

## Lesson on Java Relational and Boolean operators

Relational operators:

$x < y$	Less than	True if x is less than y, otherwise false.
$x > y$	Greater than	True if x is greater than y, otherwise false.
$x \leq y$	Less than or equal to	True if x is less than or equal to y, otherwise false.
$x \geq y$	Greater or equal to	True if x is greater than or equal to y, otherwise false.
$x == y$	Equal	True if x equals y, otherwise false.
$x != y$	Not equal	True if x is not equal to y, otherwise false.

Examples: if  $x = 3$  and  $y = 5$  these are the values of the following expressions.

$x < y$	True
$x > y$	False
$x \leq y$	True
$x \geq y$	False
$x == y$	False
$x != y$	True

### Exercise 1

- (1) Given that  $a=8$  and  $b=5$  find the value of the following expressions:
- $a > b$
  - $a == b$
  - $a \geq b$
  - $!(a > b)$
  - $(a+2) == b$
- (2) Given that  $num1 = 22$  and  $num2=20$  find the value of the following expressions
- $num1 != num2$
  - $num1 \geq (num2 + 2)$
  - $num2 \leq (num1 - 2)$
  - $(num1 + 7) > (num2)$
  - $(num1 - 3) == (num2 + 3)$

## Boolean operators

X && Y	X AND Y	True if X and Y are both true. Otherwise it is false
X    Y	X OR Y	True if X or Y or both are true. When both X and Y are false the expression is false.
! X	NOT X	True if X is false and false if X is true.

Some examples:

(1) If n1 = 6 and n2 = 7

<b>!(n1==n2)</b>	True
<b>(n1&lt;n2)&amp;&amp;(n2==7)</b>	True
<b>(n1==4)    (n2==n1)</b>	False
<b>!( (n1&lt;n2)&amp;&amp;(n1==6) )</b>	False

(2) What is the output of the following program snippet?

Snippet	Output
<pre>int abc = 5; int pqr = 8;  System.out.println ( abc==3 ); System.out.println ( pqr&lt;12 ); System.out.println ( !(abc+pqr == 13) ); System.out.println ( (abc&lt;6) &amp;&amp; (pqr == abc+3) ); System.out.println ( !( (abc*2)==(pqr+2)) );</pre>	<p>False</p> <p>True</p> <p>False</p> <p>True</p> <p>False</p>

## Exercise 2

What is the output of the following program snippet?

<pre>int ab = 7; int xy = 4;  System.out.println ( ab==3 ); System.out.println ( xy&lt;10 );</pre>
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System.out.println ( !(ab + xy == 14) );
System.out.println ( (ab<6) && (xy>=4) );
System.out.println ( !( (ab*2)>(xy+9)) );
System.out.println ( (ab == 6-2) || (xy>ab) );
if (ab + xy > 10) System.out.println ( ab );
    else System.out.println ( xy );
if ( (ab > xy) && (ab - 3 > 10) )System.out.println ( ab+xy );
    else System.out.println ( ab-xy );
if ( !(ab == 8) ) System.out.println ( "yes" );
    else System.out.println ( "no" );
if ( (ab >= xy+4) || (ab<xy) ) System.out.println ( "dog" );
    else System.out.println ( "cat" );
```