

Answers to Student's Book

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8 Programming

Answers to activities

8.1

Python

```
print("Hello World")
```

Visual Basic

```
Module Module1
    Sub Main()
        Console.WriteLine("Hello World")
        Console.ReadKey()
    End Sub
End Module
```

Java

```
public class HelloWorld
{
    public static void main(String[] args)
    {
        System.out.println("Hello World");
    }
}
```

8.2

Pseudocode

```
DECLARE radius, length : REAL
CONSTANT PI = 3.142
```

Python

```
# Python does not require separate declarations...
# ...values are simply assigned as required
# Python does not differentiate between constants and variables
radius = 10.0
length = 10.0
PI = 3.142
```

Visual Basic

```
Dim radius As Decimal
Dim length As Decimal
Const PI As Decimal = 3.142
```

Java

```
final double PI = 3.142;
double radius;
```

```
double length;
```

8.2a

Python

```
StoreInteger = int(input())  
StoreDecimal = float(input())  
StoreLetter = input()  
StoreText = input()  
StoreBoolean = bool(input())
```

Visual Basic

```
StoreInteger = Integer.parse(Console.ReadLine())  
StoreDecimal = Decimal.parse(Console.ReadLine())  
StoreLetter = Console.ReadLine()  
StoreText = Console.ReadLine()  
StoreBoolean = Bool.parse(Console.ReadLine())
```

Java

```
int StoreInteger = myObj.nextInt();  
double StoreDecimal = myObj.nextDouble();  
char StoreLetter = myObj.next();  
String StoreText = myObj.next();  
Boolean StoreBoolean = myObj.nextBoolean();
```

8.3

Python

```

ConstPi = 3.142
radius = float(input("Please enter the radius of the cylinder "))
length = float(input("Please enter the length of the cylinder "))
volume = radius * radius * length * ConstPi
print("Volume of the cylinder is ", volume)

```

Visual Basic

```

Module Module1
    Public Sub Main()
        Dim radius As Decimal
        Dim length As Decimal
        Dim volume As Decimal
        Const PI As Decimal = 3.142
        Console.Write("Please enter the radius of the cylinder ")
        radius = Decimal.Parse(Console.ReadLine())
        Console.Write("Please enter the length of the cylinder ")
        length = Decimal.Parse(Console.ReadLine())
        volume = radius * radius * length * PI
        Console.WriteLine("Volume of cylinder is " & volume)
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Cylinder
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        final double PI = 3.142;
        double radius;
        double length;

        System.out.println("Please enter the radius of the cylinder ");
        radius = myObj.nextDouble();
        System.out.println("Please enter the length of the cylinder ");
        length = myObj.nextDouble();
        double volume = radius * radius * length * PI;
        System.out.println("Volume of cylinder is " + volume);
    }
}

```

8.4

Python

```
num = int(input("Please enter a number "))
if num >= 100:
    print ("100 or over")
else:
    print ("less than 100")
```

Visual Basic

```
Module Module1
    Sub Main()
        Dim num As Integer
        Console.Write("Please enter a number ")
        num = Integer.Parse(Console.ReadLine())
        If num >= 100 Then
            Console.WriteLine("100 or over")
        Else
            Console.WriteLine("less than 100")
        End If
        Console.ReadKey()
    End Sub
End Module
```

Java

```
import java.util.Scanner;
class Activity_8_4
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        int num;

        System.out.println("Please enter a number ");
        num = myObj.nextInt();
        if (num >= 100){
            System.out.println("100 or over");
        } else {
            System.out.println("Less than 100");
        }
    }
}
```

8.5

Python

```

num = int(input("Please enter a number "))
if num == 1:
    print ("Number equals 1")
elif num == 2:
    print ("Number equals 2")
elif num == 3:
    print ("Number equals 3")
elif num == 4:
    print ("Number equals 4")
else: print ("Invalid number")

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim num As Integer
        Console.Write("Please enter a number ")
        num = Integer.Parse(Console.ReadLine())
        Select Case num
            Case 1
                Console.WriteLine("Number equals 1")
            Case 2
                Console.WriteLine("Number equals 2")
            Case 3
                Console.WriteLine("Number equals 3")
            Case 4
                Console.WriteLine("Number equals 4")
            Case Else
                Console.WriteLine("Invalid number")
        End Select
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_5_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        int num;

        System.out.println("Please enter a number ");
        num = myObj.nextInt();
        switch (num){
            case 1:
                System.out.println("Number equals 1");
                break;
            case 2:
                System.out.println("Number equals 2");
                break;
            case 3:
                System.out.println("Number equals 3");
                break;
            case 4:
                System.out.println("Number equals 4");
                break;
            default:
                System.out.println("Invalid number");
        }
    }
}

