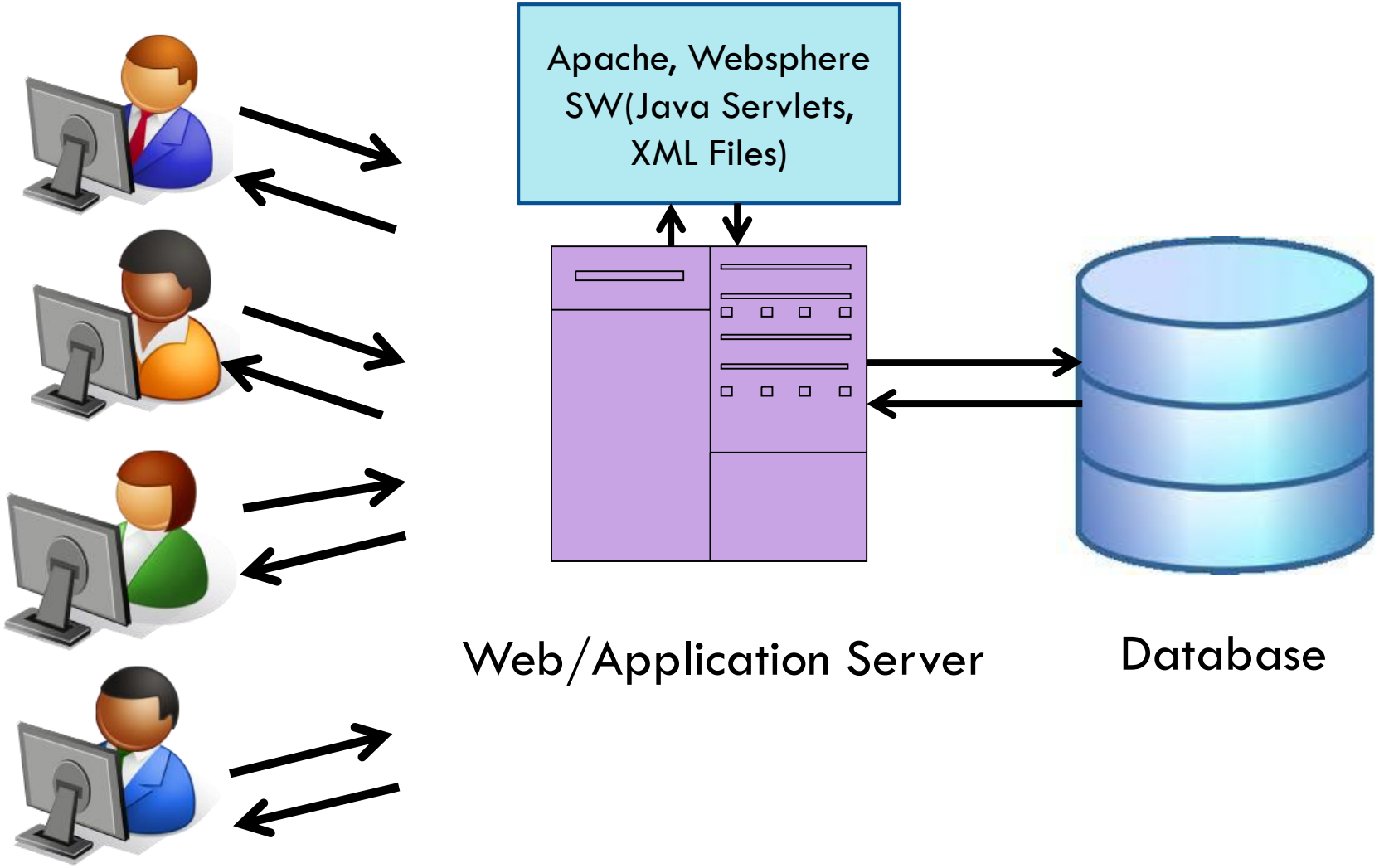
Server side basics

URLs and web servers

http://server/path/file

- Usually when you type a URL in your browser:
  - Your computer looks up the server's IP address using DNS
  - Your browser connects to that IP address and requests the given file
  - The web server software (e.g. Apache) grabs that file from the server's local file system
  - The server sends back its contents to you

URLs and web servers (cont.)



URLs and web servers (cont.)

http://**www.facebook.com/home.php**

- Some URLs actually specify programs that the web server should *run*, and then send their output back to you as the result:
  - The above URL tells the server **facebook.com** to run the program **home.php** and send back its output

Server-Side web programming

- Server-side pages are programs written using one of many web programming languages/frameworks
  - examples: PHP, Java/JSP, Ruby on Rails, ASP.NET, Python, Perl

Server-Side web programming (cont.)

