Student Lab Manual

Microsoft Technology Associate

Preparing Students for MTA Certification

MICROSOFT TECHNOLOGY ASSOCIATE

Exam Review Kit

EXAM 98-361
Software Development Fundamentals

Microsoft

LAB 1.1: WORKING WITH VARIABLES AND DATA TYPES

Lesson Objective:

1.1: Understand computer storage and data types

Directions to the student:

Identify the following declarations and initializations of variables as legal or not legal. If they are not legal, indicate how to correct them.

Content:

1. `double num = 2`
2. `strOhSnap as String = "%$^&$ "`
3. `dim intNum2 as Integer = 10.9`
4. `dim smallNum as Integer = -42`
5. `dim letter as Char = 'word'`
6. `dim dblBigNum as Double = 12345678.9`
7. `Dim shtNum As Short = 99000`
8. `Dim deciNum as Decimal = 4.2m`

LAB 1.2_1: WRITING CONDITIONAL STATEMENTS

Lesson Objective:

1.2: Understand computer decision structures.

Directions to the student:

Questions 1–5: Represent each situation as a condition starting with the keyword `if`. The names of the variables are underlined. The first one is done for you.

Content:

1. You set the high score in Donkey Kong if your `score` is over 1,050,200 points.

   If score > 1050200 then

2. Patrick wants to buy a shirt. He will buy the shirt if the shirt's `coolness` rating is above a 5 out of 10 and the `cost` is $25 or less.

   If _____

3. Morgan has different criteria for buying a shirt. The shirt must have at least 3 `buttons` and `cost` less than $50.

   If _____

4. Melissa is deciding whether to date Jarid. She will go out with him if he `combed` his hair or if he doesn't `smell`.

   If _____

5. Jill has three criteria for deciding whether someone can be her friend. The person can be `fun` and `kind`… or they can just be `rich`.

   If _____

Write a `Select Case` (VB) statement to print out the day of the week given an integer `day`:

int day;	**Day of the Week**
1	Sunday
2	Monday
3	Tuesday
4	Wednesday
5	Thursday
6	Friday
7	Saturday

LAB 1.2_2: DETECTIVE WORK

Lesson Objective:

1.2: Understand computer decision structures.

Directions to the student:

After a crime, four suspects were interviewed. Below are their statements. The detectives know that each told one true statement and one false statement. From the information below, can you tell who committed the crime?

Content:

Alex said:
It wasn't David.
It wasn't Brad.

Brad said:
It wasn't Charlie.
It was David.

Charlie said:
It was Alex.
It wasn't David.

David said:
It was Charlie.
It wasn't Alex.

LAB 1.3.1: ITERATIONS WORKSHEET

Lesson Objective:
1.3: Identify the appropriate method for handling repetition.

Directions to the student:
Complete the questions to the best of your ability.

Content:

1. Transform the following `while` loop into a `for` loop (make sure it produces the same output):

```
Dim num As Integer = 1
While num < 20
   Console.WriteLine(num)
   num = num + 1
End While
```

2. Transform the following `for` loop into a `while` loop (make sure it produces the same output):

```
Dim num As Integer = 1
For num = 1 to 9
   Console.WriteLine(num)
Next num
```

3. Transform the following `while` loop into a `for` loop (make sure it produces the same output):

```
Dim num As Integer = 10
While num >= 0
   Console.WriteLine(num)
   num = num - 1
End While
```

4. What output is produced by the following code?

```
Dim x As Integer = 0

For x = 0 To 2
   Console.WriteLine(x*3)
Next
```

5. How many lines of output will the following code produce?

```
Dim x As Integer = 0

For x = 0 To 12 Step 2
    Console.WriteLine("line")
Next
```

LAB 1.3.2: RECURSION WORKSHEET

Lesson Objective:

1.3: Identify the appropriate method for handling repetition.

Directions to the student:

Find the output to the following code segments.

