Control Structures & Functions

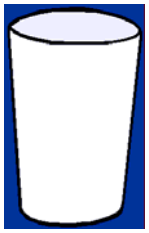
Variables (or identifiers)

1) Values stored in computer memory locations
2) Value can vary over time
3) Variables are case-sensitive
4) Cannot use *reserved words* as variables
Variable Examples: var x =10, var employeeName="Ali" , & var _hi="How are u?"
6) Conventions: Use underscore or capitalization to separate words of an identifier: employee_first_name,employeeFirstName

Variable: Real-World Analogy

- **var myCup**

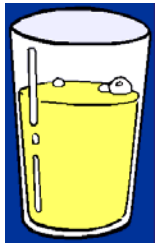
  creates myCup in memory, notice that it is empty



myCup

- **myCup = "lemonade"**

initializes or fills myCup with lemonade



myCup

- **myCup = “chocolate"**

replaces the lemonade in myCup with chocolate

myCup

Control Structures

1. If : single selection
2. If/else : double selection
3. while :repetition
4. do/while : repetition
5. for : repetition
6. switch :multiple selection

If & if/else

```
<script language="javascript">
var userName = window.prompt("What is
your name?", "");
var userAge = window.prompt("Your age?",
"");
    userAge = parseFloat(userAge);
   if (userAge < 18)
document.write("Do your parents know that
you are online?");
else
document.write("Hello " + userName + ".");
</SCRIPT>
```

```
// read weight and price from user
 <script language="javascript">
var kilo = window.prompt("Enter amount in
kilograms:", "0" );
var price = window.prompt("Enter price per kilo:",
"0" );
var total = parseFloat(kilo)  * parseFloat(price);
if ( kilo < 0 )
window.alert("Sorry, I need a positive number.");
else
        document.write("<h1> The total price: "
+"<font color= red>"    +total    +" JDs" );
</script>
```

```
<script language="JavaScript">
    var age=window.prompt ("How old are
you?","") ;
        if ((age<1) || (age>120))
        window.alert ("You must be wrong....") ;
        else
        window.alert ("Thank you.")
</SCRIPT>
```

Age=30

age=135

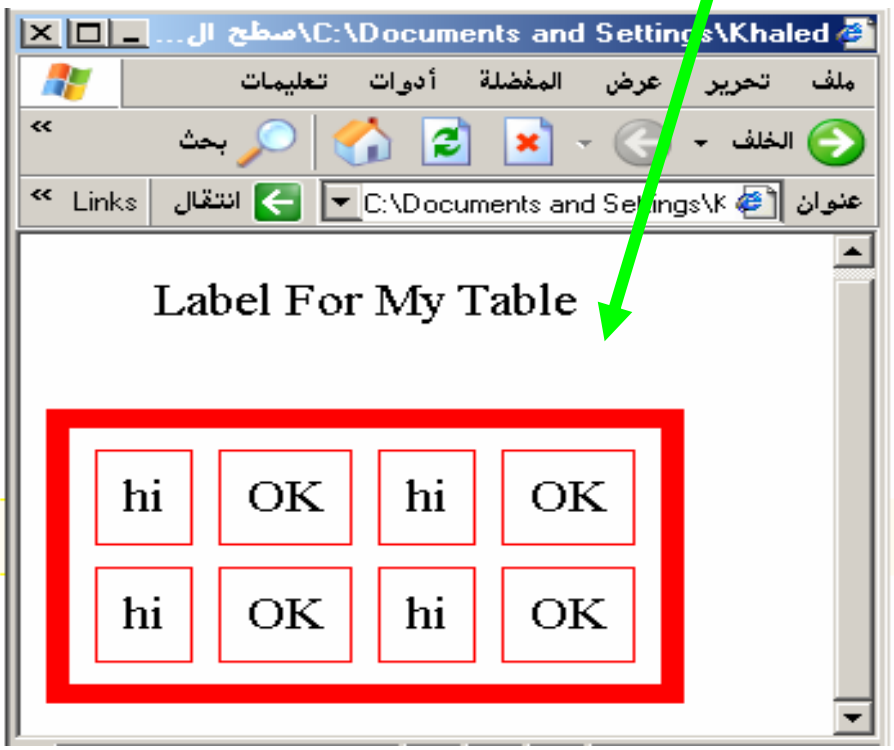
isNaN() method

```
<Script Language="JavaScript">
var age=window.prompt("Enter your age
","");
if (age == null || age == "" || isNaN(age))
{
    window.alert("You must type a
number.");
}else{
window.alert(“Thank you for being
good");}
</Script>
```

```
<HTML>
<SCRIPT language="JavaScript">
 var x= window.confirm("Do you really
want to go to this page??");
  if (x) // the same as if (x==true)
 window.location="ok13.html";
  else if (!x) // the same as else if (x==false)
 window.location="1.gif";
</SCRIPT>
<body></body>
</HTML>
```

Output


Microsoft Internet Explorer
Do you really want to go to this page??
موافق
إلغاء الأمر