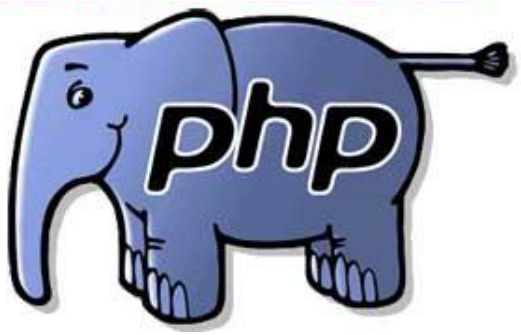
- Also called *server side scripting*:
  - Dynamically edit, change or add any content to a Web page
  - Respond to user queries or data submitted from HTML forms
  - Access any data or databases and return the results to a browser
  - Customize a Web page to make it more useful for individual users
  - Provide security since your server code cannot be viewed from a browser

Server-Side web programming (cont.)

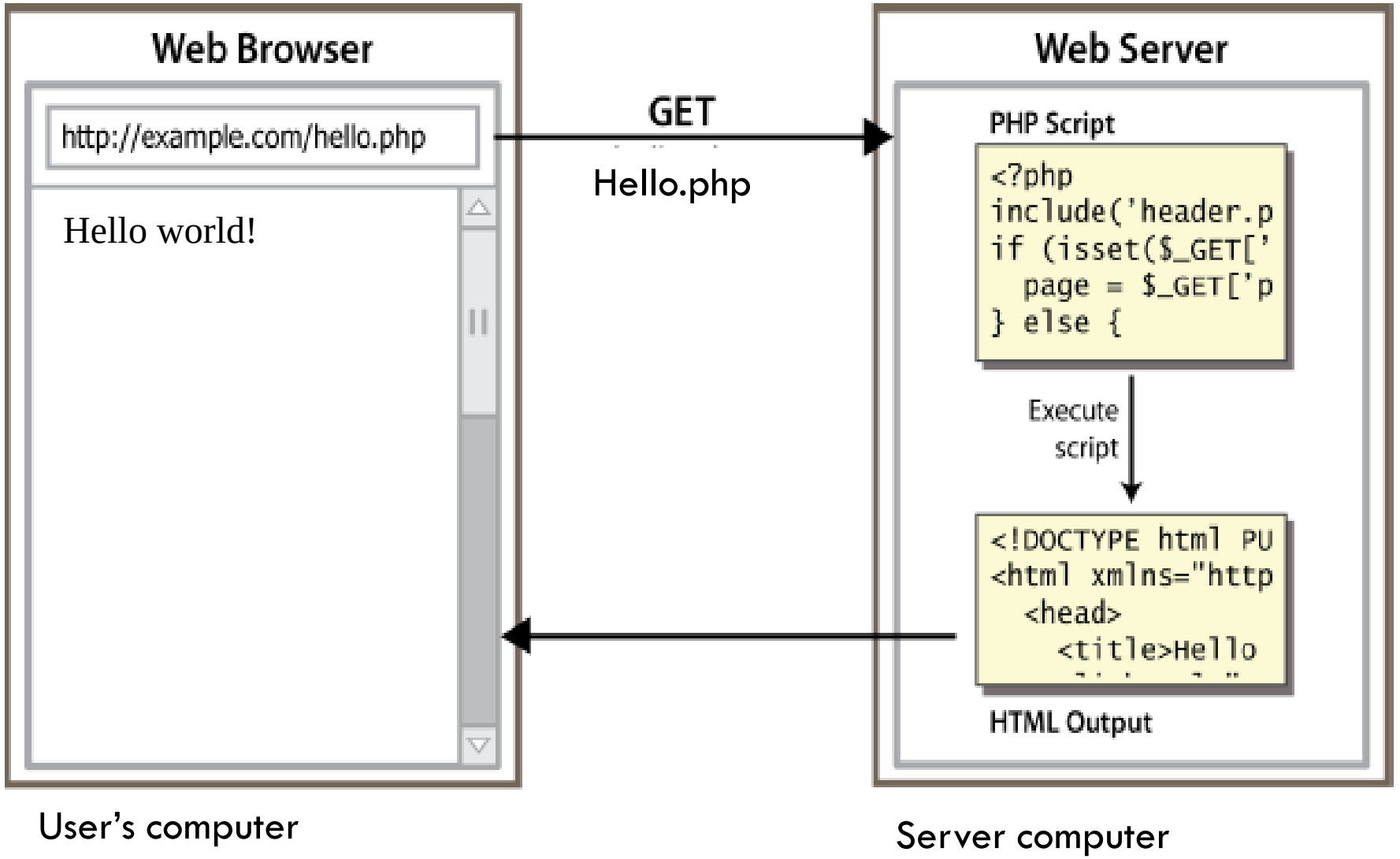
- Web server:
  - contains software that allows it to run server side programs
  - sends back their output as responses to web requests
- Each language/framework has its pros and cons
  - we use PHP