```

8.6

Python

```
#count controlled loop
for Counter in range (1, 30, 3):
    print(Counter)
#condition controlled loop
Counter = 1
while Counter < 30:
    print(Counter)
    Counter = Counter + 3
```

Visual Basic

```
Module Module1
    Sub Main()
        Dim Counter As Integer
        'count controlled loop
        For Counter = 1 To 30 Step 3
            Console.WriteLine(Counter)
        Next
        'condition controlled loop
        Counter = 1
        Do
            Console.WriteLine(Counter)
            Counter = Counter + 3
        Loop Until Counter >= 30
        Console.ReadKey()
    End Sub
End Module
```

Java

```
class Activity_8_6_Java
{
    public static void main(String args[])
    {
        int Counter;
        //count controlled loop
        for (Counter = 1; Counter <= 30; Counter = Counter + 3){
            System.out.println(Counter);
        }

        //condition controlled loop
        Counter = 1;
        do {
            System.out.println(Counter);
            Counter = Counter + 3;
        }
        while (Counter <=30);
    }
}
```

8.7

Python

```

Count = 0
TotalSackWeight = 0
SackWeight = float(input("Enter weight of next sack, -1 to finish "))
while SackWeight != -1:
    Count = Count + 1
    TotalSackWeight = TotalSackWeight + SackWeight
    SackWeight = float(input("Enter weight of next sack, -1 to finish "))
print ("Total number of sacks is ", Count)
print ("Total weight of sacks is ", TotalSackWeight)

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim Count As Integer
        Dim SackWeight As Decimal
        Dim TotalSackWeight As Decimal
        Count = 0
        TotalSackWeight = 0
        Console.Write("Please enter weight of next sack ")
        SackWeight = Decimal.Parse(Console.ReadLine())
        While SackWeight <> -1
            Count = Count + 1
            TotalSackWeight = TotalSackWeight + SackWeight
            Console.Write("Please enter weight of next sack ")
            SackWeight = Decimal.Parse(Console.ReadLine())
        End While
        Console.WriteLine("Total number of sacks is " & Count)
        Console.WriteLine("Total weight of sacks is " & TotalSackWeight)
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_7_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        int Count = 0;
        double SackWeight;
        double TotalSackWeight = 0;

        System.out.println("Please enter weight of next sack ");
        SackWeight = myObj.nextDouble();
        while (SackWeight != -1) {
            Count ++;
            TotalSackWeight = TotalSackWeight + SackWeight;
            System.out.println("Please enter weight of next sack ");
            SackWeight = myObj.nextDouble();
        }
        System.out.println("Total number of sacks is " + Count);
        System.out.println("Total weight of sacks is " + TotalSackWeight);
    }
}

```

8.8

Python

```

MyName = input("Please enter your full name ")
print ("There are ", len(MyName), " characters in your name")
print ("The first three characters are are ", MyName[0:3])
print ("Upper Case ", MyName.upper())
print ("Lower Case ", MyName.lower())

```

Visual Basic

```

Module Module1
    Public Sub Main()
        Dim MyName As String
        Console.Write("Please enter your full name ")
        MyName = Console.ReadLine()
        Console.WriteLine("There are " & MyName.Length() & " characters in your
name")
        Console.WriteLine("The first three characters are are " &
MyName.Substring(0, 3))
        Console.WriteLine("Upper case " & UCase(MyName))
        Console.WriteLine("Lower case " & LCase(MyName))
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_8_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        System.out.println("Please enter your full name ");
        String MyName = myObj.next();
        System.out.println("There are " + MyName.length() + " characters in
your name");
        System.out.println("The first three characters are " +
MyName.substring(0,3));
        System.out.println("Upper case " + MyName.toUpperCase());
        System.out.println("Lower case " + MyName.toLowerCase());
    }
}