Content:

1.
```
num = 5
Public Function Find_Answer(num As Integer)
    Dim Result1 As Integer
    If (num < 10) Then
        Return 10
    Else
         Return num + (num - 2)
    End If
    Result1 = num
    Console.WriteLine("The final answer is " + Result1)
End Function
```

Answer:

2.
```
num = 25
Public Function Find_Answer(num As Integer)
    Dim Result2 As Single
    If (num >= 20) Then
        Return -5
    Else
        Return –((num + 4) + (2 * num))
    End If
    Result2 = num
    Console.WriteLine("The final answer is " + Result2)
End Function
```

Answer:

3.
```
num = 12
Public Function Find_Answer(num As Integer)
    Dim Result3 As Double
    If num > 20 Then
        Return -1
    Else
        Return num * (-2 * num)
    End If
     Result3 = num
    Console.WriteLine("The final answer is " + Result3)
End Function
```

Answer:

LAB 1.4: EXCEPTIONS WORKSHEET

Lesson Objective:

1.4: Understand error handling. *This objective may include but is not limited to:* structured exception handling.

Directions to the student:

Provide the code in the `try` block that will trigger the exception handling in the `catch` block.

Content:

1.
```
Private Sub method1()
    Try



    Catch ex As DivideByZeroException
        Console.WriteLine(ex.ToString())
    End Try
End Sub
```

2.
```
Private Sub method2()
    Try



    Catch ex As IndexOutOfRangeException
        Console.WriteLine(ex.ToString())
    End Try
End Sub
```

3.
```
Private Sub method3()
    Try



    Catch ex As NullReferenceException
        Console.WriteLine(ex.ToString())
    End Try
End Sub
```

4.
```
Private Sub method4()
    Try



    Catch ex As StackOverflowException
        Console.WriteLine(ex.ToString())
    End Try
End Sub
```

LAB 2.1: OBJECT-OREINTED PROGRAMMING

Lesson Objective:

2.1: Understand the fundamentals of classes.

Directions to the student:

Complete each activity as described.

Content:

1. Write a constructor for the following class that initializes the variables idNumber, gpa and name:

```
Public Class Student
Private idNumber As Integer
Private gpa As Double
Private name As String

Public Property Line() As String
   Get
   'Gets the idnumber, gpa, name values
      Return _________________
      Return _________________
      Return _________________
   End Get
   Set(ByVal Value As String)
   'Sets the idnumber, gpa, name values
      _________________ = Value
      _________________ = Value
      _________________ = Value
   End Set
End Property
End Class
```

2. Identify the components of the following method:

```
Public Function calculateAverage(score As Integer, total As Integer) As Double
    Return score / total
End Function
```

Access modifier _____

Return type _____

Method name _____

Parameters _____

3. Implement a class according to the following description and write a tester/driver class to instantiate an object of the class and call its `displayArea` method.

Write a class called `Triangle` that has two properties: `theBase` and `theHeight`. The constructor for a triangle initializes the `theBase` and `theHeight`, while a method called `displayArea` will calculate its area and display it to the console window. Use the formula *area = .5(base*height).*

LAB 2.2: INHERITANCE

Lesson Objective:
2.2: Understand inheritance.

Directions to the student:
Answer the following questions.

Content:
Questions 1–3 refer to the Employee, Supervisor, and Assistant classes partially defined below.

```
Public Class Employee
    'Instance variables here
    'Constructors and other methods here
    Public Sub work()
        Console.WriteLine("Employee working.")
    End Sub

End Class
Public Class Supervisor
    Inherits Employee
    'Instance variables here
    'Constructors and other methods here
    Public Overloads Sub work()
        Console.WriteLine("Supervisor working.")
    End Sub
End Class

Public Class Assistant
    Inherits Employee
    'Instance variables here
    'Constructors and other methods here
    Public Overloads Sub work()
        Console.WriteLine("Assistant working.")
    End Sub
End Class
```

1. Indicate which of the following declarations will cause a compile-time error:

   a. `Employee employA = new Employee();`

   b. `Employee employB = new Supervisor();`

   c. `Supervisor employC = new Supervisor();`

   d. `Supervisor employD = new Employee();`

   e. `Assistant employE = new Supervisor();`

2. Consider the following declarations:

```
Dim employ1 As New Employee()
Dim employ2 As New Supervisor()
Dim employ3 As New Supervisor()
```

Identify the following assignments as legal or illegal:

a. `employ1 = employ2`

b. `employ2 = employ3`

c. `employ1 = employ2`

3. Consider the following declarations:

```
Dim employ1 As New Employee()
Dim employ2 As New Supervisor()
Dim employ3 As New Supervisor()
```

Predict the output of the following code segment:

a. `employ1 = employ2`

b. `employ1.work()`

c. `employ3.work()`

Lesson Objective:

3.3: Understand algorithms and data structures.