What is PHP?

- PHP stands for "PHP Hypertext Preprocessor"
- Server-side scripting language
- Used to make web pages dynamic:
  - provide different content depending on context
  - interface with other services: database, e-mail, etc.
  - authenticate users
  - process form information
- PHP code can be embedded in XHTML code



Lifecycle of a PHP web request



Why PHP?

- Free and open source
- Compatible
  - as of November 2006, there were more than 19 million websites (domain names) using PHP.
- Simple

Hello World!

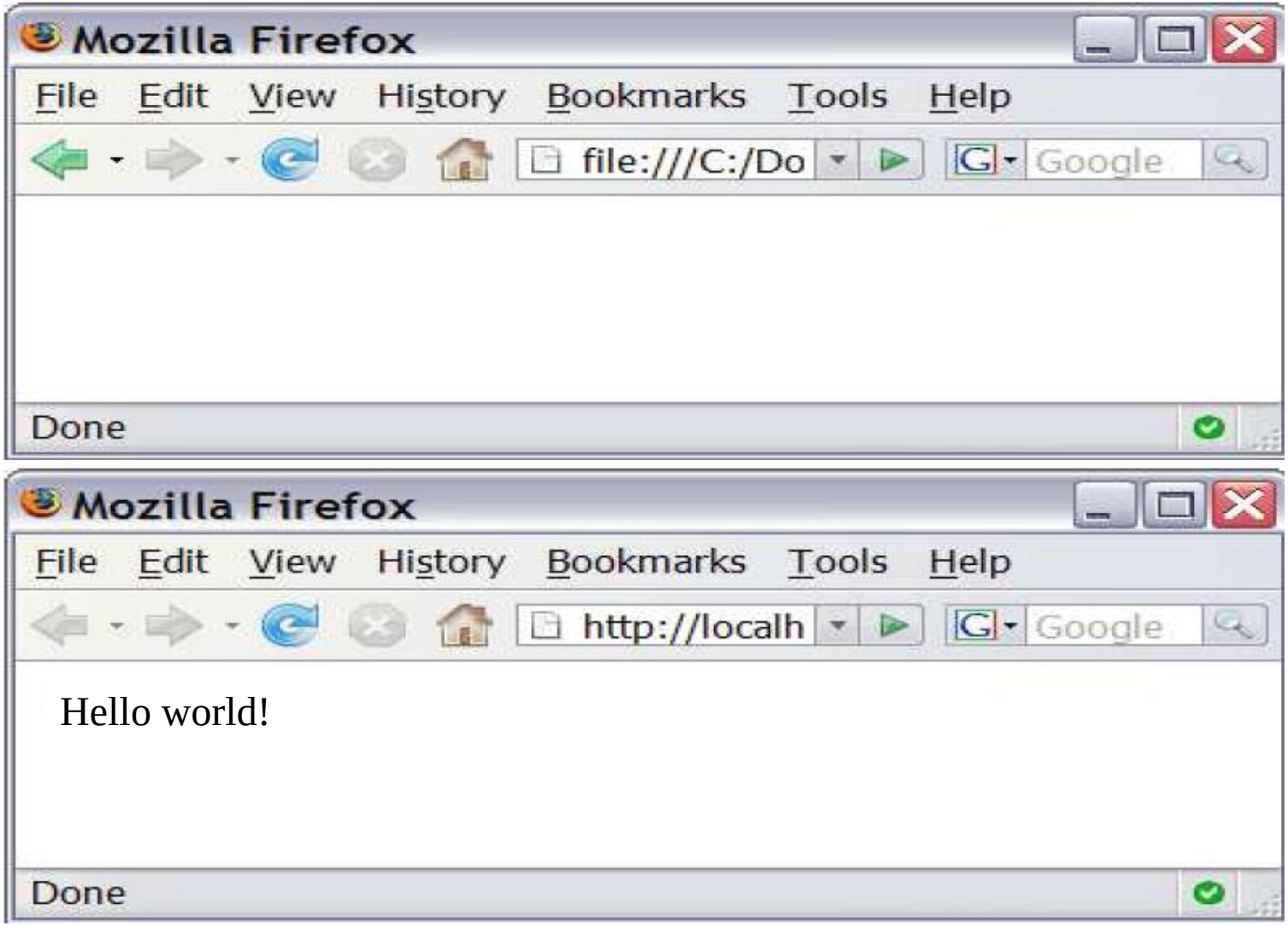

```php
<?php
print "Hello, world!";
?>
```