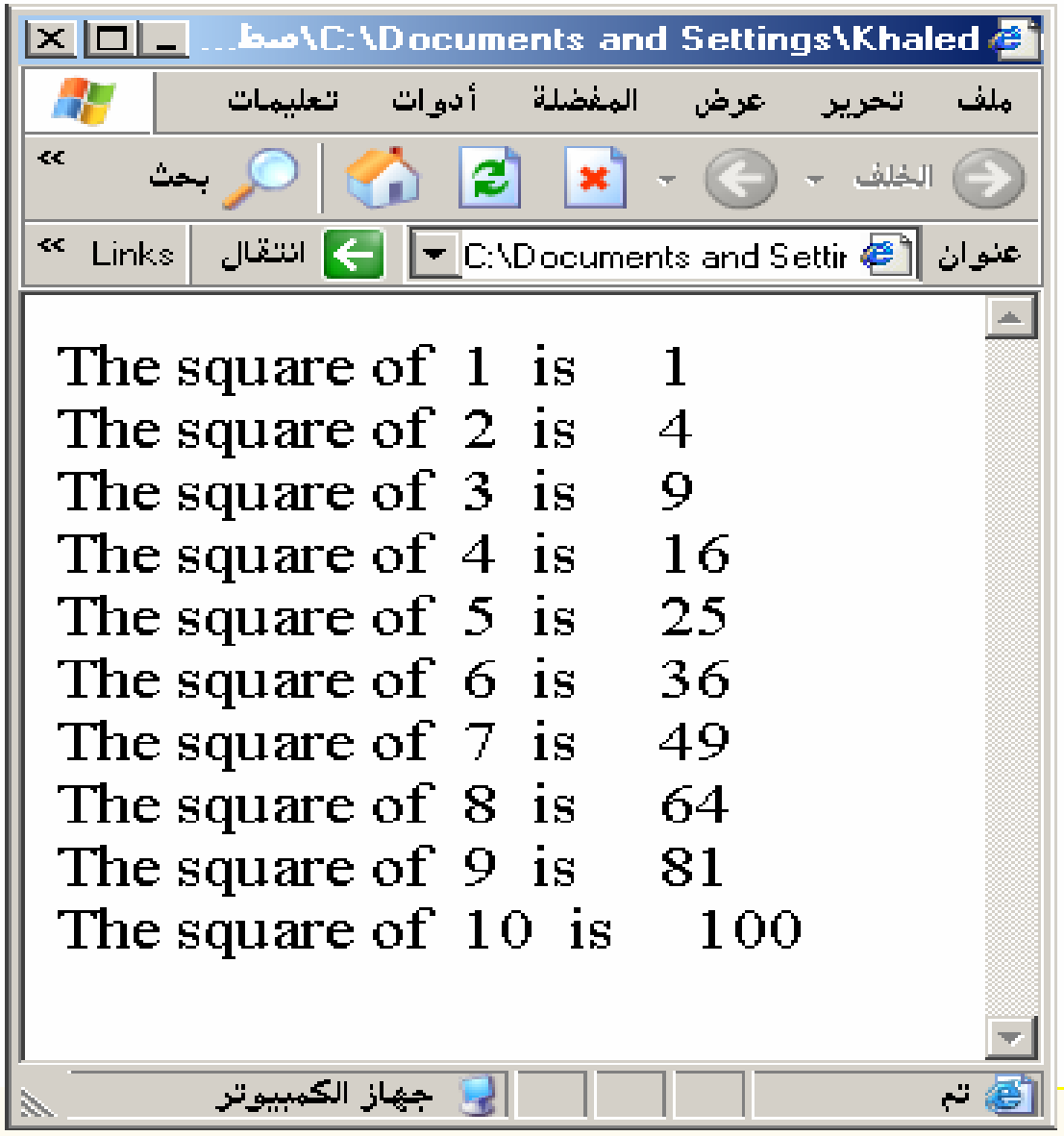

C:\Documents and Settings\Khaled
Label For My Table
hi
OK
hi
OK
hi
OK
hi
OK


C:\Documents and Settings
جهاز الكمبيوتر

while & do/while

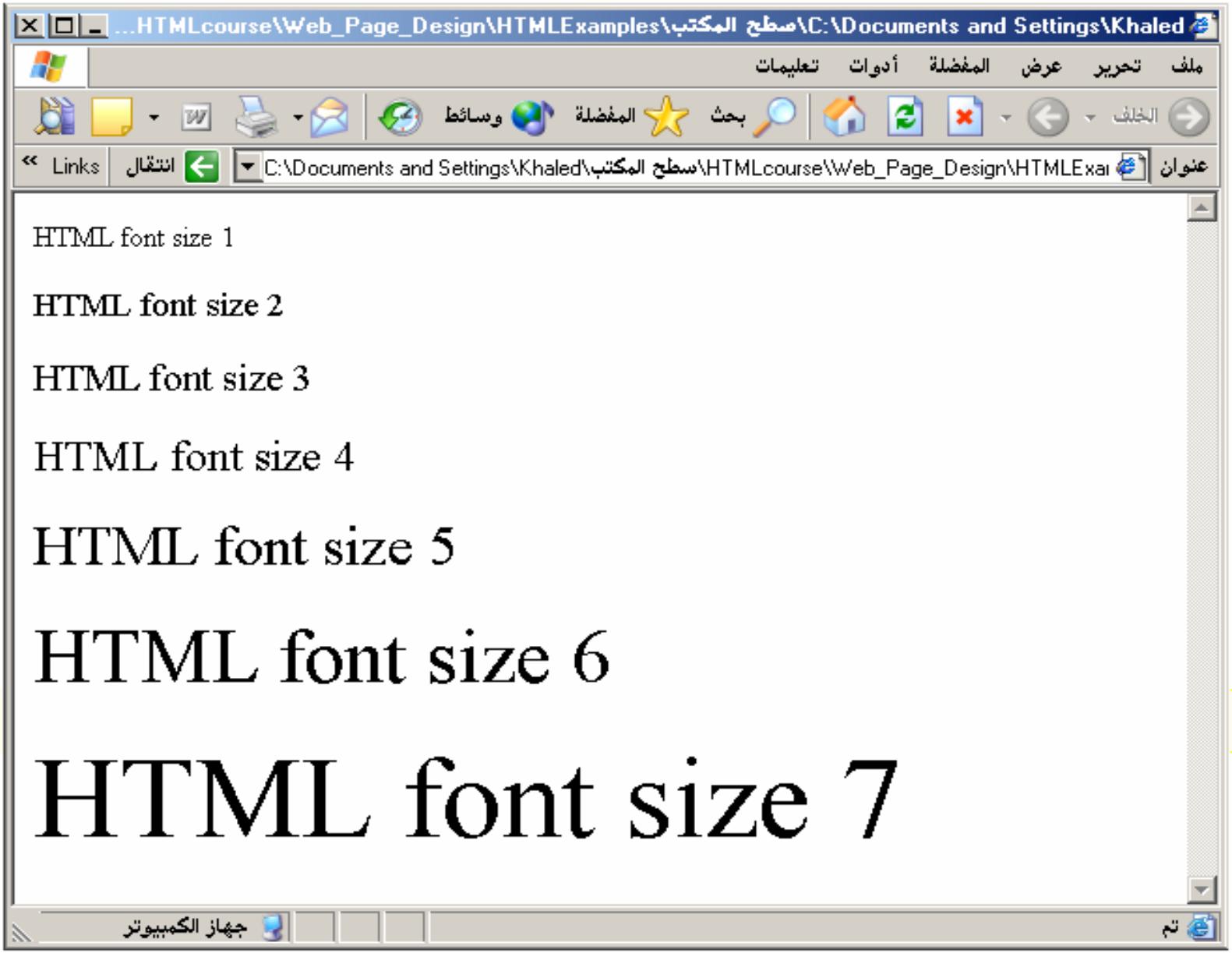
```
<SCRIPT LANGUAGE="JavaScript">
var x = 1 ;
while ( x <= 10 )
{
document.writeln("The square of
 "+ x +"  is     "+
Math.pow(x ,2 )+"<br>");
  x = x + 1;
}</SCRIPT>
```

Output


C:\Documents and Settings\Khaled
ملف تحرير عرض المفضلة أدوات تعليمات
بحث
الخلف
Links انتقال
C:\Documents and Settir
عنوان
The square of 1 is 1
The square of 2 is 4
The square of 3 is 9
The square of 4 is 16
The square of 5 is 25
The square of 6 is 36
The square of 7 is 49
The square of 8 is 64
The square of 9 is 81
The square of 10 is 100
جهاز الكمبيوتر
تم

```
<HTML>
<SCRIPT language="JavaScript">
var x=1;
while(x<=7)
{
document.writeln("<p><font size="+ x +
">HTML font size "+x+"</font></p>");
++x;
}
</SCRIPT>
<body></body>
</HTML>
```

Output


...HTMLcourse\Web_Page_Design\HTMLExamples\سطح المكتب\C:\Documents and Settings\Khaled
ملف تحرير عرض المفضلة أدوات تعليمات
الخلف بحث المفضلة وسائط
عنوان C:\Documents and Settings\Khaled\سطح المكتب\HTMLcourse\Web_Page_Design\HTMLExa انتقال Links
HTML font size 1
HTML font size 2
HTML font size 3
HTML font size 4
HTML font size 5
HTML font size 6
HTML font size 7
تم جهاز الكمبيوتر

What will the following do?

```
<script language="javascript">
var i, j;
i=1;
while (i <= 10) {
   document.writeln("<BR>"  );
   j = 1;
   while (j <= i) {
      document.writeln(" * ");
      j++;
   }
   i++;
}
</SCRIPT>
```

Output


C:\Documents and Settings\Khaled\سطح ا...
ملف تحرير عرض المفضلة أدوات تعليمات
الخلف بحث
عنوان C:\Documents and Settings\I انتقال Links
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جهاز الكمبيوتر
تم

