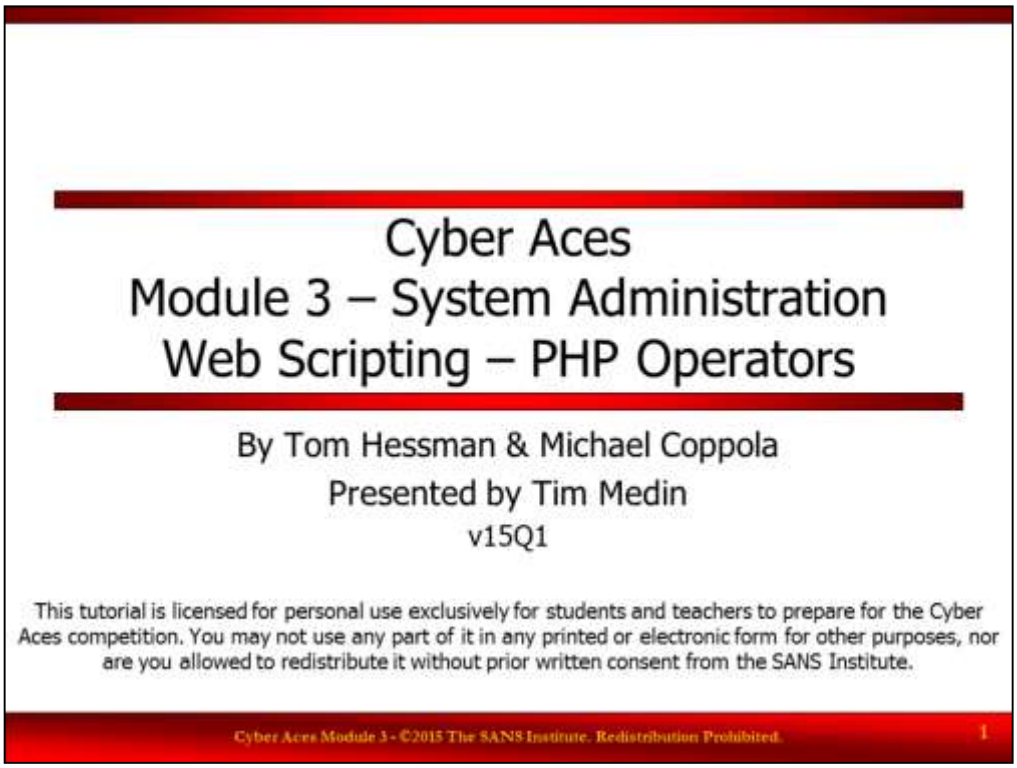
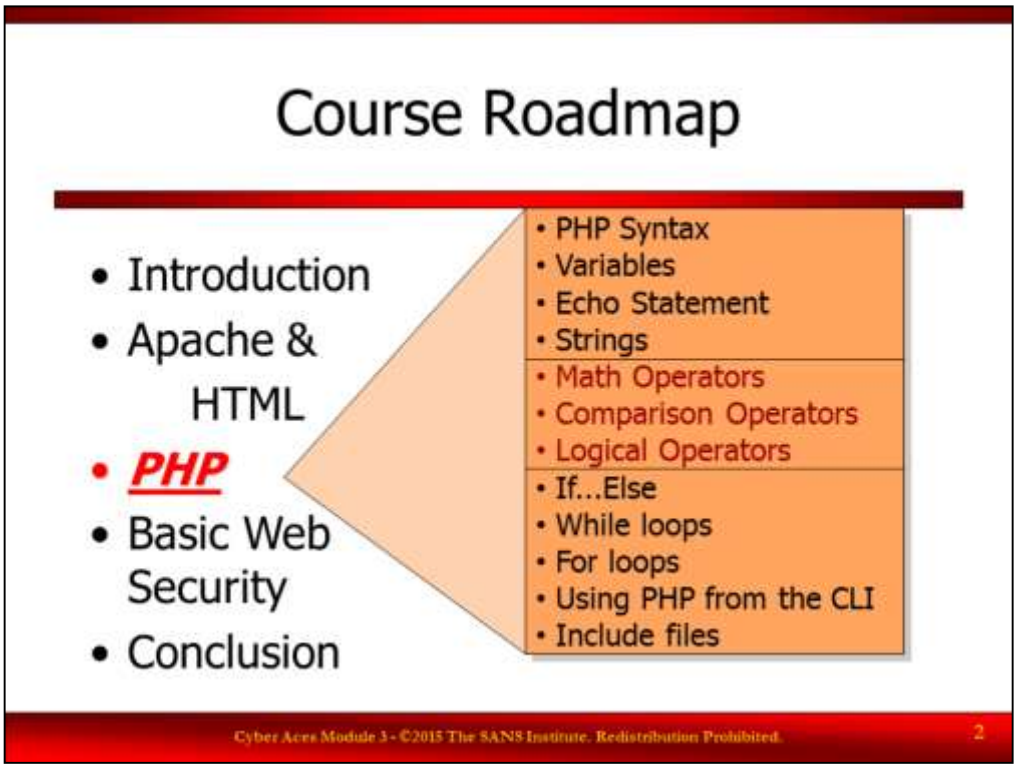
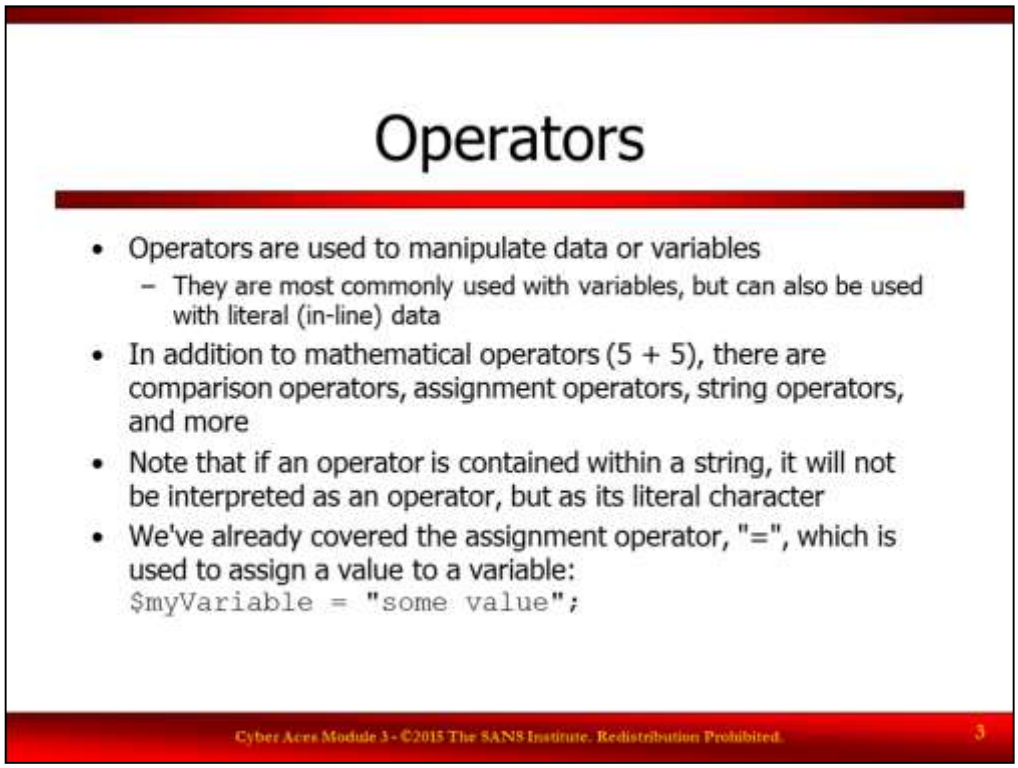