PHP

```
Hello world!
```

output

Viewing PHP output



PHP Basic Syntax

PHP syntax template


```
HTML content
<?php
PHP code
?>
HTML content
<?php
PHP code
?>
HTML content ...
```

PHP

- Contents of a .php file between `<?php` and `?>` are executed as PHP code
- All other contents are output as pure HTML
- We can switch back and forth between HTML and PHP "modes"

Console output: `print`


```
print "text";
```

PHP

```
print "Hello, World!\n";
print "Escape \"chars\" are the SAME as in Java!\n";
print "You can have
line breaks in a string.";
print 'A string can use "single-quotes". It\'s cool!';
```

PHP

```
Hello world!  Escape "chars" are the SAME as in Java! You can have line
breaks in a string. A string can use "single-quotes". It's cool!
```

output

Variables


```
$name = expression;
```
PHP

```
$user_name = "mundruid78";
$age = 16;
$drinking_age = $age + 5;
$this_class_rocks = TRUE;
```
PHP

- names are case sensitive
- names always begin with $, on both declaration and usage
- always implicitly declared by assignment (type is not written)
- a loosely typed language (like JavaScript or Python)

Variables

- basic types: *int, float, boolean, string, array, object, NULL*
  - test type of variable with `is_type` functions, e.g. `is_string`
  - `gettype` function returns a variable's type as a string
- PHP *converts between types automatically* in many cases:
  - string → int auto-conversion on +
  - int → float auto-conversion on /
- type-cast with **(type)**:
  - `$age = (int) "21";`

Arithmetic operators

- + - * / % . ++ --
- = += -= *= /= %= .=
- many operators auto-convert types: 5 + "7" is 12

Comments


```php
# single-line comment
// single-line comment
/*
multi-line comment
*/
```

- like Java, but # is also allowed
  - a lot of PHP code uses # comments instead of //

String Type


```php
$favorite_food = "Ethiopian";
print $favorite_food[2];
$favorite_food = $favorite_food . " cuisine";
print $favorite_food;
```

PHP

- zero-based indexing using bracket notation
- there is no char type; each letter is itself a String
- string concatenation operator is . (period), not +
  - `5 + "2 turtle doves" === 7`
  - `5 . "2 turtle doves" === "52 turtle doves"`
- can be specified with "" or ''

String Functions


```
# index 0123456789012345
$name = "Stefanie Hatcher";
$length = strlen($name);
$cmp = strcmp($name, "Brian Le");
$index = strpos($name, "e");
$first = substr($name, 9, 5);
$name = strtoupper($name);
```

PHP

String Functions (cont.)

Name	Java Equivalent
strlen	length
strpos	indexOf
substr	substring
strtolower, strtoupper	toLowerCase, toUpperCase
trim	trim
explode, implode	split, join
strcmp	compareTo

Interpreted Strings


```php
$age = 16;
print "You are " . $age . " years old.\n";
print "You are $age years old.\n"; # You are 16 years old.
```

- strings inside " " are interpreted
  - variables that appear inside them will have their values inserted into the string
- strings inside ' ' are not interpreted:

```php
print 'You are $age years old.\n'; # You are $age years
old. \n
```

Interpreted Strings (cont.)


```
print "Today is your $ageth birthday.\n"; # $ageth not
found
print "Today is your {$age}th birthday.\n";
```

PHP

- if necessary to avoid ambiguity, can enclose variable in {}

Interpreted Strings (cont.)


```php
$name = "Xenia";
$name = NULL;
if (isset($name)) {
print "This line isn't going to be reached.\n";
}
```

- a variable is NULL if
  - it has not been set to any value (undefined variables)
  - it has been assigned the constant NULL
  - it has been deleted using the unset function
- can test if a variable is NULL using the isset function
- NULL prints as an empty string (no output)

for loop (same as Java)


```
for (initialization; condition; update) {
      statements;
}
```