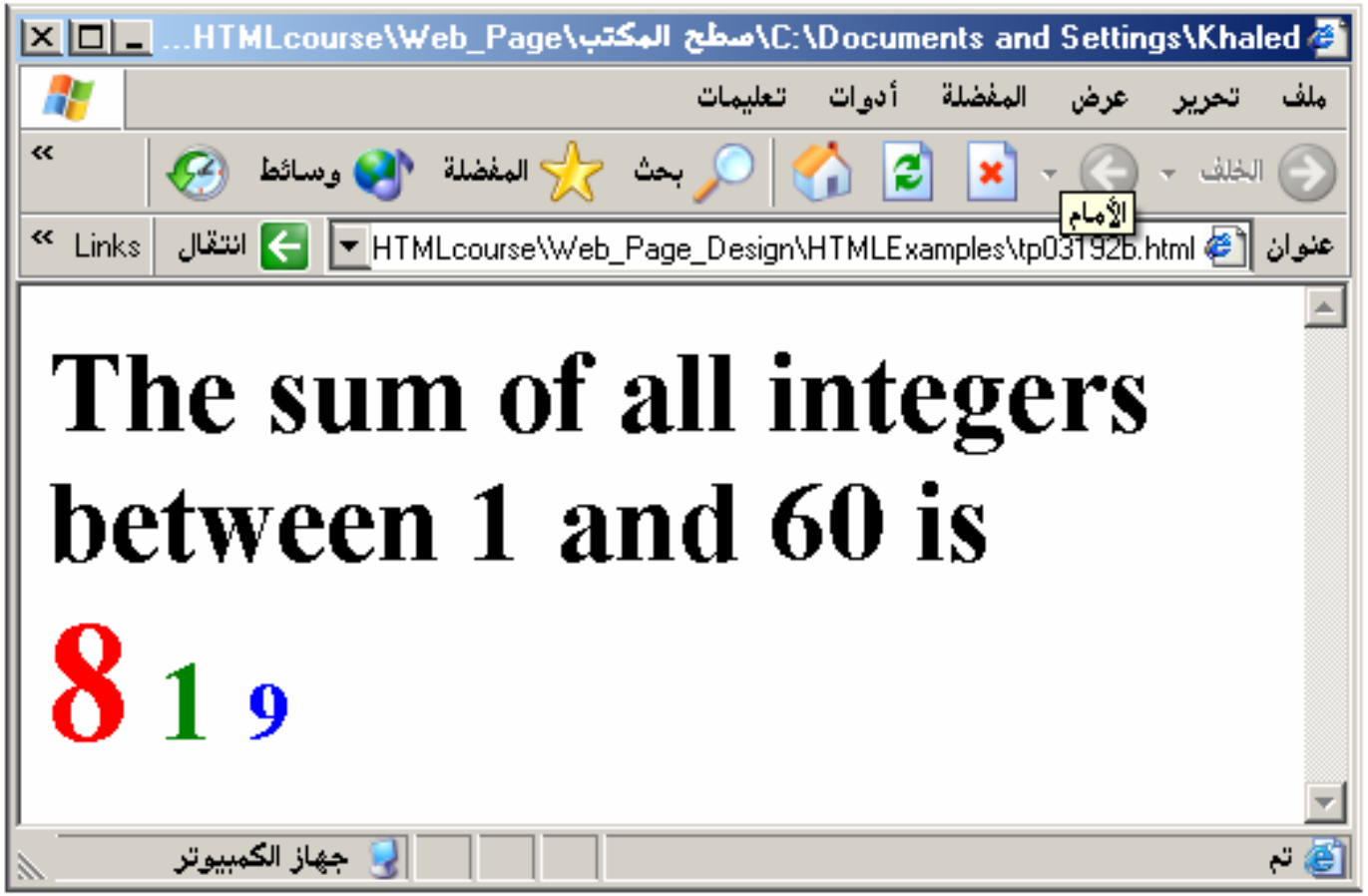
for control statement

Write a program that displays the sum of all numbers between 1 and 10.

```
<script language="javascript">
var sum=0 ;
for ( var x = 1; x <= 10; x += 1 )
sum += x;
document.write("<h2>The sum of all
integers between 1 and 10 is " +sum);
</script>
```

Write a program that displays the sum of all numbers that are divisible by 3 OR 7 which lie between 1 and 60.

Your output must look like this:



Solution

```
<script language="javascript">
var sum = 0;
for ( var x = 1; x <= 60; x += 1 )
if(x%3==0 || x%7==0)
sum += x;
var x11=Math.floor(sum/100); stringx11=x11+"";
var x12=Math.floor((sum%100)/10); stringx12=x12+"";
var x10=sum%10; stringx10=x10+"";
document.write("<h1>The sum of all integers between 1
and 60 is<br> ");
 document.writeln(stringx11.fontcolor("red").fontsize(7));
 document.writeln(stringx12.fontcolor("green").fontsize(6));
 document.writeln(stringx10.fontcolor("blue").fontsize(5));
 </script>
```

Use for control statement to draw the following Table

Solution

```
<script language="javascript">
document.write("<table border= 5  width=300 height=200
cellspacing= 5   borderColor= blue >");
document.write("<caption> <h2>Table Colors</h2> </caption>");
var r=5;
for(var x=1; x<=r; x++)
{
        document.write("<tr><td bgcolor=red>  </td>");
        document.write("<td bgcolor=green> </td>");
        document.write("<td bgcolor=yellow> </td>");
        document.write("<td bgcolor=black> 
</td></tr>");
}
document.write("</table>");
</script>
```

A person invests $10000 in a saving account yielding 5% interest. Assuming that all interest is left on deposit, calculate and print the amount of money in the account at the end of each year for 20 years. Use the following formula determining these amounts:

$$a = p(1+r)^n$$

Where

p is the original amount invested,

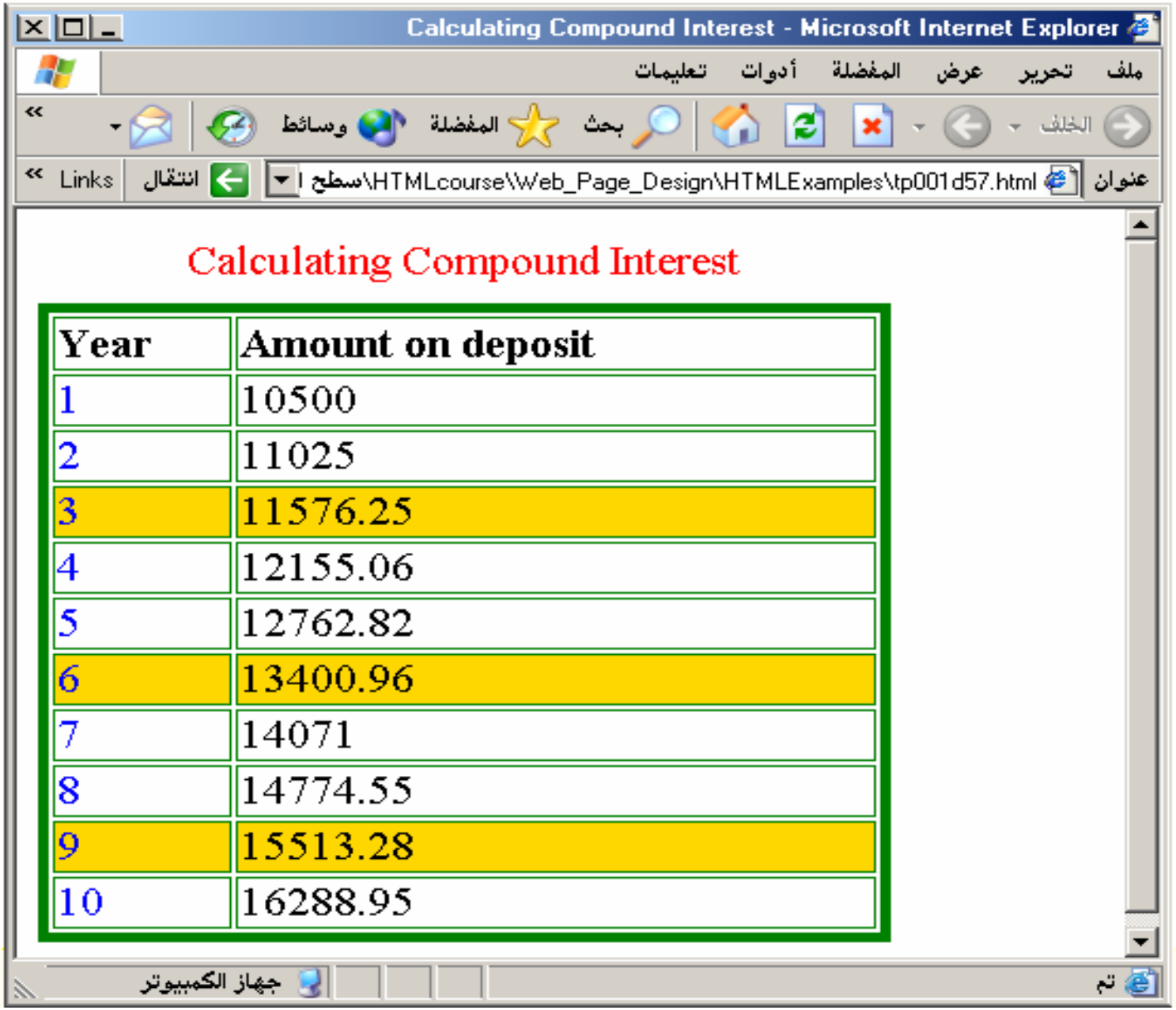
r is the annual interest rate,

n is the number of years and

a is the amount on deposit at the end of each year.

Your output must be tabulated as shown below

Output


Calculating Compound Interest - Microsoft Internet Explorer
ملف تحرير عرض المفضلة أدوات تعليمات
الخلف بحث المفضلة وسائط
عنوان سطح ا\HTMLcourse\Web_Page_Design\HTMLExamples\tp001d57.html انتقال Links
Calculating Compound Interest
Year | Amount on deposit
1 | 10500
2 | 11025
3 | 11576.25
4 | 12155.06
5 | 12762.82
6 | 13400.96
7 | 14071
8 | 14774.55
9 | 15513.28
10 | 16288.95
جهاز الكمبيوتر
تم

Solution

```
<HTML><head><title>Calculating Compound Interest</title>
<script language="javascript">
var amount, principal = 10000, rate = .05;
document.writeln( "<table border =5 borderColor=green  table width=80%>" );
document.writeln( "<caption><font color=red> Calculating Compound Interest </caption>" );
document.writeln("<TR><TH align=left> Year </TH><TH align=left>Amount on deposit </TH></TR>");
```

```
for ( var year = 1; year <= 10; ++year )
{
if (year%3==0){
document.writeln("<TR bgcolor=gold> <TD>"+
"<font color=blue>" +year+"</font>"
+"</TD><TD>"+
Math.round (amount*100)/100 +"</TD></TR>");}
else{
amount = principal * Math.pow( 1.0 + rate, year );
document.writeln("<TR><TD>"+"<font
color=blue>"+year+"</font>"+"</TD><TD>"+
Math.round(amount*100)/100+"</TD></TR>");}
document.writeln( "</table>" );
</script> </head><body></body></HTML>
```