Welcome to Cyber Aces, Module 3! This module provides an introduction to the Apache Web Server, HTML, PHP, and basic web security.



Course Roadmap

In this section, we will learn about PHP operators.



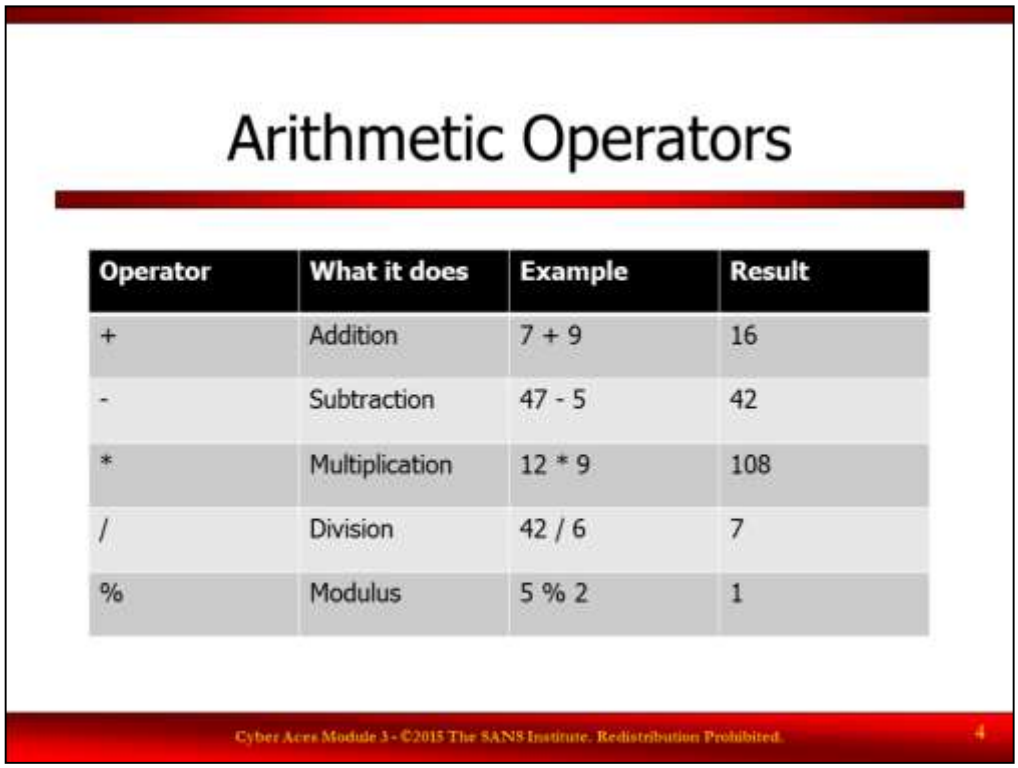
Operators

Operators are used to manipulate data or variables. They are mostly used with variables, but can also be used with literal (in-line) data. In addition to mathematical operators (5 + 5), there are comparison operators, assignment operators, string operators, and more. Note that if an operator is contained within a string, it will not be interpreted as an operator, but as its literal character.

We've already covered the assignment operator, "=", which is used to assign a value to a variable:

