Developing Curriculums and Educational Subjects Center

General Directory for Developing the Subject of Computer & Information Technology

Information and Communication Technology

Activity Book

The Programming Projects

Third Secondary
Unit One

2016/2017

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Unit One

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Introduction

This book presents a comprehensive vision of the relationship between science, technology and society, which reflects the role of information and communication technology and its innovations in various fields of life and community development, through training students on the skill of the implementation of some software projects based on the Markup language HTML, programming languages PHP &VB.NET and applications such as Expression Web.

Those projects help students practice many of the technological skills and conscious behaviors by using information and communication technology, in addition to the development of their multi positive attitudes.

The first unit of the book deals with implementation of a project to convert a number between the numerical systems programmatically, and this unit includes a simplified explanation of numerical systems as a cognitive basic background, followed by display the unit topics that represent the stages of implementation of the project, and the implied skills that the students have to train on.

The second unit deals with the Logic Gates which is considered the basics for the electronic integrated circuits and it represents the basics for the computer and electronic devices, and how it performs through applied projects production which stimulate it, with showing some life applications to employ the idea of Logic Gates, by considering life decisions as a set of issues or mathematical formulas which can be evaluated and judged right or wrong , which is considered a lifestyle and style of thinking which helps in taking life decisions in a scientific method, which represents a very important input to qualify you, dear student, for your future life, and qualification towards the specialized study in this field.

GOD GRANTS SUCCESS

STAFF

Table of content

Unit 1: Project of producing programs to convert a number between numerical systems

Unit one

A Project to produce programs to convert a number between numerical systems

By the end of the unit students will be able to:

1- Identify some concepts and advanced scientific terms related to computer

(Programming languages–Numerical systems–…..)

2- Employ computer programs in implementing learning tasks.

3- Suggest simple projects to convert a number between numerical systems

using VB.NET &PHP languages.

4- Employ information and communication technology applications in the

construction of educational content

5- Practice VB.Net & PHP skills.

6- Employ electronic communication media to support learning tasks related

to the learning project.

7 .Select the appropriate tools, methods and technological applications to

search for the information needed to resolve the problems.

First topic

Numerical systems

Numerical analysis of the number in the decimal system

Practice (1)

Firstly:

You have the number $(79)_{10}$ and want to analyze each digit in it to reach its equivalent value according to its ranking in number.

The task: Complete the following table to analyze the number $(79)_{10}$

procedure	Tens (10) $(10)^1$	Ones (1) $(10)^0$
Analyzing the number (79)$_{10}$	7	9
Value Calculation	7 x ……… 7 x … = …	9 x ……… …… x 1 = ……
By adding the value of each part in the number, we get the value represented by the number.	……… +………= $(79)_{10}$	

Secondly:

You have the number $(326)_{10}$ and would like to analyze each digit in it to reach a corresponding value according to its ranking in number.

The task: Complete the following table to analyze the number $(326)_{10}$

procedure	Hundreds (100) $(10)^2$	Tens (10) $(10)^1$	Ones (1) $(10)^0$
Analyzing the number (326)$_{10}$	3	2	6
Value Calculation	3 x ……. …x… = …	2 x ……. … x … = …	6 x ……. … x … = …
By adding the value of each part in the number, we get the value represented by the number	……. + ……. + ……. = $(326)_{10}$		

Thirdly:

You have number $(8501)_{10}$, and would like to analyze each digit in it to reach a corresponding value according to its ranking in number.

The task: Complete the following table to analyze the number $(8501)10$

Procedure	Thousands(100) $(10)^3$	Hundreds(100) $(10)^2$	Tens(10) $(10)^1$	Units(1) $(10)^0$
Analyzing the number (………)$_{10}$	…….	…….	…….	…….
Calculating the value	8 x……. … X… = …	5 x……. … X… = …	0 x……. … X… = …	1 x……. … X… = …
By adding the value of each number in the box, we get the value representing the number	…….+……..+……. + ……. =$(8501)_{10}$			

Convert a number from binary numerical system to their equivalent in decimal numerical system

Practice (2)

Firstly: You have the number $(1010)_2$ and you want to analyze each digit in it to reach its equivalent in the decimal numerical system.

The task: Complete the following table to analyze the number $(1010)_2$ and

determine its value in the decimal numerical system.