```

8.9

Python

```

Number1 = float(input ("Enter first number "))
Number2 = float(input ("Enter second number "))
print("Add ", Number1 + Number2)
print("Subtract ", Number1 - Number2)
print("Multiply ", Number1 * Number2)
print("Divide ", Number1 / Number2)
print("Raise to the power of ", Number1 ** Number2)
Number3 = int(input ("Enter third number "))
print("Number3 * (Number1 + Number2) ", Number3 * (Number1 + Number2))
print("Number3 * (Number1 - Number2) ", Number3 * (Number1 - Number2))
print("(Number1 + Number2) ^ Number3 ", (Number1 + Number2) ** Number3)

```

Visual Basic

```

Module Module1
    Public Sub Main()
        Dim Number1 As Decimal
        Dim Number2 As Decimal
        Dim Number3 As Integer
        Console.Write("Please enter the first number ")
        Number1 = Decimal.Parse(Console.ReadLine())
        Console.Write("Please enter the second number ")
        Number2 = Decimal.Parse(Console.ReadLine())
        Console.WriteLine("Add " & (Number1 + Number2))
    End Sub
End Module

```

```

        Console.WriteLine("Subtract " & (Number1 - Number2))
        Console.WriteLine("Multiply " & (Number1 * Number2))
        Console.WriteLine("Divide " & (Number1 / Number2))
        Console.WriteLine("Raise to the power of " & (Number1 ^ Number2))
        Console.Write("Please enter the third number ")
        Number3 = Integer.Parse(Console.ReadLine())
        Console.WriteLine("Number3 * (Number1 + Number2) " & (Number3 *
(Number1 + Number2)))
        Console.WriteLine("Number3 * (Number1 - Number2) " & (Number3 *
(Number1 - Number2)))
        Console.WriteLine("(Number1 + Number2) ^ Number3 " & ((Number1 +
Number2) ^ Number3))
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
import java.lang.Math;
class Activity_8_9_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        System.out.println("Please enter first number ");
        double Number1 = myObj.nextDouble();
        System.out.println("Please enter second number ");
        double Number2 = myObj.nextDouble();
        System.out.println("Add " + (Number1 + Number2));
        System.out.println("Subtract " + (Number1 - Number2));
        System.out.println("Multiply " + (Number1 * Number2));
        System.out.println("Divide " + (Number1 / Number2));
        System.out.println("Raise to the power of " +
(Math.pow(Number1,Number2)));
        System.out.println("Please enter third number ");
        int Number3 = myObj.nextInt();
        System.out.println("Number3 * (Number1 + Number2) " + (Number3 * (Number1
+ Number2)));
        System.out.println("Number3 * (Number1 - Number2) " + (Number3 * (Number1
- Number2)));
        System.out.println("(Number1 + Number2) ^ Number3 " +
(Math.pow((Number1 + Number2),
            Number3)));
    }
}

```

8.10

Python

```

Number1 = float(input ("Enter first number "))
Number2 = float(input ("Enter second number "))
if (Number1 == Number2):
    print("Both numbers are equal ")
elif (Number1 > Number2):
    print("Numbers are not equal, Number 1 is the largest and Number 2 is the
smallest")
else:
    print("Numbers are not equal, Number 2 is the largest and Number 1 is the
smallest")
Number3 = float(input ("Enter third number "))
if (Number1 == Number2) and (Number2 == Number3):
    print("All numbers are equal ")

```

```

elif Number1 == Number2:
    if Number1 > Number3:
        print("Numbers 1 and 2 are equal largest, Number 3 is smallest")
    else:
        print("Numbers 1 and 2 are equal smallest, Number 3 is largest")
elif Number2 == Number3:
    if Number2 > Number1:
        print("Numbers 2 and 3 are equal largest, Number 1 is smallest")
    else:
        print("Numbers 2 and 3 are equal smallest, Number 1 is largest")
elif Number3 == Number1 :
    if Number3 > Number2:
        print("Numbers 1 and 3 are equal largest, Number 2 is smallest")
    else:
        print("Numbers 1 and 3 are equal smallest, Number 2 is largest")

else:
    print("All numbers are not equal")
    if (Number1 > Number2 and Number2 > Number3):
        print("Number 1 is the largest and Number 3 is the smallest")
    if (Number1 > Number3 and Number3 > Number2):
        print("Number 1 is the largest and Number 3 is the smallest")
    if (Number2 > Number1 and Number1 > Number3):
        print("Number2 is the largest and Number3 is the smallest")
    if (Number2 > Number3 and Number3 > Number1):
        print("Number2 is the largest and Number1 is the smallest")
    if (Number3 > Number2 and Number2 > Number1):
        print("Number3 is the largest and Number1 is the smallest")
    if (Number3 > Number1 and Number1 > Number2):
        print("Number3 is the largest and Number2 is the smallest")