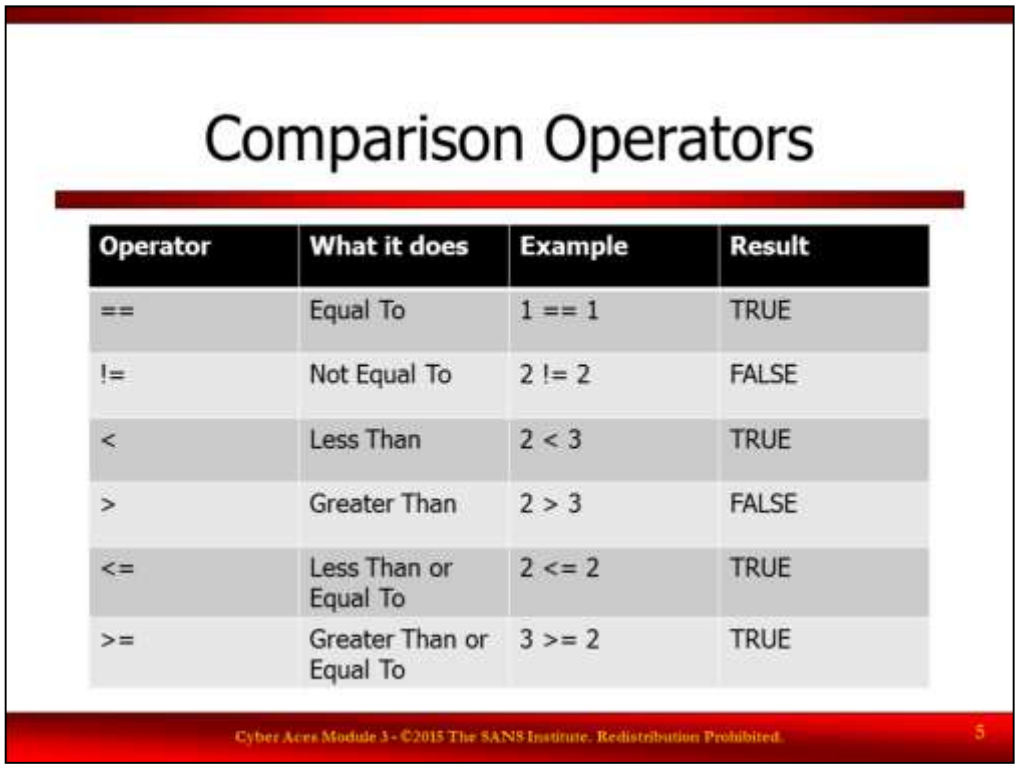
```
$myVariable = "some value";
```

Further reading: http://www.tizag.com/phpT/operators.php



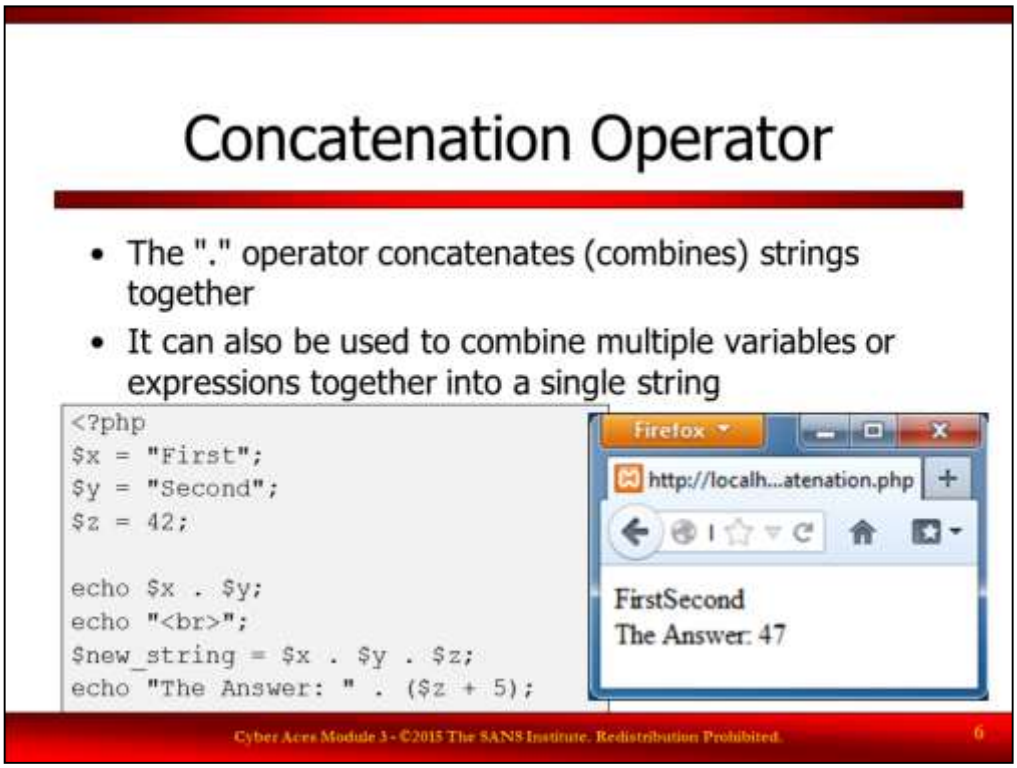
Arithmetic Operators

Arithmetic Operators are used to perform basic mathematical operations, such as addition (+), subtraction (-), multiplication, division (/), and modulus (%). Modulus is an operation that returns the remainder after a division operation, which has many uses in programming (such as determining if a number is odd or even by dividing it by two and seeing if the remainder is zero).



Comparison Operators