Switch control statement

Write a program that uses switch control statement to switch between HTML List formats

```
<HTML><head><title>Using Switch</title>
<script language="javascript">

var choice,  startTag,   endTag,    listType;
var validInput = true;

   choice = window.prompt( "Select a list style:
" +   "1 (bullet), 2 (numbered), 3 (lettered)", "1" );
```

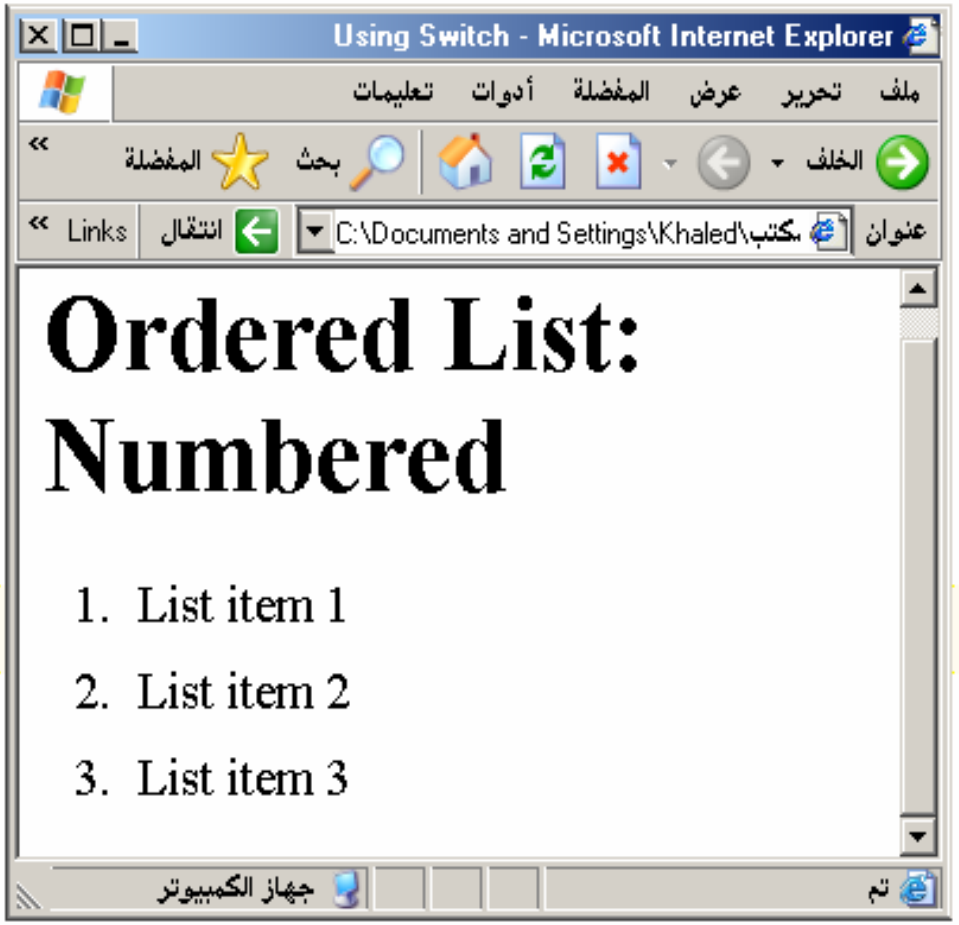
```
switch ( choice ) {
        case "1":
              startTag = "<ul>";
              endTag = "</ul>";
              listType = "<h1>Bullet List</h1>";
              break;
         case "2":
              startTag = "<ol>";
              endTag = "</ol>";
              listType = "<h1>Ordered List: Numbered</h1>";
              break;
          case "3":
              startTag = "<ol type = 'A'>";
              endTag = "</ol>";
              listType = "<h1>Ordered List: Lettered</h1>";
              break;
        default:
             validInput = false; }
```

```
if ( validInput == true ) {
            document.writeln( listType + startTag );
 for ( var i = 1; i <= 3; ++i )
    document.writeln( "<li>List item " + i + "</li>" );
            document.writeln( endTag );
         }
else
document.writeln( "<h1>Invalid choice: " + choice );
</script>
       </head>  <body>  </body>  </html>
```

Output

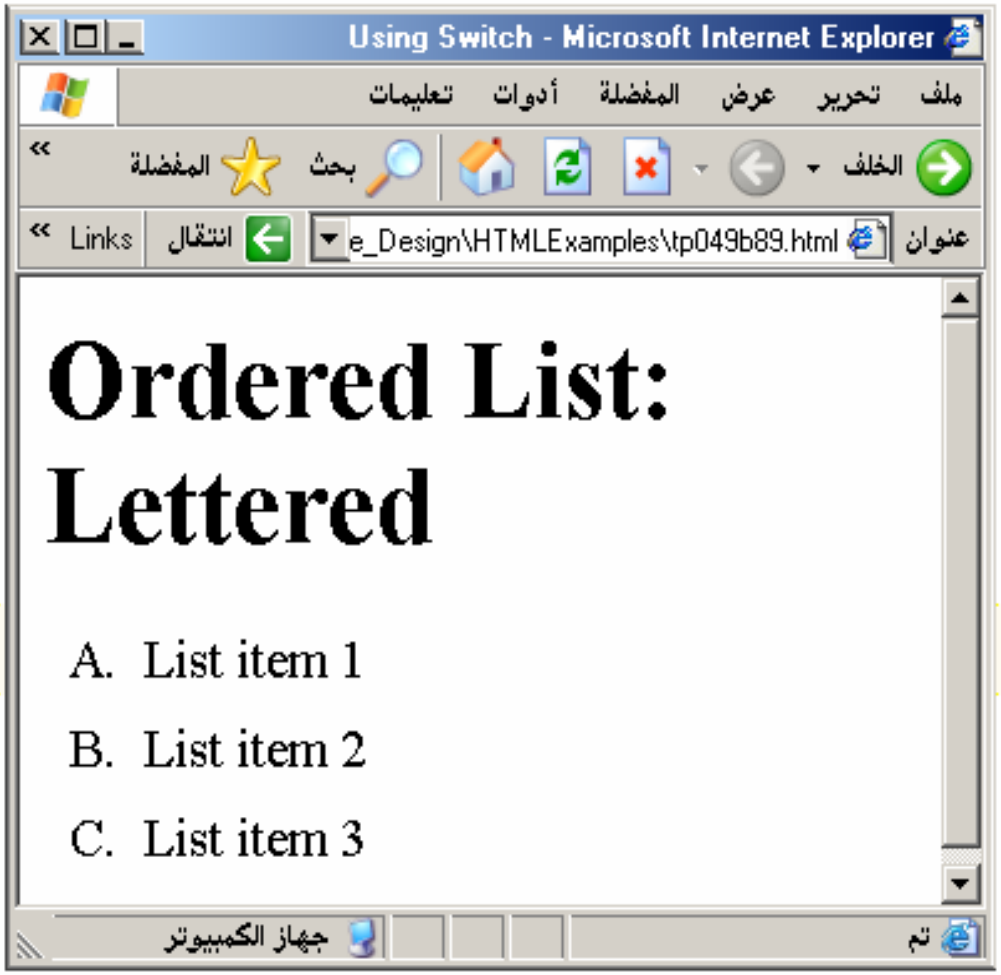
Choice=1

Choice=2



Output

Choice=3



Choice=4

Write a program that generates the following by manipulating the variable: var str="javascriptings"

Solution

```
<script>
var str="JavaScriptings";
str=str.toUpperCase();
var output="";
var y=1;
for (var x=0; x<str.length; x++){
if(x<=7)
output+=str.charAt(x).fontsize(x).bold();
else {
++y;
output+=str.charAt(x).fontsize(y).bold().f
ontcolor("blue");
}}
```

Javascript Functions

What is a Function?

- A function is a block of predefined programming statements whose execution is deferred until the function is "called."

```
function displayGreeting() {
alert("Greetings and Salutations!") }
```

- You call a function by invoking its name along with any required or optional parameters enclosed in parentheses and separated by commas, Such as:

```
displayGreeting()
```

What's a Parameter?

- A function parameter, also known as an argument, is a data value or data reference that you can pass to the function to work on or use.