Procedure	$(2)^3$ 8	$(2)^2$ 4	$(2)^1$ 2	$(2)^0$ 1
Analyzing the number $(1010)_0$	1	0	1	0
Calculating the value	1 x…….= …	0 x…….= 0	1 x……= …	0 x1= ……
By adding the value of each part in the binary number, we get its equivalent in the decimal system.	…….+…….+…….+…….= …………			

Secondly: You have the number $(100)_2$ and you want to analyze each digit in it to reach its corresponding value in the decimal numerical system.

The task: complete the following table to analyze the number $(100)2$ and

determine its value using decimal numerical system.

Procedure	$(2)^2$ 4	$(2)^1$ 2	$(2)^0$ 1
Analyzing the number $(100)_2$	……..	………	………
Calculating the value	1 x…….= …….	0 x……= …	0 x……= ……
By adding the value of each part in the binary number, we get its corresponding value in the decimal system.	……. + ……. + ……. = …….		

Thirdly: You have the number $(11001)_2$ and you want to analyze it to reach its corresponding value in the decimal numerical system.

The task: Complete the following table to analyze the number $(11001)_2$ and determine its corresponding value in the decimal numerical system.

Procedure	$(2)^4$ 16	$(2)^3$ 8	$(2)^2$ 4	$(2)^1$ 2	$(2)^0$ 1
Analyzing the number$(11001)_2$	……	…..	……	……..	………
Calculating the value	1 x…= …	1 x…=….	0 x…= ….	0 x….= …	1 x …= ….
By adding the value of each part in the binary number, we get its corresponding value in the decimal numerical system.	……..+……..+…….+…….+……….= …………				

Converting a number from the decimal number to its equivalent in the binary numerical system
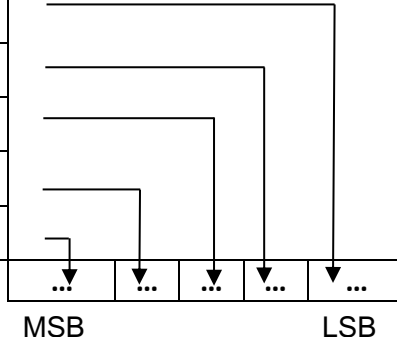
Practice (3)

Answer the following:

(1) Complete the following table to convert the decimal number $(18)_{10}$ to its equivalent in the binary system.
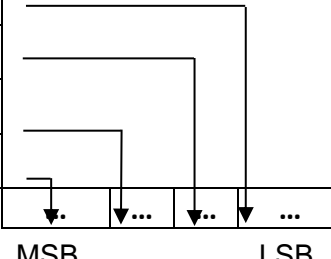
Decimal Number	The remainder
18 ÷ .... = 9	...
.... ÷ 2 = 4	...
4 ÷ 2 = ...	0
2 ÷ 2 = ...	...
1 ÷ 2 = 0	1

... ...

MSB   LSB

So the number $(18)_{10}$= (........)$_2$

(2) Complete the following table to convert the decimal number $(11)_2$ to its equivalent in the binary number.

Decimal Number	The remainder
11 ÷ 2 = ...	...
.... ÷ 2 = ...	...
.... ÷ 2 = ...	...
.... ÷ 2 = ...	...

.. ..

MSB   LSB

So the number $(11)_{10}$ = (.........)$_2$

(3) Find the equivalent of the number $(25)_{10}$ in the binary system.

Decimal Number	The remainder
25 ÷ 2 = ...	**...**
.... ÷ 2 = ...	**...**
.... ÷ 2 = ...	**...**
.... ÷ 2 = ...	**...**
.... ÷ 2 = ...	**...**

MSB   LSB

So the number $(25)_{10}$= (...........)$_2$

Converting a number from hexadecimal numerical system to their equivalent in decimal numerical system

Practice (4)

(1) You have the number $(ED8)_{16}$ and you want to analyze each digit in it to reach its equivalent in the decimal numerical system.

The task: complete the following table to analyze the number $(ED8)_{16}$ and determine its value using the decimal number system.

Procedure	$(16)^2$ 256	$(16)^1$ 16	$(16)^0$ 1
Analyzing the number$(ED8)_{16}$	E= …….	D= ……	8
Calculating the value	……. x…….= 3584	13 x…..=……	1 x……= ……
By adding the value of each part in the hexadecimal number, we get its corresponding value in the decimal number system.	**3584+ ……. + ……. = (…….) $_{10}$**		

So the number $(ED8)_{16}$ = (………..)$_{10}$

(2) You have the number $(5BF)_{16}$ and you want to analyze each digit in it to reach its equivalent in the decimal numerical system.

