



Computer Science Virtual Learning

HS Computer Science A

April 28th, 2020



Lesson: **Complex Conditionals?**

Objective/Learning Target:

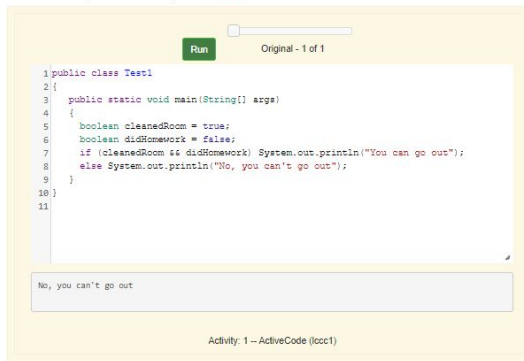
Understanding what a Complex Conditional is and the how to apply it using Java

What is a Complex Conditional?

What if you want two things to be true before the body of the conditional is executed? Use `&&` as a logical *and* to join two Boolean expressions and the body of the condition will only be executed only if both are true. For example, what if you want to go out and your mom said you could if you clean your room and do your homework?

Go to: <https://runestone.academy/runestone/books/published/apcsareview/Conditionals/cComplex.html>

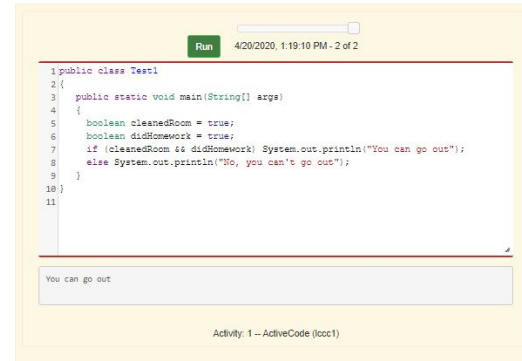
Run the first code block and try different values for `cleanedRoom` and `didHomework` and see what they have to be for it to print `You can go out`.



```
1 public class Test1
2 {
3     public static void main(String[] args)
4     {
5         boolean cleanedRoom = true;
6         boolean didHomework = false;
7         if (cleanedRoom && didHomework) System.out.println("You can go out");
8         else System.out.println("No, you can't go out");
9     }
10 }
11
```

No, you can't go out

Activity: 1 -- ActiveCode (lcccl)



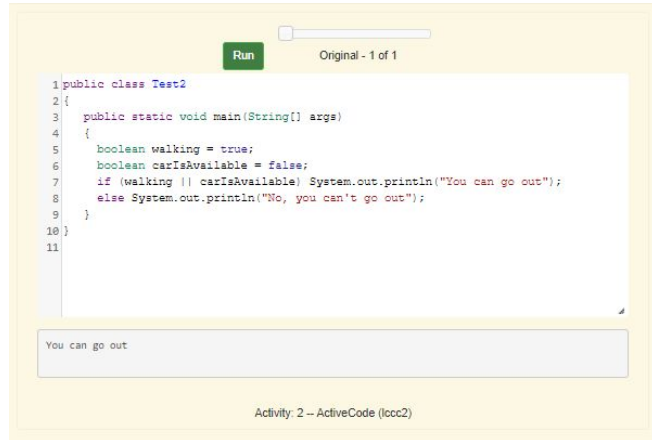
```
1 public class Test1
2 {
3     public static void main(String[] args)
4     {
5         boolean cleanedRoom = true;
6         boolean didHomework = true;
7         if (cleanedRoom && didHomework) System.out.println("You can go out");
8         else System.out.println("No, you can't go out");
9     }
10 }
11
```

You can go out

Activity: 1 -- ActiveCode (lcccl)

What is a Complex Conditional?