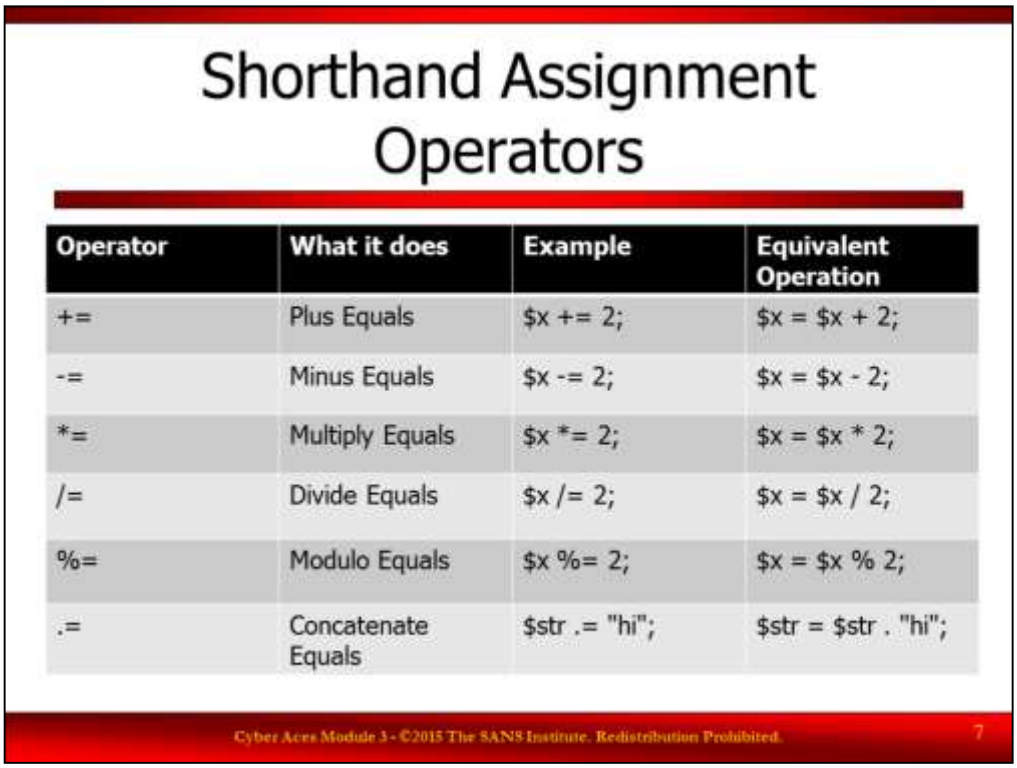
Comparison Operators are used to compare values. They return a boolean value of either "TRUE" or "FALSE", and are commonly used within conditional statements to test whether a condition has been met. The "==" operator checks if two values are equal to one another (don't confuse it with the assignment operator, "="). The "!=" operator checks if two values are NOT equal to one another. The < and > operators check if a value is less than or greater than another, respectively, and the <= and >= check if a value is less than or equal to or greater than or equal to another value, respectively.