The task: Complete the following table to analyze the number $(5BF)$ 16 and determine its corresponding value in the decimal numerical system.

Procedure	$(16)^2$ 256	 16	$(16)^0$ ....
Analyzing the number $(5BF)_{16}$	5	B=....	F=....
Calculating the value	....x ....=	.... x ....=176	15 x 1 = 15
By adding the value of each part in the hexadecimal number, we get its corresponding value in the decimal numerical system.	.... + 176 + ... = (..........)$_{10}$		

So the number $(5BF)_{16}$ =(.......)$_{10}$

(3) Find an equivalent to the number $(1B5C)_{16}$ in the numerical decimal system.

The task: Complete the following table to analyze the number $(1B5C)_{16}$ and determine its corresponding value in the decimal numerical system.

Procedure	$(16)^3$ 4096	$(16)^2$	 16	$(16)^0$ ....
Analyzing the number$(5BF)^{16}$	....	B = ...	....	c = ...
Calculating the value	... x ... = ...	... x ... = ...	... x ... = ...	... x ...= ....
By adding the value of each part in the hexadecimal number, we get its corresponding value in the decimal numerical system.	.... + ... + ... + ... = (..........)$_{10}$			

So the number $(1B5C)_{16}$ =(.........)$_{10}$

Converting a number from hexadecimal numerical system to their equivalent in decimal numerical system

Practice (5)

1) Complete the following table to convert $(586)_{10}$ to its corresponding value in the hexadecimal numerical system under the supervision of your teacher.

Decimal Number	The remainder
586 ÷ ..... = 396	.....
..... ÷ **16** = ...	4
2 ÷ ..... = **0**	.....

MSB   LSB

So the number $(586)_{10}$ = (........)$_{16}$

2) Convert $(6342)_{10}$ to its corresponding value in the hexadecimal numerical system using the following table:

Decimal Number	The remainder
6342 ÷ .... = ...	....
.... ÷ **16** = ...	....
.... ÷ .... = ...	....
.... ÷ **16** = ...	....

MSB   LSB

So the number $(6342)_{10}$ = (.....)$_{16}$

3) Find an equivalent to the number $(3995)_{10}$ in the hexadecimal numerical system:

Decimal Number	The remainder
3995 ÷ .... = 249	....
.... ÷ 16 = ...	....
15 ÷ .... = ...	....

...	...	...
MSB		**LSB**

So the number $(3995)_{10}$= (........)_{16}$

Converting a number from hexadecimal numerical system to their equivalent in decimal numerical system

Practice (6)

1) Use the following table to analyze the number $(2B7)_{16}$ to its corresponding value in the binary numerical system under the supervision of your teacher. (You can use table(3) SB p.23)

$(2B7)_{16}$	2	B	7
	0010	....	....
$(.......)_{16} =$	$(.....................................)_2$		

So the number $(2B7)_{16} = (..............)_2$

2) Find an equivalent to the number $(64E5)_{16}$ in the binary numerical system using the following table:

$(............)_{16}$	6	4	E	5
	....	....	....	....
$(64E5)_{16} =$	$(.....................................)_2$			

So the number $(64E5)_{16} = (.................................)_2$

3) Find an equivalent to the number $(8C07)_{16}$ in the binary numerical system using the following table:

$(............)_{16}$	......	......	......	......
	....	....	....	....
$(8C07)_{16} =$	$(.....................................)_2$			

So the number $(8C07)_{16} = (.................................)_2$

Converting a number from the binary numerical system to its equivalent in the hexadecimal numerical system

Practice (7)

1) Use the following table to analyze the number $(10101010011001)_2$ to its corresponding value in the hexadecimal numerical system under the supervision of your teacher. (You can use table (3) SB p 23)

$(10101010011001)_2$	0010	1010	1001	1001
Hexadecimal Number	......	......	......	9
$(10101010011001)_2 =$	$(............)_{16}$			

So the number $(10101010011001)_2 = (...........)_{16}$

2) Find an equivalent to the number $(110000011010001)_2$ in the hexadecimal numerical system using the following table:

$(110000011010001)_2$	......	0000	......	0001
Hexadecimal Number	......	......	......	......
$(110000011010001)_2 =$	$(............)_{16}$			

So the number $(110000011010001)_2 = (...........)_{16}$

3) Find an equivalent to the number $(11000111000100)_2$ in the hexadecimal numerical system using the following table:

$(...............................)_2$	......	......	......	......
Hexadecimal Number	......	......	......	......
$(11000111000100)_2 =$	$(............)_{16}$			

So the number $(11000111000100)_2 = (...........)_{16}$

Second topic
Producing a project to convert a number between numerical systems using VB.NET language.