  Parameters make functions more useful and flexible.

```
function greetVisitor(firstName)
{
alert("Hello, " + firstName + "!")
}
```

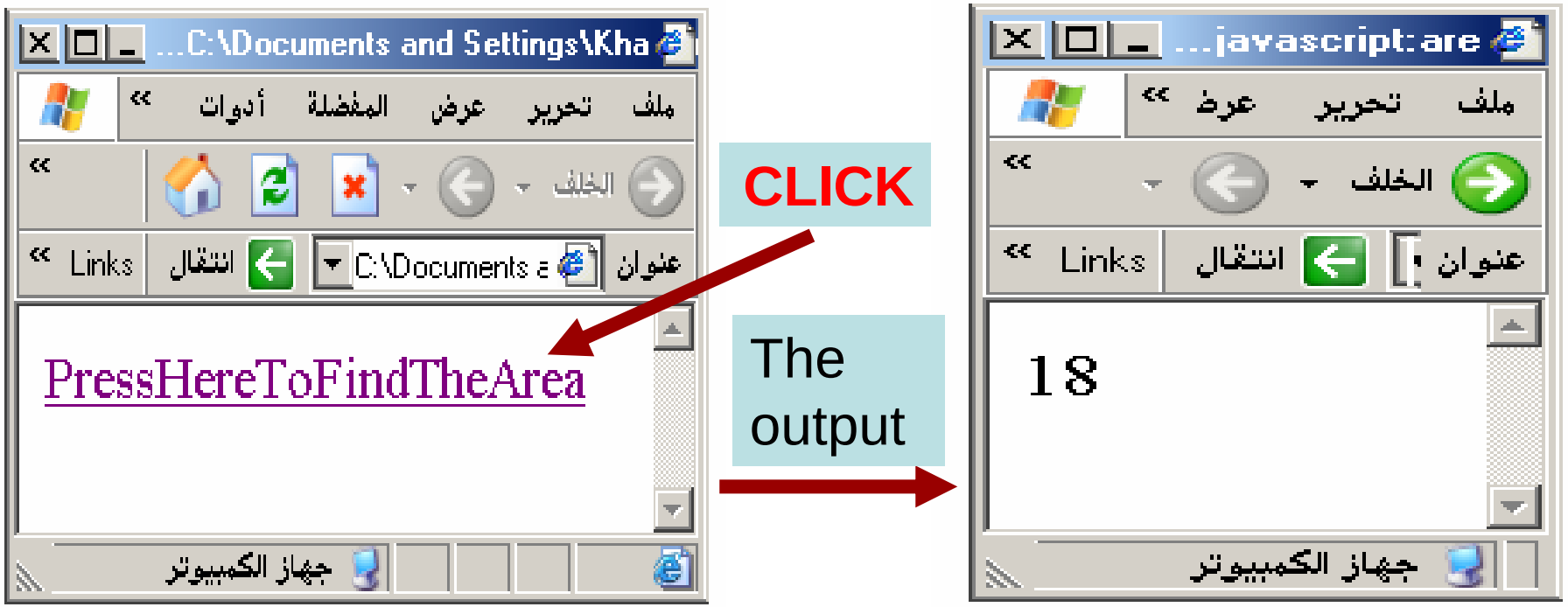
  When a value is passed to a function it is called an argument. Let's pass "Sam" as an argument for the visitor parameter: **greetVisitor("Sam")**

Javascript Functions

```
script language="javascript">
function sum(number)
{
        var result = number + number;
        return result;
}
var output=sum(10);
document.writeln(output);
window.alert(output);

</script>
```

```
<script language="javascript">
function areaTriangle(base, height){
var area = .5 * base * height;
   return area;   }
window.alert("The area is " + areaTriangle(4,7));
</script>
```

```
<script language="javascript">
function areaTriangle(base, height) {
var area = .5 * base * height;
   return area  }
</script>
< BODY ><h1>
 <A HREF="javascript:areaTriangle(4,9)" >
PressHereToFindTheArea</A>  </BODY>
```



Calling a Function

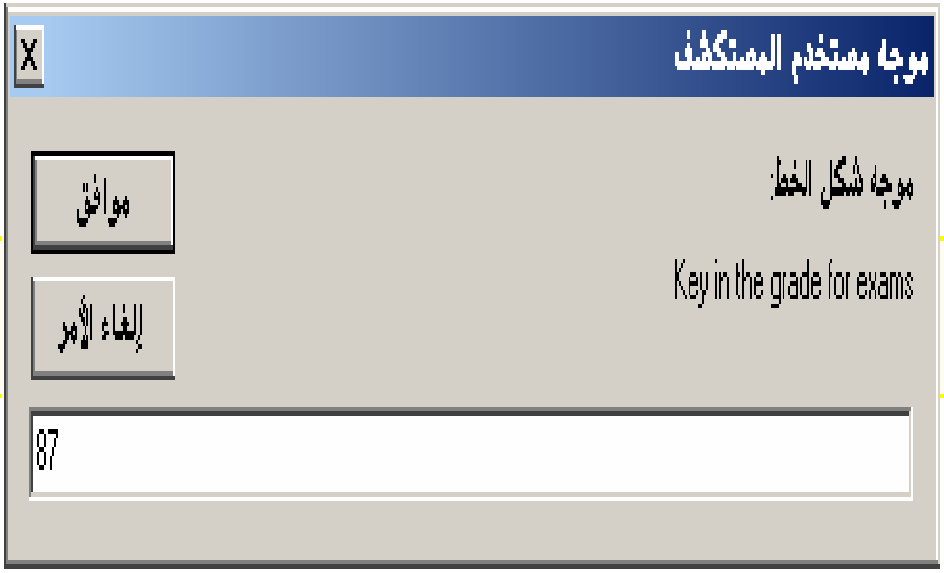
One of the ways of calling can be shown below:

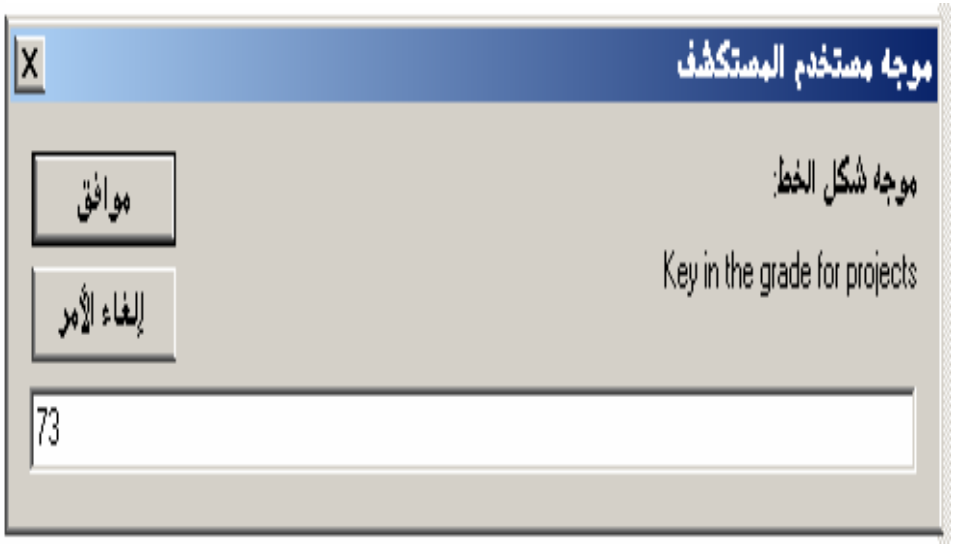
```
<Script Language="JavaScript">
function showAddress()
{
  document.write(“<h1>125 Hi street, Irbid, Jordan");
}
</Script>

<Script Language="JavaScript">
        showAddress();// call the method above
</Script>
```