```

Visual Basic

```

Module Module1
    Public Sub Main()
        Dim Number1 As Decimal
        Dim Number2 As Decimal
        Dim Number3 As Decimal

        Console.WriteLine("Please enter the first number ")
        Number1 = Decimal.Parse(Console.ReadLine())
        Console.WriteLine("Please enter the second number ")
        Number2 = Decimal.Parse(Console.ReadLine())
        If (Number1 = Number2) Then
            Console.WriteLine("Both numbers are equal ")
        Else
            Console.WriteLine("Both numbers are not equal")
            If (Number1 > Number2) Then
                Console.WriteLine("Number1 is largest and Number2 is
smallest")
            Else
                Console.WriteLine("Number2 is largest and Number1 is
smallest")
            End If
        End If
        Console.WriteLine("Please enter the third number ")
        Number3 = Decimal.Parse(Console.ReadLine())
        If Number1 = Number2 And Number2 = Number3 Then
            Console.WriteLine("All numbers are equal ")
        ElseIf Number1 = Number2 Then
            If Number1 > Number3 Then
                Console.WriteLine("Numbers 1 and 2 are equal largest, Number 3
is smallest")
            Else
                Console.WriteLine("Numbers 1 And 2 are equal smallest, Number
3 is largest")
            End If
        End If
    End Sub
End Module

```

```

        ElseIf Number2 = Number3 Then
            If Number2 > Number1 Then
                Console.WriteLine("Numbers 2 and 3 are equal largest, Number 1
is smallest")
            Else
                Console.WriteLine("Numbers 2 And 3 are equal smallest, Number
1 is largest")
            End If

            ElseIf Number3 = Number1 Then
                If Number3 > Number2 Then
                    Console.WriteLine("Numbers 1 and 3 are equal largest, Number 2
is smallest")
                Else
                    Console.WriteLine("Numbers 1 And 3 are equal smallest, Number
2 is largest")
                End If

            Else
                If Number1 > Number2 And Number2 > Number3 Then
                    Console.WriteLine("Number1 is largest and Number3 is
smallest")
                End If
                If Number1 > Number2 And Number3 > Number2 And Number1 > Number3
Then
                    Console.WriteLine("Number1 is largest and Number2 is
smallest")
                End If
                If Number2 > Number3 And Number3 > Number1 Then
                    Console.WriteLine("Number2 is largest and Number1 is
smallest")
                End If
                If Number2 > Number1 And Number1 > Number3 And Number1 > Number3
Then
                    Console.WriteLine("Number2 is largest and Number3 is
smallest")
                End If
                If Number3 > Number2 And Number2 > Number1 Then
                    Console.WriteLine("Number3 is largest and Number1 is
smallest")
                End If
                If Number3 > Number1 And Number1 > Number2 And Number3 > Number2
Then
                    Console.WriteLine("Number3 is largest and Number2 is
smallest")
                End If
            End If
        End If
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_10_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        System.out.println("Please enter first number ");
        double Number1 = myObj.nextDouble();
        System.out.println("Please enter second number ");
        double Number2 = myObj.nextDouble();
        if (Number1 == Number2) {
            System.out.println("Both numbers are equal");
        } else {
            System.out.println("Both numbers are not equal");
            if (Number1 > Number2) {