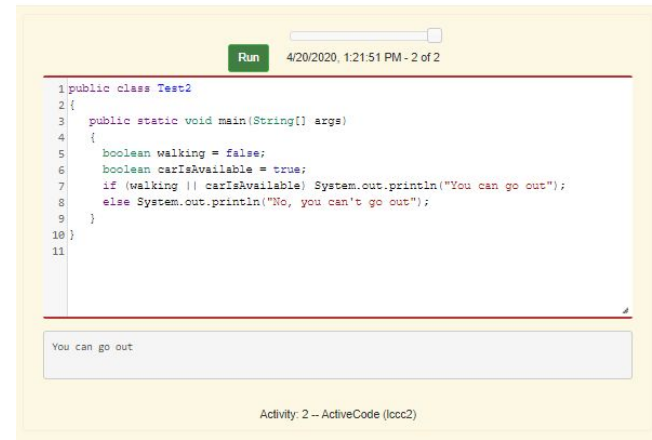
What if it is okay if only one of two things is true? Use `||` as a logical *or* to join two Boolean expressions and the body of the condition will be executed if one or both are true. For example, your Dad might say you can go out if you can walk or he doesn't need the car. Try different values for `walking` and `carIsAvailable` and see what the values have to be to print `You can go out`.

A screenshot of a code editor window titled "Original - 1 of 1". It contains a Java program named "Test2". The code sets `walking = true` and `carIsAvailable = false`. The `if` statement condition is `walking || carIsAvailable`, which evaluates to true. The output box shows "You can go out".

```
1 public class Test2
2 {
3     public static void main(String[] args)
4     {
5         boolean walking = true;
6         boolean carIsAvailable = false;
7         if (walking || carIsAvailable) System.out.println("You can go out");
8         else System.out.println("No, you can't go out");
9     }
10 }
11
```

You can go out

Activity: 2 -- ActiveCode (lccc2)

A screenshot of a code editor window titled "4/20/2020, 1:21:51 PM - 2 of 2". It contains a Java program named "Test2". The code sets `walking = false` and `carIsAvailable = true`. The `if` statement condition is `walking || carIsAvailable`, which evaluates to true. The output box shows "You can go out".

```
1 public class Test2
2 {
3     public static void main(String[] args)
4     {
5         boolean walking = false;
6         boolean carIsAvailable = true;
7         if (walking || carIsAvailable) System.out.println("You can go out");
8         else System.out.println("No, you can't go out");
9     }
10 }
11
```

You can go out

Activity: 2 -- ActiveCode (lccc2)

Truth Table Using &&

The following table (also called a **truth table**) shows the result for `P && Q` when P and Q are both expressions that can be true or false. As you can see below the result of `P && Q` is only true if both P and Q are true.

P	Q	P && Q
true	true	true
false	true	false
true	false	?
false	false	false

The truth table above is missing one result. What is the result of `P && Q` when `P=true` and `Q=false`?



Truth Table Using ||

The following table shows the result for $P \parallel Q$ when P and Q are both expressions that can be true or false. As you can see below the result of $P \parallel Q$ is true if either P or Q is true. It is also true when both of them are true.

P	Q	$P \parallel Q$
true	true	true
false	true	?
true	false	true
false	false	false

The truth table above is missing one result. What is the result of $P \parallel Q$ when $P=false$ and $Q=true$?



Check Your Understanding

1. What is printed when the following code executes and x has been set to zero?

```
if (x > 0 && (y / x) == 3)
System.out.println("first case");
else System.out.println("second case");
```

- a. first case
- b. second case
- c. You will get an error because you can't divide by zero

2. What is printed when the following code executes and x has been set to 3 and y has been set to 9?

```
if (x > 0 && (y / x) == 3)
System.out.println("first case");
else System.out.println("second case");
```

- a. first case
- b. second case

3. What is printed when the following code executes and x has been set to 3 and y has been set to 6?

```
if (x > 0 && (y / x) == 3)
System.out.println("first case");
else System.out.println("second case");
```

- a. first case
- b. second case

4. What is printed when the following code executes and x has been set to zero? Notice that it is now a logical or rather than an and.

```
if (x > 0 || (y / x) == 3)
System.out.println("first case");
else System.out.println("second case");
```

- a. first case
- b. second case
- c. You will get an error because you can't divide by zero



For More Resources and to Check Answers

Go to: <https://runestone.academy/runestone/books/published/apcsareview/Conditionals/cComplex.html>