Activity (1)
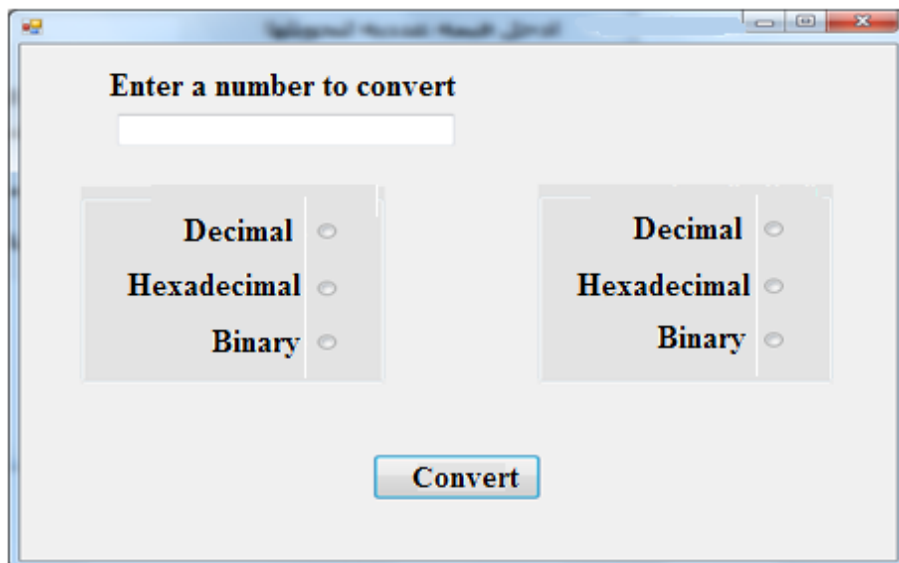
"Inserting control elements on the form window and adjusting its properties using VB.NET language"

You can use Visual Studio.NET language to insert control elements on the form window of 'converting a number among numerical systems' in collaboration with colleagues in your group and under your teacher supervision.

Through following the following procedures:

1- Open Visual Studio.NET application.

2- Insert controls so that the user interface appears as shown in the figure.

3- Adjust the formats to show the form as follows.

Enter a number to convert

Decimal ○	Decimal ○
Hexadecimal ○	Hexadecimal ○
Binary ○	Binary ○

Convert

4– Use the previous form window and the following control tools to adjust the properties of controls using the values shown in the table.

Control Tools	Properties	Value
Form1	**Text** **RightToLeft**	Convert among numerical systems **Yes**
Label1	**Text** **AutoSize** **BorderStyle**	Insert a numeric value to convert False Fixed Single
TextBox1	**Text**	" "
GroupBox1	**Text**	The system converted from
RadioButton1	**Text**	Decimal
RadioButton2	**Text**	Hexadecimal
RadioButton3	**Text**	Binary
GroupBox2	**Text**	The system converted to
RadioButton4	**Text**	Decimal
RadioButton5	**Text**	Hexadecimal
RadioButton6	**Text**	Binary
Button1	**Text**	Conversion

5– Save what you've implemented.

Write a code to convert a number between numerical systems using VB.NET language

Activity (2)

Write the following code to produce a project to convert a number among numerical systems using VB.NET language by collaborating with your colleagues in the group and under the supervision of your teacher.

```vbnet
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e
As System.EventArgs) Handles Button1.Click
    Dim value As String = Me.TextBox1.Text
    Dim baseType As Integer
    Dim toBase As Integer
    Dim fromBase As Integer
    If Me.RadioButton1.Checked Then
        baseType = 10
    ElseIf Me.RadioButton2.Checked Then
        baseType = 16
        Else
            baseType = 2
    End If
    If Me.RadioButton4.Checked Then
        toBase = 10
    ElseIf Me.RadioButton5.Checked Then
        toBase = 16
         Else
            toBase = 2
    End If
    fromBase = Convert.ToInt32(value, baseType)
    MsgBox(Convert.ToString(fromBase, toBase))
    End Sub
```

Activity (3)

The task: Implement the program and test its validity.

Perform the following actions in collaboration with your colleagues in the group using and based on your previous experience:

1) Press the button 'Start Debugging'.

2) Insert a numerical value.

3) Select the numerical system converted from.

4) Select the numerical system converted to.

5) Press the conversion button.