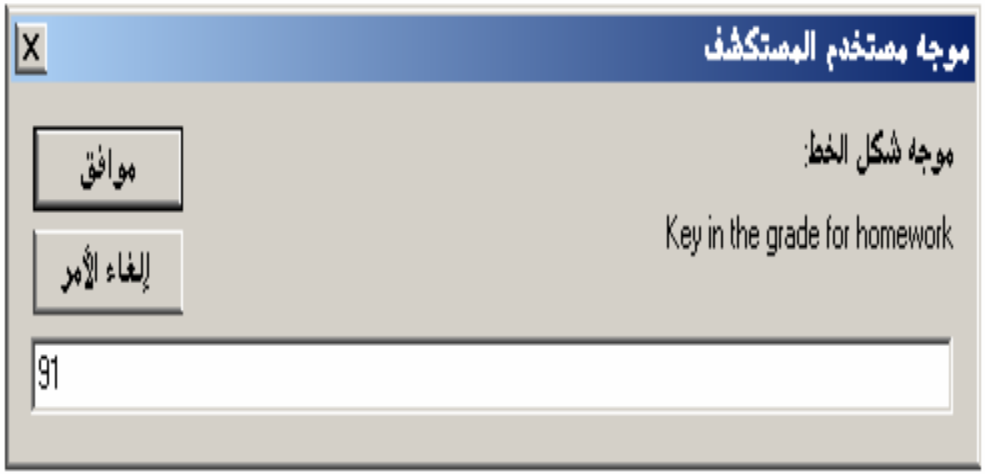
Calculating the Average

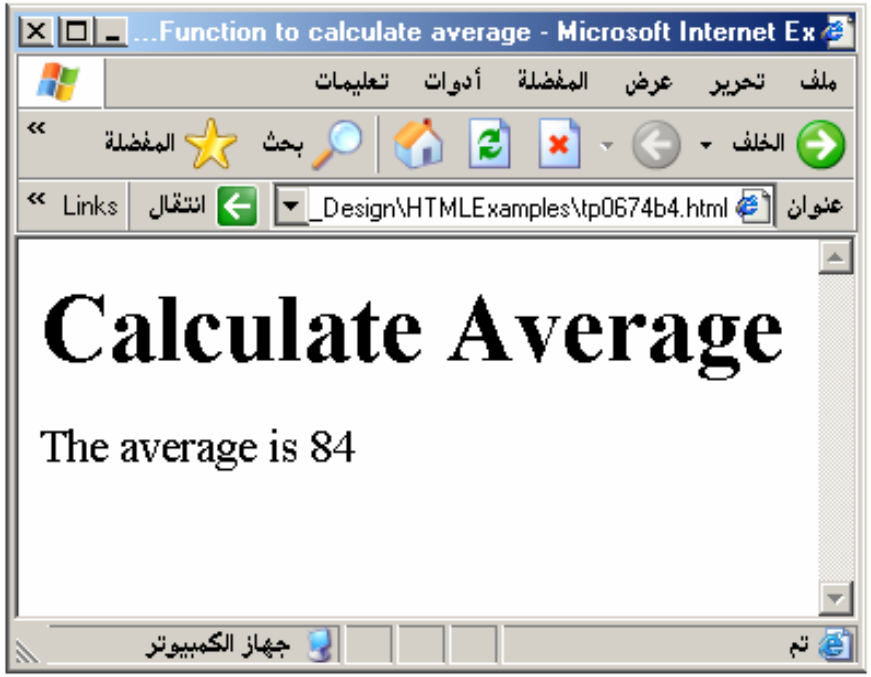
```
<SCRIPT language = "JavaScript">
function calAvg(exam, proj, hmwk)      {
       var theAvg = (exam + proj + hmwk)/3;
 document.write("<h1>The average is " + Math.round(theAvg)); }
</SCRIPT></HEAD>
<BODY>
<H1>Calculate Average</H1>
<SCRIPT language="JavaScript">
var exam = parseInt(prompt("Key in the grade for exams"));
var proj = parseInt(prompt("Key in the grade for projects"));
var hmwk = parseInt(prompt("Key in the grade for
homework"));
calAvg(exam, proj, hmwk);
</SCRIPT></BODY>
```

Output


موجه مستخدم المستكشف
موجه شكل الخط:
Key in the grade for exams
موافق
إلغاء الأمر
87


موجه مستخدم المستكشف
موجه شكل الخط:
Key in the grade for projects
موافق
إلغاء الأمر
73

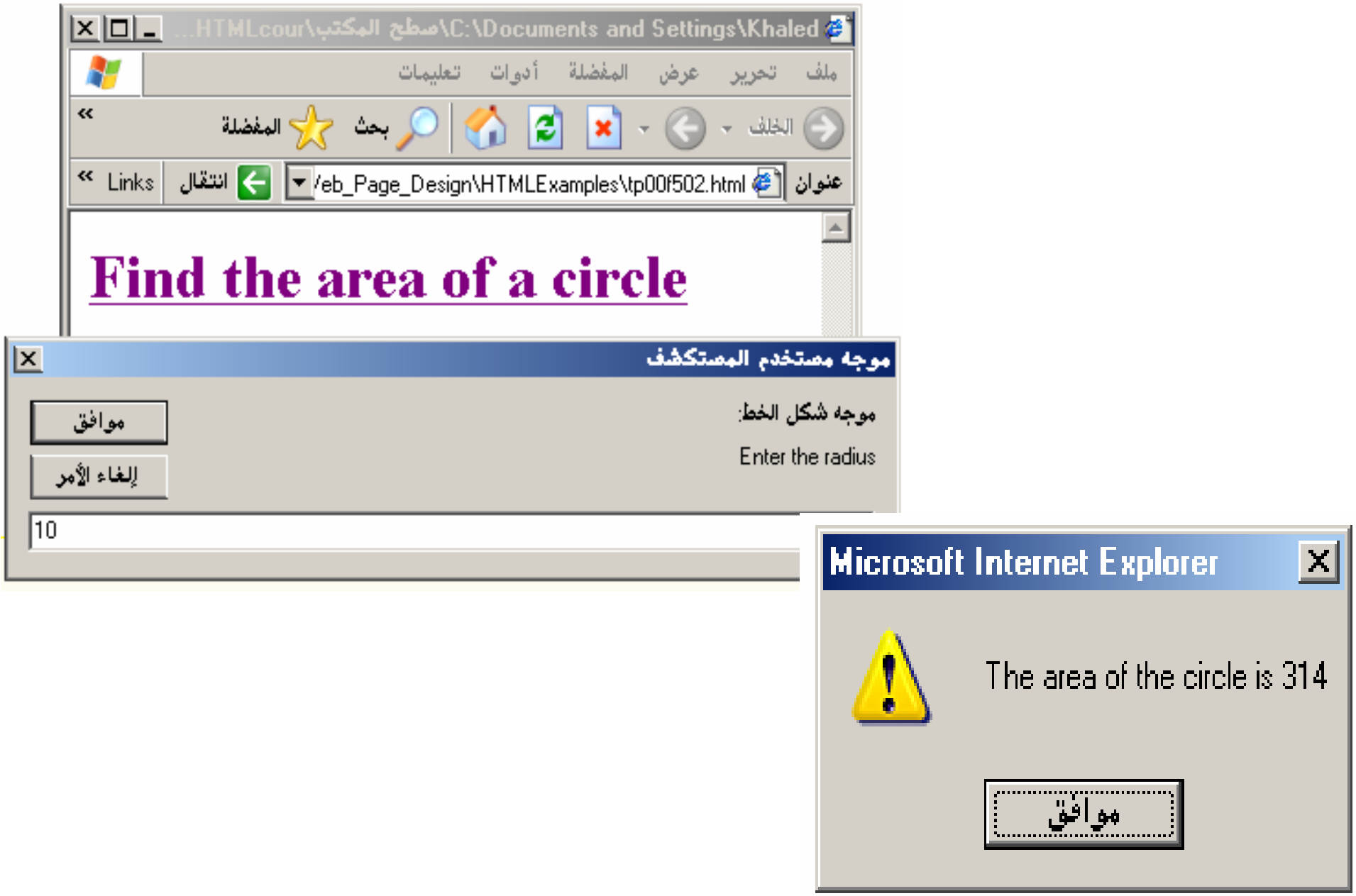

موجه مستخدم المستكشف
موجه شكل الخط:
Key in the grade for homework
موافق
إلغاء الأمر
91


...Function to calculate average - Microsoft Internet Ex
ملف تحرير عرض المفضلة أدوات تعليمات
الخلف بحث المفضلة
عنوان _Design\HTMLExamples\tp0674b4.html انتقال Links
Calculate Average
The average is 84
تم جهاز الكمبيوتر

Find the area of a circle by passing its radius to a function

```
<script language="javascript">
function circleArea(radius){
var area = radius * radius * Math.PI;
alert("The area of the circle is "+
Math.round(area));}
</script>
<body><H2>
<A HREF="javascript:circleArea(prompt('Enter
the radius',''));">
Find the area of a circle
</A></H2></BODY>
```

Output


C:\Documents and Settings\Khaled\سطح المكتب\HTMLcour...
ملف تحرير عرض المفضلة أدوات تعليمات
الخلف بحث المفضلة
عنوان /eb_Page_Design\HTMLExamples\tp00f502.html انتقال Links
Find the area of a circle
موجه مستخدم المستكشف
موجه شكل الخط:
Enter the radius
موافق
إلغاء الأمر
10
Microsoft Internet Explorer
The area of the circle is 314
موافق