Concatenation Operator

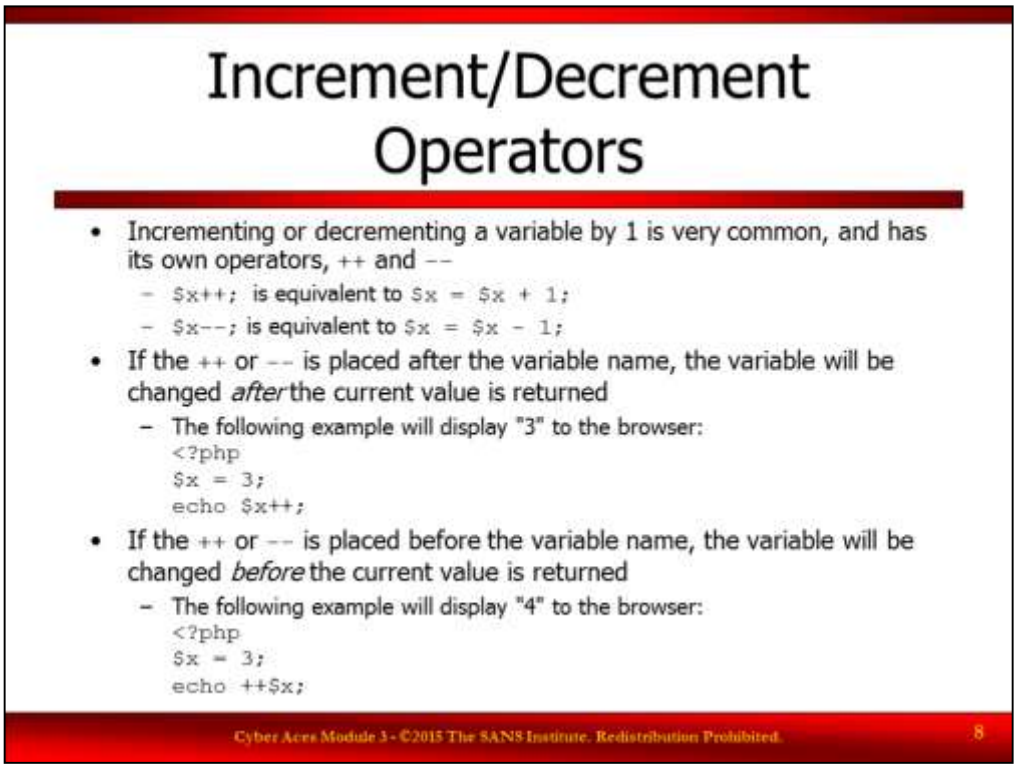
The concatenation operator, "." (a single period), combines strings together. It can also be used to combine multiple variables or expressions together into a single string.

In the example above, the first echo statement displays the strings "`$x`" and "`$y`" together, which would display "FirstSecond" to the browser. The next line combines `$x`, `$y`, and `$z` into a single string and assigns it to the variable "`$new_string`" (which will have the contents "FirstSecond42"). The last echo statement displays the text "The Answer: ", followed by the results of the mathematical expression "`$z + 5`" (which evaluates to 47). Note that the parenthesis are necessary around the "$z + 5" operation due to operator precedence (order of operations)...without them, the string "The Answer: " and the variable "$z" would be concatenated together, and then added to 5, which results in an answer of 5.