6) Verify the validity of the obtained results.

Third topic

Producing a project to convert a number between numerical systems using the PHP language

Activity (1)

Inserting controls and adjusting its properties on the project's web page using Expression Web application.

The following figure shows a proposal for the design of web pages that appear on the Internet browser window, and the controls necessary for the production of project.
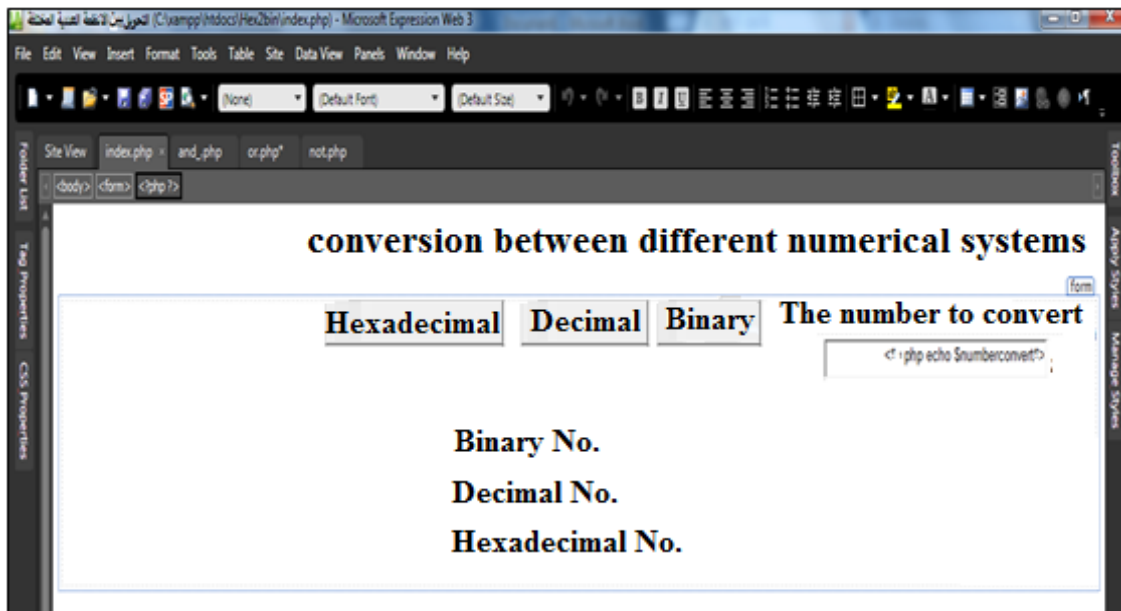
1-Study the previous figure in collaboration with your colleagues in the group and under the supervision of your teacher, determine the controls on the web page, deduce their purpose and write down your conclusions in the following table.

Control	Its purpose
Form	....
....	....
Three 'submit' buttons	• The first 'binary conversion' ---------------------- • The second 'decimal conversion'............................ • Third 'hexadecimal' conversion ....
Three 'label'	• The first shows the ---------------------- • The second shows the ---------------------- • The third shows the ----------------------

(2) Use the Expression Web application to implement user interface design for the project through writing the texts and inserting appropriate controls, using your previous experience, the help of former colleagues and under the supervision of your teacher.

Write a code of a project to convert a number between numerical systems, implement it and test its validity using language PHP code.

Activity (2)

Answer the following questions:

1- Consider the code, and then complete the following sentences and discuss the findings with your classmates and your teacher:

```php
<?php

$numberconvert=""; A variable to receive the number to be converted

$numberbin="";        A variable to receive the binary number

$numberdec="";        A variable to receive the decimal number

$numberhex="";        A variable to receive the binary number


    if(isset($_POST['Submit1']))

Test if the button 'binary conversion' has been pressed which means that
the number is binary, and consequently:

    {

     $numberconvert= $_POST['num'];

Pick up the number that has been inserted in the text box and put it in the
.numberconvert variable

      $numberbin=$numberconvert;

Assign the same 'binary' number to the variable numberbin

      $numberdec=bindec($numberconvert);
```

bindec function is used to convert the stored number in the variable numberconvert of binary numerical system to the equivalent number in a decimal numerical system and customize the output of the variable numberdec

```
$numberhex=dechex($numberdec);
```

Dechex function used to convert the stored number in the variable numberdec of decimal numerical system to the equivalent number in a hexadecimal number system and customize the output of the variable numberdec where there is no direct conversion from binary to hexadecimal function.

```
}

    if(isset($_POST['Submit2']))
```

test if the button "hex conversion" has been pressed, which means that the number you want to convert is decimal.

```
{

    $numberconvert= $_POST['num'];
```

Pick up a number that has been entered in the text box and puts it in the variable 'numberconvert'.

```
$numberbin=decbin($numberconvert);
```

(Exercise) Complete the following:

1. The function .... is used to convert the number stored in the variable 'numberconvert' of the numerical system .... to the equivalent number in a numerical system .... and assignment the result to the variable 'numberbin.'