```

```

        System.out.println("Number1 is the largest and Number2 is the
smallest");
    } else {
        System.out.println("Number2 is the largest and Number1 is the
smallest");
    }
}
System.out.println("Please enter third number ");
double Number3 = myObj.nextDouble();
if(Number1 == Number2 && Number2 == Number3) {
    System.out.println("All numbers are equal");
}
else if(Number1 == Number2) {
    if (Number1 > Number3) {
        System.out.println("Numbers 1 and 2 are equal largest, Number
3 is smallest");
    } else {
        System.out.println("Numbers 1 and 2 are equal smallest, Number
3 is largest");
    }
}

else if(Number2 == Number3) {
    if (Number2 > Number1) {
        System.out.println("Numbers 2 and 3 are equal largest, Number
1 is smallest");
    } else {
        System.out.println("Numbers 2 and 3 are equal smallest, Number
1 is largest");
    }
}

else if(Number3 == Number1) {
    if (Number3 > Number2) {
        System.out.println("Numbers 1 and 3 are equal largest, Number
2 is smallest");
    } else {
        System.out.println("Numbers 1 and 3 are equal smallest, Number
2 is largest");
    }
}

else {
    if (Number1 > Number2 && Number2 > Number3) {
        System.out.println("Number1 is the largest and Number3 is the
smallest");
    }
    if (Number1 > Number3 && Number3 > Number2) {
        System.out.println("Number1 is the largest and Number2 is the
smallest");
    }
    if (Number2 > Number1 && Number1 > Number3) {
        System.out.println("Number2 is the largest and Number3 is the
smallest");
    }
    if (Number2 > Number3 && Number3 > Number1) {
        System.out.println("Number2 is the largest and Number1 is the
smallest");
    }
    if (Number3 > Number2 && Number2 > Number1) {
        System.out.println("Number3 is the largest and Number1 is the
smallest");
    }
    if (Number3 > Number1 && Number1 > Number2) {
        System.out.println("Number3 is the largest and Number2 is the
smallest");
    }
}
}
}

```

8.11, 8.12 and 8.13**Python**

```

ClassHigh = 0
ClassLow = 100
ClassTotal = 0
NumberOfTests = 5
NumberOfSubjects = 6
ClassSize = 20
for Student in range (1, ClassSize + 1):
    StudentHigh = 0
    StudentLow = 100
    StudentTotal = 0
    for Subject in range (1, NumberOfSubjects + 1):
        SubjectHigh = 0
        SubjectLow = 100
        SubjectTotal = 0
        for Test in range (1, NumberOfTests + 1):
            Mark = int(input("Please enter mark "))
            if (Mark > SubjectHigh):
                SubjectHigh = Mark
            if (Mark < SubjectLow):
                SubjectLow = Mark
            SubjectTotal = SubjectTotal + Mark
        SubjectAverage = SubjectTotal / NumberOfTests
        print ("Average mark for Subject ", Subject, " is ", SubjectAverage)
        print ("Highest mark for Subject ", Subject, " is ", SubjectHigh)
        print ("Lowest mark for Subject ", Subject, " is ", SubjectLow)
        if SubjectHigh > StudentHigh:
            StudentHigh = SubjectHigh
        if SubjectLow < StudentLow:
            StudentLow = SubjectLow
        StudentTotal = StudentTotal + SubjectTotal
    StudentAverage = StudentTotal / (NumberOfTests * NumberOfSubjects)
    print ("Average mark for Student ", Student, " is ", StudentAverage)
    print ("Highest mark for Student ", Student, " is ", StudentHigh)
    print ("Lowest mark for Student ", Student, " is ", StudentLow)

    if StudentHigh > ClassHigh:
        ClassHigh = StudentHigh
    if StudentLow < ClassLow:
        ClassLow = StudentLow
    ClassTotal = ClassTotal + StudentTotal
ClassAverage = ClassTotal / (NumberOfTests * NumberOfSubjects * ClassSize)
print ("Average mark for Class is ", ClassAverage)
print ("Highest mark for Class is ", ClassHigh)
print ("Lowest mark for Class is ", ClassLow)

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim ClassAverage, StudentAverage, SubjectAverage As Decimal
        Dim Student, Subject, Test, Mark As Integer
        Dim ClassHigh, ClassLow, ClassTotal As Integer
        Dim StudentHigh, StudentLow, StudentTotal As Integer
        Dim SubjectHigh, SubjectLow, SubjectTotal As Integer
        ClassHigh = 0
        ClassLow = 100
        ClassTotal = 0
        'Use of constants enables you to easily change the values for testing
        Const NumberOfTests As Integer = 5
        Const NumberOfSubjects As Integer = 6
        Const ClassSize As Integer = 20
        For Student = 1 To ClassSize
            StudentHigh = 0
            StudentLow = 100
            StudentTotal = 0
            For Subject = 1 To NumberOfSubjects