Shorthand Assignment Operators

While programming, it is common to have to alter the value of a variable by a fixed amount, such for a counter. These shorthand assignment operators were created to make these repetitive tasks easier. The most commonly used shorthand assignment operator is "plus equals", to increment a variable by a certain amount. In the example above, the variable "$x" is incremented by 2, which is the same as the operation `$x = $x + 2;`. "Concatenate equals" is also very common in PHP, used to keep adding more data into a string, such as to build up a string of display data and then display it to the user.



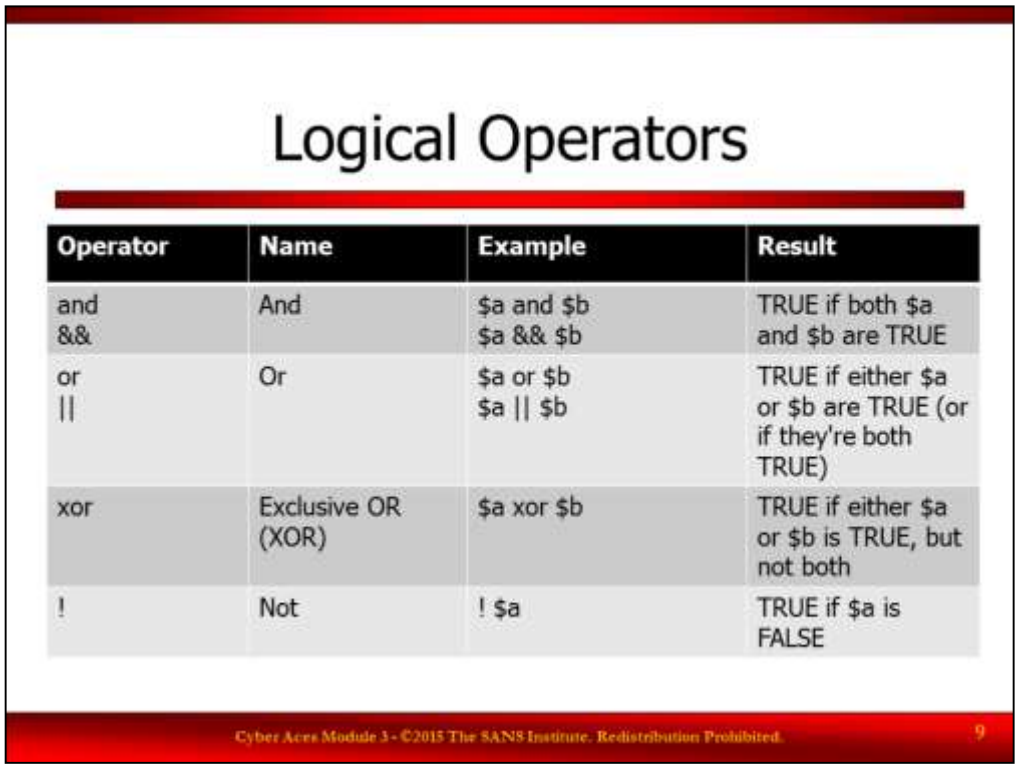
Increment/Decrement Operators

Incrementing or decrementing a variable by 1 is a very common task in programming, so it has its own operators, ++ and --. The "++" operation is equivalent to setting a variable equal to itself plus one, and the "--" operation is equivalent to setting a variable equal to itself minus one.

If the ++ or -- is placed after the variable name, the variable will be incremented or decremented *after* its value is returned in the current expression. In the first example above, the value "3" is displayed to the browser, because PHP returns the value of the variable before it increments it by 1.

If the ++ or -- is placed before the variable name, the variable will be incremented or decremented *before* the current value is returned in the current expression. In the second example above, the value "4" is displayed to the browser, because PHP increments the variable by 1 before it returns its value.