   $numberdec=$numberconvert;

2. Allocate the same number "decimal" to the variable..............

   $numberhex=dechex($numberdec);

3. The function dechex is used to convert the number stored in the variable .... from the numerical system ------------ to its the equivalent number in the numerical system .... and customize the output to the variable ....

   if(isset($_POST['Submit3']))

4. The code tests if the button '----------------' has been pressed

 i.e. the number to be converted is .... and therefore:

   $numberconvert= $_POST['num'];

5. Pick up a number that has been entered in .... and put it in the variable ....

   $numberdec=hexdec($numberconvert);

6- The function ....is used to convert the number stored in the variable 'numberconvert' from the .... numerical system to its equivalent number of the .... numerical system and customize the output to the variable 'numberdec'.

   $numberbin=decbin($numberdec);

7- The function.............. was used to convert the number in variable numberconvert of .... numerical system to equivalent number in the .... numerical system and assignment the result to the variable numberbin.

8- The same number stored in the variable --------------- is assigned to variable { ....

?>

(Exercise)

2- Copy the following code and use it in the implementation of a project to convert a number from a numerical system to another numerical system on a web page.

```
<html >
        <head>
                <meta          content='text/html;          charset=utf-
                8' http- equiv='Content-Type' />
                <title> conversion among numerical systems </title>
        </head>
<body dir='RTL'>
                <h1>   conversion   among   different   numerical
systems </h1>
<form method='post' action=' '>
<?php
```

```php
        $numberconvert="";

        $numberbin="";

        $numberdec="";

        $numberhex="";

    if(isset($_POST['Submit1']))

     {

       $numberconvert= $_POST['num'];

       $numberbin=$numberconvert;

       $numberdec=bindec($numberconvert);

       $numberhex=dechex($numberdec);

     }

    if(isset($_POST['Submit2']))

     {

       $numberconvert= $_POST['num'];

       $numberbin=decbin($numberconvert);

       $numberdec=$numberconvert;

       $numberhex=dechex($numberdec);

     }
```

```php
    if(isset($_POST['Submit3']))

    {

      $numberconvert= $_POST['num'];

      $numberdec=hexdec($numberconvert);

      $numberbin=decbin($numberdec);

      $numberhex=$numberconvert;

    }
?>
```

```html
    <h3> the number to be converted

    <input name='num' style='width: 254px; height:
    29px' type='text' value='<?php echo
    $numberconvert; ?>' >   

    <input name='Submit1' style='width: 118px'
    type='submit' value='binary conversion'>  

    <input name='Submit2' type='submit'
    value=' Hex conversion>    

    <input name='Submit3' type='submit'
    value=' hexadecimal conversion '>    
            
          </h3>  <br>  <br>

    <p>      
           
        

    <label id='Label1'> <?php echo $numberbin; ?>
    </label>   </p>

    <p> Decimal number      
            
```

```
        <label     id='Label2'>      <?php    echo    $numberdec;    ?>
        </label>        </p>

        <p>  Hexadecimal number     

        <label     id='Label3'><?php    echo    $numberhex;    ?>
        </label>       </p>
</form>

</body>

</html>
```

2- Save the web page in the name of convert.php within the path c:\xampp\htdocs.

3- Upload the project page on the Internet browser at the following address:

http://localhost/convert.php

4- Insert the number and test the project validity of conversion between numerical systems.

An important note

Dear student,

You should be writing a code that verifies the validity of any value entered in the text box while running the program, For example, in the previous code you must enter a numerical value only in the text box, which we assumed for simplicity, You can search for the concept of the term validation and the right code to verify the input values.

A Virtual Tour

Look online for a code used in any programming language in the conversion between the numerical systems. Then use the results to complete the following table:

Activity (3)

The Key Word |s used in the search for the code	The Programming code you got	The programming language used in writing the code	The Source (the site address and subservience)	Date and time of getting the code	Evaluate the code obtained explaining briefly the difference between it and the code that you studied

See you

In

Unit two