Example

```
<script >
<!--
var x = prompt ( "Please enter name : ", "" );
var y = prompt ( "Please enter your age : ", "" );
function FindSeconds(first,next){
var temp = next * 365 * 24 * 60 * 60;
document.write ("Hi "+first+"! You have lived "
+ temp + " seconds! ");
}
// -->
</script>
<script>
FindSeconds(x,y);
</script>
```

Math.methods()

```
<script LANGUAGE="JAVASCRIPT">
var n1 =10; var n2=87; var n3=90; var n4=98;
window.alert("The maximum value is "+Math.max(n1,
n2, n3,n4)+ "\nThe minimum value is "+Math.min(n1,
n2, n3,n4));
</script>
```

eval () methods

```
<script>
var question="What is 10 * 10?";
var x=question.substring(8,15);
document.write("<h1>"+x);
var xx=eval( x );
document.write("<br>"+xx);
</script>
```

(With) Object

```
<Script Language="JavaScript">
var r=10
with (Math) {
    a = PI * r * r ;
    x = r * cos(PI) ;
    y = r * sin(PI/2);
    window.alert("a= "+round(a*1000)/1000 +"\nx= "+x+"\ny =
"+y);} </Script>
```

Math methods

Method	Returns
Math.abs(arg)	*Absolute value of argument*
Math.acos(arg)	Arc-cosine of argument
Math.asin(arg)	Arc sine of argument
Math.atan(arg)	Arc tangent of argument
Math.atan2(y,x)	Angle between x-axis and point x,y
Math.ceil(arg)	*Ceiling of argument*
Math.cos(arg)	Cosine of argument
Math.exp(arg)	E to arg power
Math.floor(arg)	Floor of arg
Math.log(arg)	Natural log of arg
Math.max(arg1,arg2)	*The greater of arg1 and arg2*
Math.min(arg1,arg2)	*The smaller of arg1 and arg2*
Math.random()	*A random number between 0 and 1*
Math.round(arg)	*Rounding to nearest integer up or down*
Math.sin(arg)	The sine of the argument
Math.sqrt(arg)	The square root of the argument
Math.tan(arg)	The tangent of the argument

Random Number Generation

1) The values produced directly by random are always in the range

0.0 <= Math.random() <1.0

2) We can generalize picking a random number from a range of values by writing:

randomValue=a+Math.floor(Math.random()*b);

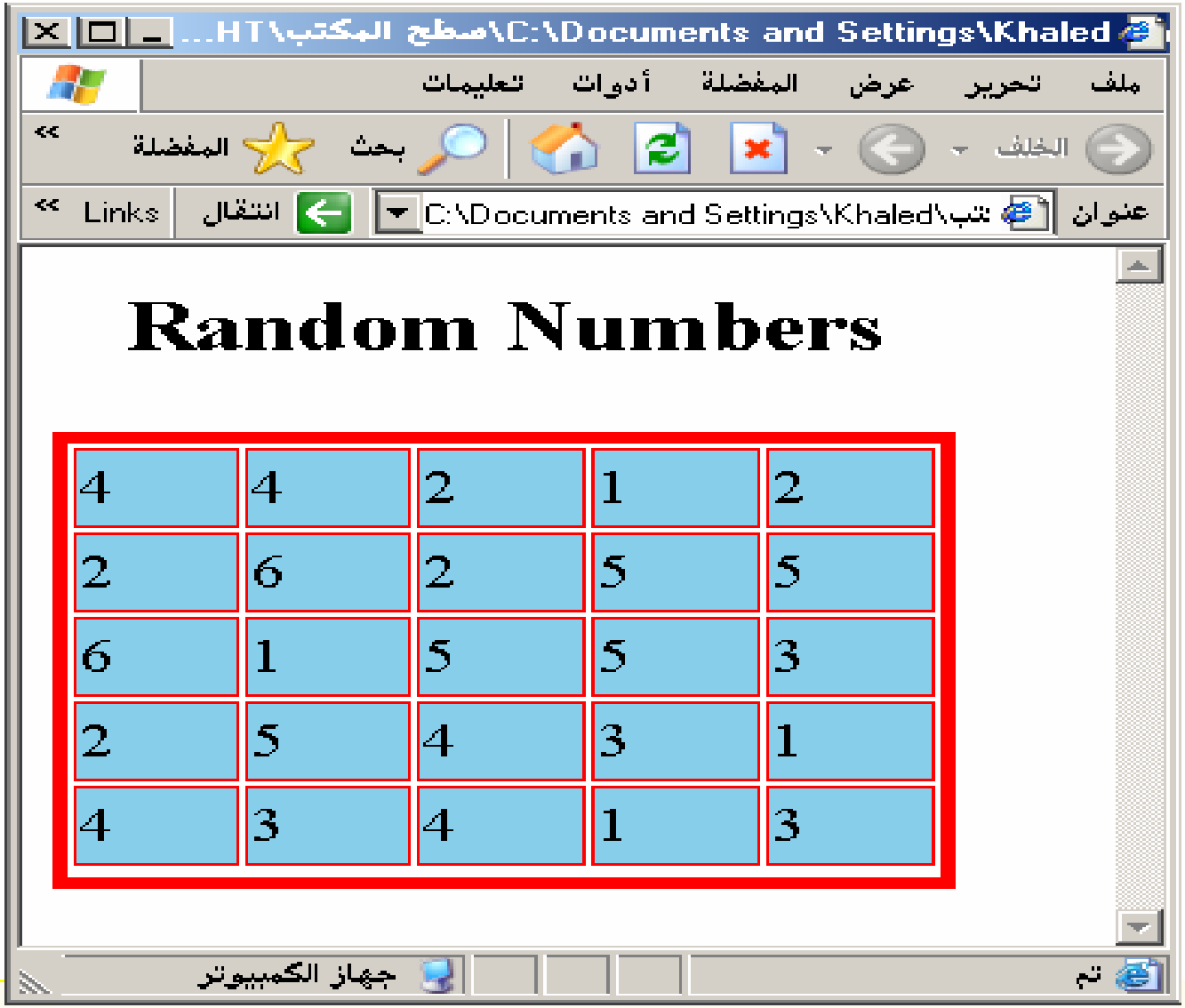
Where a is the shifting value(the first number in the desired range) and b is the scaling factor(the width of the desired range of the consecutive integers)

Write a program that generates randomly the following:

Solution

```
<Script Language="JavaScript">
document.bgColor="skyblue";
for (var x=1; x<=25; ++x)
{
var randomNumber=1+Math.floor(Math.random()*6);
document.write( randomNumber+"    ");
if(x%5==0)
document.write("<BR>");
}
</Script>
```

Write a program that generates randomly the following:



Solution

```
<script language="javascript">
document.write("<table border= 5  width=300
height=200 cellspacing= 2   borderColor= red >");
document.write("<caption> <h2>Random
Numbers</h2> </caption>");
document.write("<tr>");
for(var x=1; x<=25; x++) {
randomValue= 1+Math.floor(Math.random()*6);
document.write("<td bgcolor=skyblue>"+
randomValue+ "</td>");
if(x%5==0)
document.writeln("</tr><tr>");}
document.write("</table>");
</script>
```

Arrays

An *array* is a composite data type that stores a collection of values. These values can then be referenced by an index number.

Creating Arrays:There are a few different ways to create an array. The first three involve the Array( ) constructor, and the last is the array literal.
The arrays constructor is used on the right hand side of a combined variable declaration and assignment statement. It takes the following forms:

```
var aName = new Array( );
var aName = new Array(6);
var aName = new Array(20, 1, 7, 'top', ' ok‘,-9);
```