PHP

```
for ($i = 0; $i < 10; $i++) {
      print "$i squared is " . $i * $i . ".\n";
}
```

PHP

bool (Boolean) type


```php
$feels_like_summer = FALSE;
$php_is_great = TRUE;
$student_count = 7;
$nonzero = (bool) $student_count; # TRUE
```

PHP

- the following values are considered to be FALSE (all others are TRUE):
  - 0 and 0.0 (but NOT 0.00 or 0.000)
  - "", "0", and NULL (includes unset variables)
  - arrays with 0 elements
- FALSE prints as an empty string (no output); TRUE prints as a 1

if/else statement


```php
if (condition) {
      statements;
} elseif (condition) {
      statements;
} else {
      statements;
}
```

PHP

`while` loop (same as Java)


```
while (condition) {
      statements;
}
```
PHP

```
do {
      statements;
} while (condition);
```
PHP

Math operations


```php
$a = 3;
$b = 4;
$c = sqrt(pow($a, 2) + pow($b, 2));
```

PHP

math functions

abs	ceil	cos	floor	log	log10	max
min	pow	rand	round	sin	sqrt	tan

math constants

M_PI	M_E	M_LN2

Int and Float Types


```php
$a = 7 / 2; # float: 3.5
$b = (int) $a; # int: 3
$c = round($a); # float: 4.0
$d = "123"; # string: "123"
$e = (int) $d; # int: 123
```

PHP

- int for integers and float for reals
- division between two int values can produce a float

PHP exercise 1

- For your first PHP exercise, echo the following statement to the browser:

"Twinkle, Twinkle little star."

- Next, create two variables, one for the word "Twinkle" and one for the word "star". Echo the statement to the browser, this time substituting the variables for the relevant words. Change the value of each variable to whatever you like, and echo the statement a third time. Remember to include code to show your statements on different lines.

PHP exercise 2

- PHP includes all the standard arithmetic operators. For this PHP exercise, you will use them along with variables to print equations to the browser. In your script, create the following variables:
  $x=10;
  $y=7;
- Write code to print out the following:

10 + 7 = 17
10 - 7 = 3
10 * 7 = 70
10 / 7 = 1.4285714285714
10 % 7 = 3

- Use numbers only in the above variable assignments, not in the echo statements.

PHP exercise 3

- Arithmetic-assignment operators perform an arithmetic operation on the variable at the same time as assigning a new value. For this PHP exercise, write a script to reproduce the output below. Manipulate only one variable using no simple arithmetic operators to produce the values given in the statements.
- Hint: In the script each statement ends with "Value is now $variable."

Value is now 8.
Add 2. Value is now 10.
Subtract 4. Value is now 6.
Multiply by 5. Value is now 30.
Divide by 3. Value is now 10.
Increment value by one. Value is now 11.
Decrement value by one. Value is now 10.

PHP exercise 4

- When you are writing scripts, you will often need to see exactly what is inside your variables. For this PHP exercise, think of the ways you can do that, then write a script that outputs the following, using the echo statement only for line breaks.

string(5) "Harry"
Harry
int(28)
NULL

PHP exercise 5

- For this PHP exercise, write a script using the following variable:
  $around="around";
- Single quotes and double quotes don't work the same way in PHP. Using single quotes (' ') and the concatenation operator, echo the following to the browser, using the variable you created:
  What goes around, comes around.

PHP exercise 5

- In this PHP exercise, you will use a conditional statement to determine what gets printed to the browser. Write a script that gets the current month and prints one of the following responses, depending on whether it's August or not:

It's August, so it's really hot.
Not August, so at least not in the peak of the heat.

- Hint: the function to get the current month is *'date('F', time())'* for the month's full name.

PHP exercise 6

- Loops are very useful in creating lists and tables. In this PHP exercise, you will use a loop to create a list of equations for squares.
- Using a for loop, write a script that will send to the browser a list of squares for the numbers 1-12. Use the format, "1 * 1 = 1", and be sure to include code to print each formula on a different line.

PHP exercise 7

- HTML tables involve a lot of repetitive coding - a perfect place to use for loops. You can do even more if you nest the for loops.
- In this PHP exercise, use two for loops, one nested inside another. Create the following multiplication table:

1	2	3	4	5	6	7
2	4	6	8	10	12	14
3	6	9	12	15	18	21
4	8	12	16	20	24	28
5	10	15	20	25	30	35
6	12	18	24	30	36	42
7	14	21	28	35	42	49