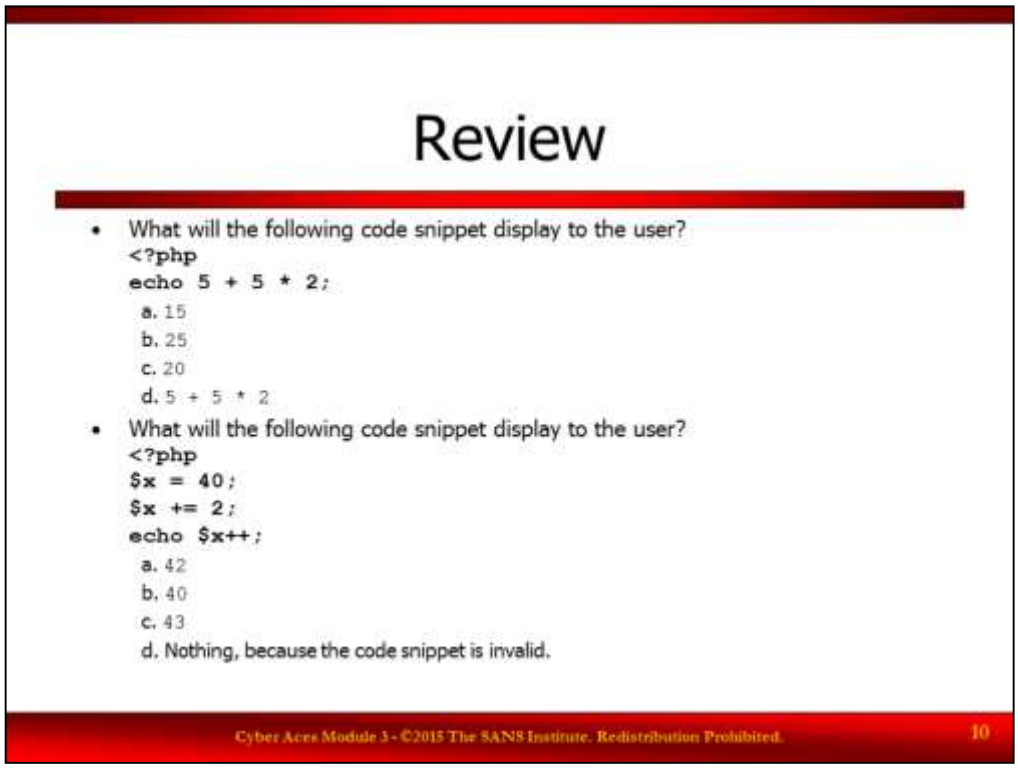
Most of the time, you'll probably be incrementing the variable separately from other tasks, so this distinction won't matter. However, there are use cases where it is convenient to combine statements together, and then this distinction becomes important!



Logical Operators

Logical Operators are used when multiple conditions need to be checked in an expression. For example, you may need to check if someone's first name is "Chuck", AND that their last name is "Bartowski". The "`and`" operator returns TRUE when both expressions are TRUE. The "`or`" operator returns TRUE if either expression is TRUE (or if both are TRUE). The "`xor`" (exclusive or) operator returns TRUE if one expression is true but the other is not (not if both are TRUE). The "`!`" (not) operator inverts a comparison, checking if something is not TRUE.

The "`&&`" operator is essentially identical to the "`and`" operator, but "`&&`" has a higher precedence (meaning it gets evaluated first). The same is true of "`||`" and "`or`".



Review

What will the following code snippet display to the user?

```
<?php
echo 5 + 5 * 2;
```

a. 15

b. 25

c. 20

d. 5 + 5 * 2

What will the following code snippet display to the user?

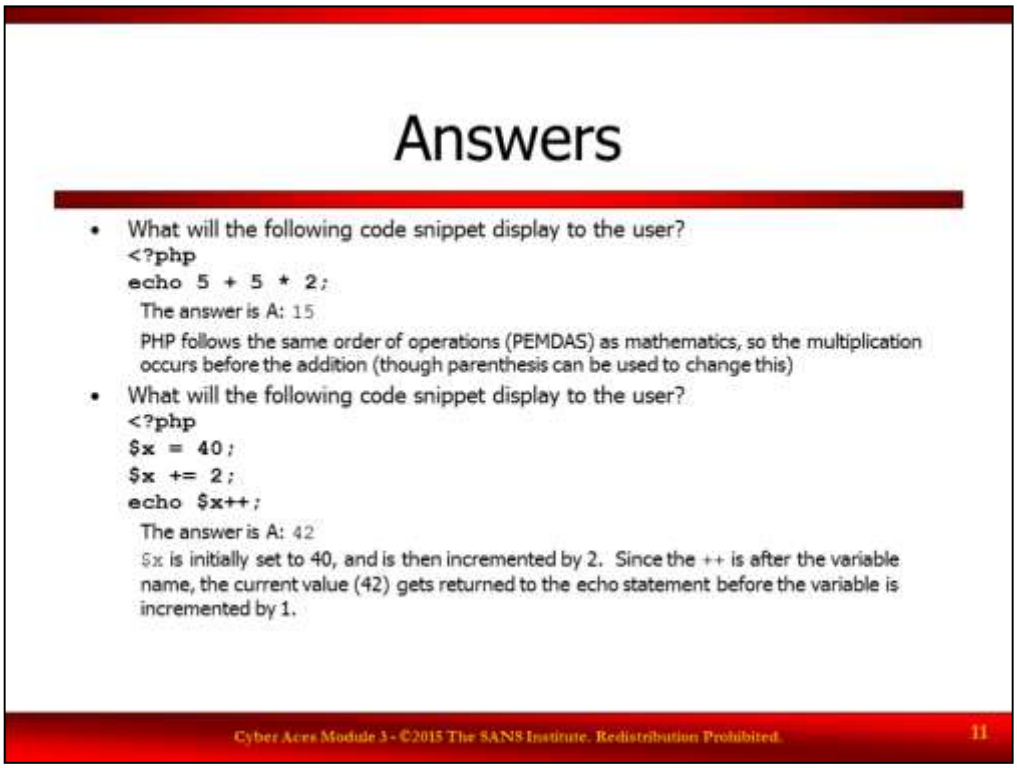
```
<?php
$x = 40;
$x += 2;
echo $x++;
```