Array Literals:

```
var aName = [20, 1, 7, 'top', ‘ok‘,’-9’];
```

Creating Arrays: two ways

I) First Method

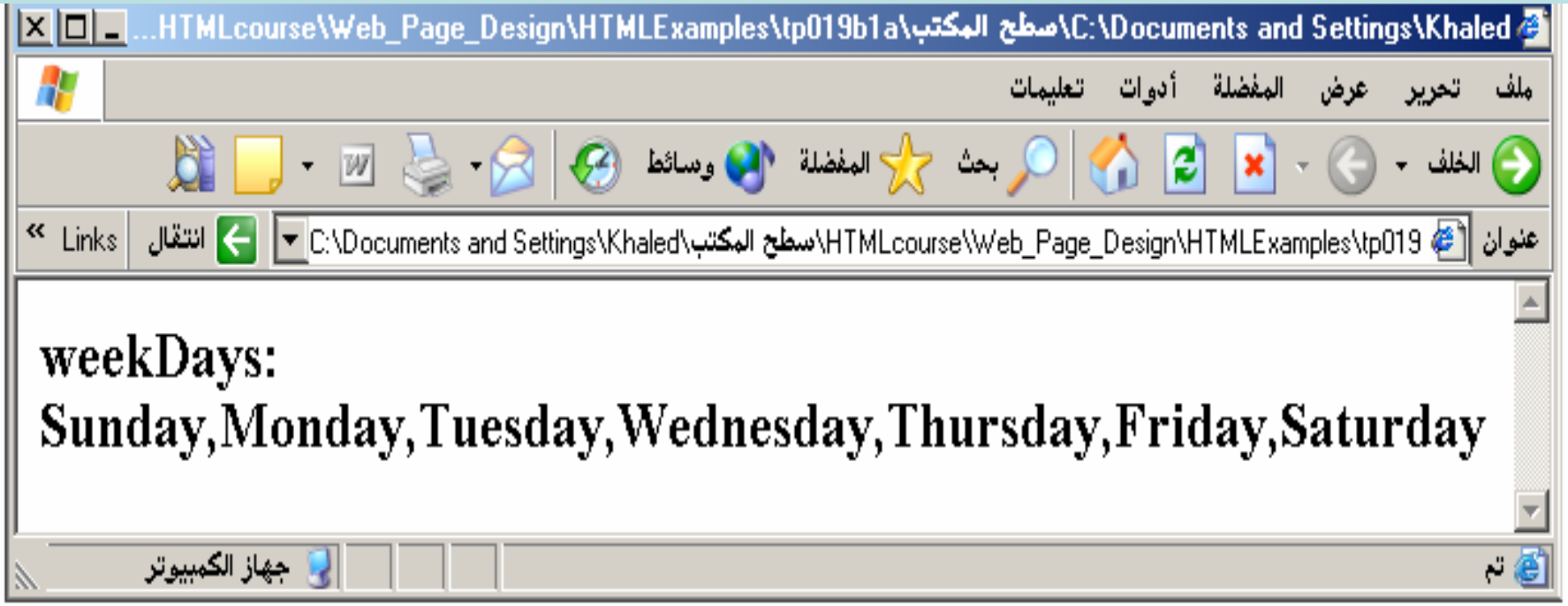
```
var weekDays = new Array(7);
weekDays[0] = "Monday";
weekDays[1] = "Tuesday";
weekDays[2] = "Wednesday";
weekDays[3] = "Thursday";
weekDays[4] = "Friday";
weekDays[5] = "Saturday";
weekDays[6] = "Sunday";
```

II) Second Method

```
var weekDays = [ "Monday", "Tuesday",
"Wednesday", "Thursday", "Friday",
"Saturday", "Sunday“];
```

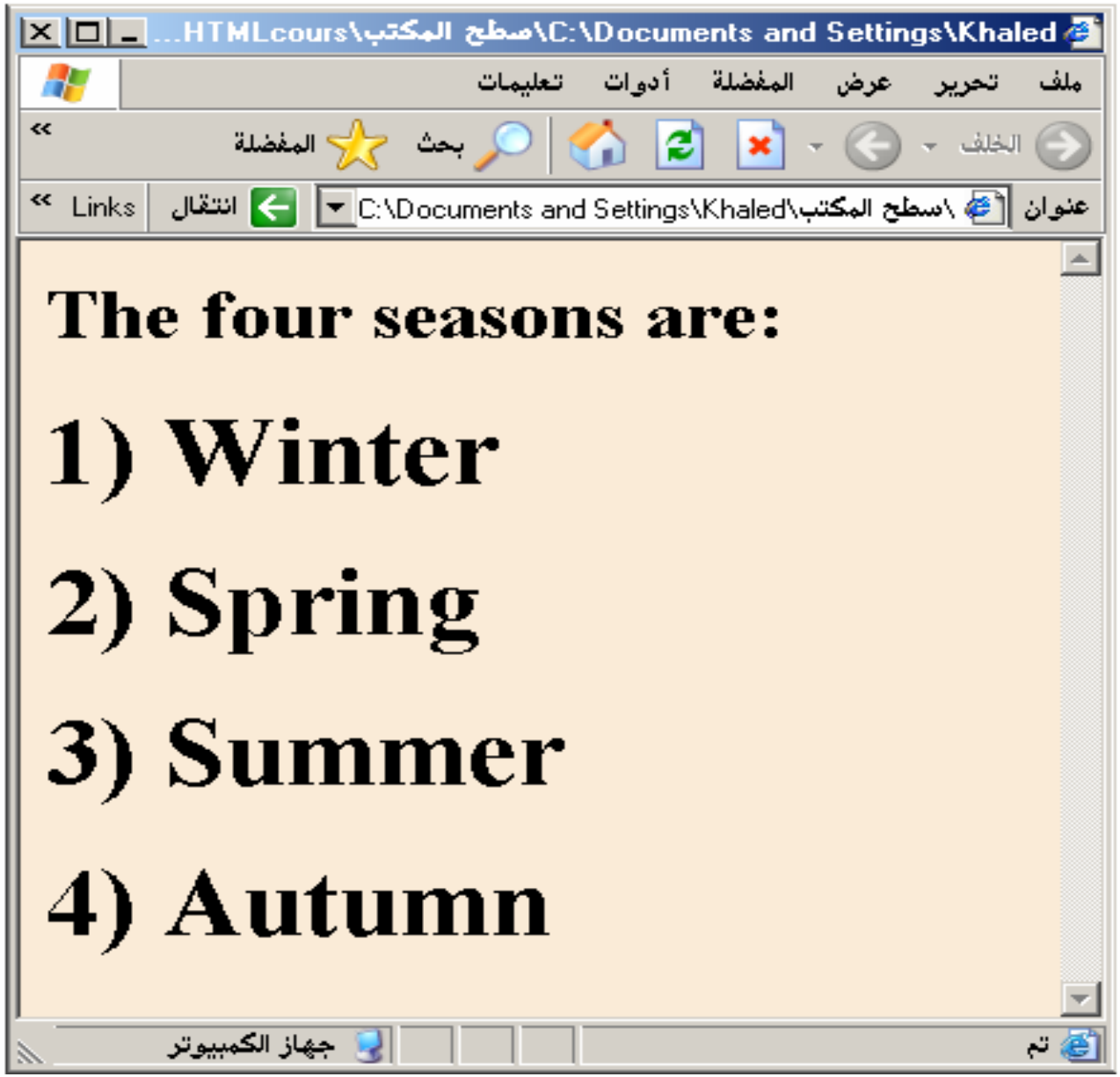
Example

```
<script language="javascript">
var weekDays = new Array("Sunday", "Monday",
"Tuesday", "Wednesday", "Thursday", "Friday",
"Saturday" );
document.write( "<b><h1>weekDays: </b>" + weekDays);
</SCRIPT>
```



```
<HEAD><SCRIPT language="JavaScript">
document.bgColor="antiquewhite";
var Seasons = new Array(4);
Seasons[0] = "Winter"
Seasons[1] = "Spring"
Seasons[2] = "Summer"
Seasons[3] = "Autumn"
document.writeln("<h2>"+"The four seasons are:"+
"<br>");
for (var x=0; x<Seasons.length; ++x)
document.write("<h1>"+(x+1)+")"+Seasons[x]
+"<br>");

</SCRIPT></HEAD>
```

Output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The four seasons are:
1) Winter
2) Spring
3) Summer
4) Autumn
تم جهاز الكمبيوتر

We may define an array like:

```
var things = new Array();
things[0] = 21;                 // Integer
things[1] =“hello”;          //String
things[2] = true;           //Boolean
things[3] = false;          // Boolean
things[4] = 3.1415;      // Float
things[5]=1.gif;          //image
```

```
//what will the following do?
<script language="javascript">
var colors = [ "blue",  "green", "red","yellow",
"lime", "gold"];
var x = window.prompt("enter 0-5","1");
document.bgColor = colors[x];
</SCRIPT>
```

Array Methods

```
<script language="javascript">
var verbs = new Array
( "relay", "consolidate", "fortify","yield ",
"destroy", "adore","serve", "operate",
"loathe","trigger"  );
document.write("<h3>The sorted verbs are "+
verbs.sort());
verbs.reverse();
document.write("<BR><h3>"+"The reverse is
"+verbs);
</SCRIPT>
```

```
<script>
var myArray = ["red", "green", "blue"];
var stringVersion = myArray.join(" ");
alert(stringVersion);
</script>
```

```
<script>
var employeeList = new Array(4);
    employeeList[0] = 'Ali';
   employeeList[1] = 'Salem';
   employeeList[2] = 'Saad';
   employeeList[3] = 'Ismaeel';
     var message = 'Here is a list of employees: \n \n';
      for (var counter = 0 ; counter < 4 ; counter++) {
       message += employeeList[counter] + ' \n';   }
      alert(message);
      </script>
```

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