && age < 21)....
```

```
if (roll == 7 || roll == 11)...
```