# Relational Operators and the If Statement

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#### Conditionals

- So far, we can Input, Output and Calculate
- How can we explore relationships between data?
- How can our program only do things sometimes?

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## Decisions!

- Relational Expressions allow our program to make a decision
  - o based on the data in the program
- What are some decisions we might want out program to make?

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# **Relational Expression**

- An expression is a statement that \_\_\_
- Relational expression: an expression that uses a Relational Operator
  - o its value is a Boolean value (True or False)

```
int x=9, y=42;
```

x > y

y == x // y = x; is the assignment operator

 $x \le (x * y + 99)$ 

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## **Relational Operators**

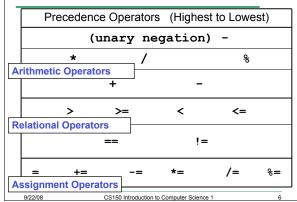
Operator	Meaning
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
==	Equal to
!=	Not equal to

- o All are binary operators
- Left to right associativity

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# Precedence (page 1101)



#### Practice

 What is the value of the following Relational Expressions?

```
int x = 99, y = 42;
x > y
y <= x
y != x
Relational Operators work
on Integers, Floating point
numbers, and Characters.

y == y + 1
y == x - 45

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```

#### The if Statement

- We execute each statement in our program in order.
- What if we only want to execute a statement sometimes?
- The if Statement!

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## Practice: What is the output?

```
int x=5, y=10;

if ( x < y )
{
  cout << x << " < " << y;
  cout << " is true" << endl;
}</pre>
```

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#### Practice

- For the problem below:
  - o what data will you need?
  - o what will you need to do conditionally?
    - what data will you use in your decision?
- Calculate the average grade for all three exams in a course. Print a message showing the letter grade the student received and a message stating if the student passed the course.

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# Boolean value (True or False)

 How does the computer represent True and False?

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#### Practice

```
bool value;
int x=5, y=10;
value = x > y; // value = ??
value = x == y; // value = ??
value = x == y - 5; // value = ??
// what does this output look like?
cout << "Value is: " << value;</pre>
```

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#### Practice

 What C++ statement would we write make the following determinations?

```
bool value;
int yourAge = 22, currentYear = 2008;
```

- Are you old enough to vote?
- · Where you born before 1980?
- Is you age evenly divisible by 7?

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#### Coding Standards

```
If you only have ONE
  if( expression )
                               statement in the body
                               of the if, the { } are
                               optional in C++.
     statement 1;
                              For this class, the { }
                               must ALWAYS be used.
                               Not using { } will result
  👀 ( expression )
                               In a loss of style points.
      statement 1;
                               The {} must also be on
                               their own line.
                               Why?
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```

#### More on Truth

 Expressions that evaluate to non-zero are considered true

```
int x=5, y=0;
if ( x + y)
{ // This will be executed
  cout << "x+y is True" << endl;
}
if ( y )
{ // This will NOT be executed
  cout << "y is True" << endl;
}</pre>
```

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