Directions to the student:

Practice sorting the data sets below using the sorting algorithms identified. Remember that the following sorts are implemented using nested *for* loops. Write the resulting sequence of integers for each value of the outer-loop control variable after the inner loop has been completed.

Content:

1. Bubble Sort

outer	84	50	62	82	83	15
0	_____	_____	_____	_____	_____	_____
1	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____

2. Selection Sort

outer	20	2	10	34	83	29
0	_____	_____	_____	_____	_____	_____
1	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____

3. Insertion Sort.

outer	83	95	44	37	38	72
1	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____	_____

LAB 4.2: WEB APPLICATION ROLE PLAY

Lesson Objective:

4.2: Understand Microsoft ASP.NET Web application development.

Directions to the student:

Model the stages of the ASP.NET page life cycle with a skit. You may also choose to draw a comic strip, create a puppet show, or sing a song. Be creative!

Content:

You will be evaluated by the following criteria:

- Content:
  - — Modeled seven of the eight stages: Page request, Start, Initialization, Load, Validation, Postback event handling, Rendering, Unload
  - — Accurately represented the main concept of the page life cycle stage being portrayed
- Presentation:
  - — Audible and understandable.
  - — Skit was creative. Humor is encouraged.
  - — Use of visuals.

Lesson Objective:

6.1: Understand relational database management systems. *This objective may include but is not limited to:* characteristics and capabilities of database products; database design; Entity Relationship Diagrams (ERDs); normalization concepts.

Directions to the student:

As a review of the concepts in this lesson, please read the content section of the activity and then complete the following activities:

1. Read the content and identify all the data fields and data types required for the application.
2. Group the data and identify the necessary database tables for the project.
3. Use the process of normalization to get the database in Second Normal Form (2NF).
4. Create an Entity Relationship Diagram (ERD) for the new database.

Content:

Heinrich Fisher is the owner and general contractor for a construction company called Contoso, Ltd. Heinrich normally has three to five different types of construction jobs going at a given time. Recently, he has been having trouble keeping track of the jobs, so he wants to create some type of reporting system to help manage his business.

Many of the jobs are repeat work for the same *customer* or a *referral* from various sources, such as local electricians, excavators, real estate agents, and previous customers. When he gets a job with a customer, he keeps track of the *name, address,* and *phone number* of the customer.
The referrals also have *name, address,* and *phone number,* but also it has a *business name* when appropriate.

Contoso offers a wide variety of services, such as post and beam construction, siding, roofs, stonework, and additions. For each job, he needs to know the *start date, end date, job description, amount due,* and *amount paid.* If there was a referral, they need to also keep track of who referred this customer.

Complete the following tables and include primary keys, foreign keys, and ERD relationships. (*Note:* the ZIP code table is already filled in.)

Customer Table

ZipCodeTable
ZipCode (primary key)
City
State

ReferralTable

JobInfo

LAB 6.2: UNDERSTAND DATABASE QUERIES

Lesson Objective:

6.2: Understand database query methods.

Directions to the student:

As a review of the concepts in this lesson, have the answers to Student Activity 6.1 available as a reference and then complete the following activities:

1. Read the questions and provide sample query statements to meet the intended purpose of each question.

Content:

1. Write the query to select a list of all customers' last names and first names from the CUSTOMER table.
2. Write a query to select all data from the REFERRAL table.
3. Write a query to select all column information from the JOB table where the amount paid is greater than $1,000.
4. Provide a list of customers who have an outstanding balance due > 0 (this requires a subquery).
5. Return a count of all customers.
6. Add a new customer to the customer table:

   Samantha Smith, 123 South Main Street, 43202, 214-555-1212, 214-555-0909