a. 42

b. 40

c. 43

d. Nothing, because the code snippet is invalid.



Answers

What will the following code snippet display to the user?

```
<?php
echo 5 + 5 * 2;
```

The answer is A: `15`

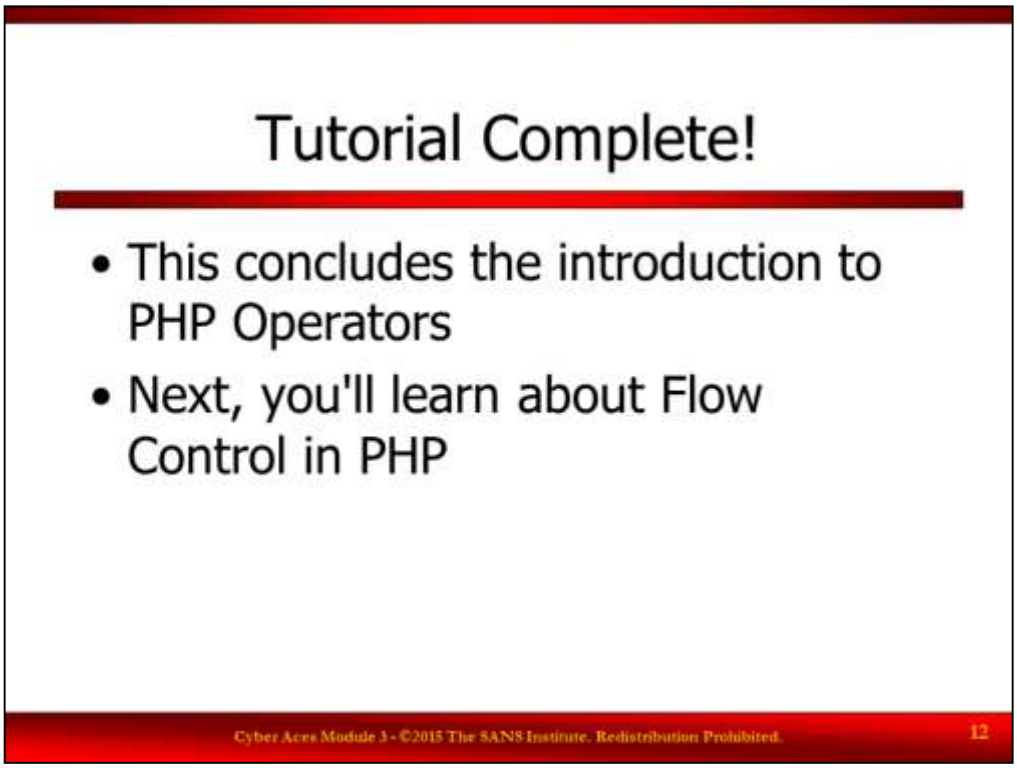
PHP follows the same order of operations (PEMDAS) as mathematics, so the multiplication occurs before the addition (though parenthesis can be used to change this)

What will the following code snippet display to the user?

```
<?php
$x = 40;
$x += 2;
echo $x++;
```

The answer is A: `42`

`$x` is initially set to 40, and is then incremented by 2. Since the ++ is after the variable name, the current value (42) gets returned to the echo statement before the variable is incremented by 1.



This concludes the first section of Module 3. We've learned the basics PHP operators. Next, we'll learn about PHP's Flow Control.