```

```

        SubjectHigh = 0
        SubjectLow = 100
        SubjectTotal = 0
        For Test = 1 To NumberOfTests
            Console.WriteLine("Please enter mark ")
            Mark = Decimal.Parse(Console.ReadLine())
            If Mark > SubjectHigh Then
                SubjectHigh = Mark
            End If
            If Mark < SubjectLow Then
                SubjectLow = Mark
            End If
            SubjectTotal = SubjectTotal + Mark
        Next Test
        SubjectAverage = SubjectTotal / NumberOfTests
        Console.WriteLine("Average mark for Subject " & Subject & " is "
& SubjectAverage)
        Console.WriteLine("Highest mark for Subject " & Subject & " is
" & SubjectHigh)
        Console.WriteLine("Lowest mark for Subject " & Subject & " is
" & SubjectLow)
        If SubjectHigh > StudentHigh Then
            StudentHigh = SubjectHigh
        End If
        If SubjectLow < StudentLow Then
            StudentLow = SubjectLow
        End If
        StudentTotal = StudentTotal + SubjectTotal
    Next Subject
    StudentAverage = StudentTotal / (NumberOfTests * NumberOfSubjects)
    Console.WriteLine("Average mark for Student " & Student & " is " &
StudentAverage)
    Console.WriteLine("Highest mark for Student " & Student & " is " &
StudentHigh)
    Console.WriteLine("Lowest mark for Student " & Student & " is " &
StudentLow)
    If StudentHigh > ClassHigh Then
        ClassHigh = StudentHigh
    End If
    If StudentLow < ClassLow Then
        ClassLow = StudentLow
    End If
    ClassTotal = ClassTotal + StudentTotal
Next Student
ClassAverage = ClassTotal / (NumberOfTests * NumberOfSubjects *
ClassSize)
Console.WriteLine("Average mark for Class is " & ClassAverage)
Console.WriteLine("Highest mark for Class is " & ClassHigh)
Console.WriteLine("Lowest mark for Class is " & ClassLow)
Console.ReadKey()
End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_13_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        double ClassAverage, StudentAverage, SubjectAverage;
        int Student, Subject, Test, Mark;
        int ClassHigh, ClassLow, ClassTotal;
        int StudentHigh, StudentLow, StudentTotal;
        int SubjectHigh, SubjectLow, SubjectTotal;
        ClassHigh = 0;
        ClassLow = 100;
        ClassTotal = 0;
    }
}

```

```

final int NumberOfTests = 5;
final int NumberOfSubjects = 6;
final int ClassSize = 20;

for (Student = 1; Student <= ClassSize ; Student ++ ) {
    StudentHigh = 0;
    StudentLow = 100;
    StudentTotal = 0;
    for (Subject = 1; Subject <= NumberOfSubjects; Subject ++ ) {
        SubjectHigh = 0;
        SubjectLow = 100;
        SubjectTotal = 0;
        for (Test = 1; Test <= NumberOfTests; Test ++ ) {
            System.out.println("Please enter mark ");
            Mark = myObj.nextInt();
            if (Mark > SubjectHigh) {
                SubjectHigh = Mark;
            }
            if (Mark < SubjectLow) {
                SubjectLow = Mark;
            }
            SubjectTotal = SubjectTotal + Mark ;
        }
        SubjectAverage = SubjectTotal / NumberOfTests ;
        System.out.println("Average mark for subject " + Subject + "
is " + SubjectAverage );
        System.out.println("Highest mark for subject " + Subject + "
is " + SubjectHigh);
        System.out.println("Lowest mark for subject " + Subject + " is
" + SubjectLow);
        if (SubjectHigh > StudentHigh) {
            StudentHigh = SubjectHigh;
        }
        if (SubjectLow < StudentLow) {
            StudentLow = SubjectLow;
        }
        StudentTotal = StudentTotal + SubjectTotal;
    }
    StudentAverage = StudentTotal / (NumberOfTests * NumberOfSubjects);
    System.out.println("Average mark for student " + Subject + " is " +
StudentAverage);
    System.out.println("Highest mark for student " + Subject + " is " +
StudentHigh);
    System.out.println("Lowest mark for student " + Subject + " is " +
StudentLow);
    if (StudentHigh > ClassHigh) {
        ClassHigh = StudentHigh;
    }
    if (StudentLow < ClassLow) {
        ClassLow = StudentLow;
    }
    ClassTotal = ClassTotal + StudentTotal ;
}
ClassAverage = ClassTotal / (NumberOfTests * NumberOfSubjects *
ClassSize);
System.out.println("Average mark for class is " + ClassAverage );
System.out.println("Highest mark for class is " + ClassHigh);
System.out.println("Lowest mark for class is " + ClassLow);
}
}

```

8.14**Python**

```
def Stars():
    print("*****")
    print("*****")
    print("*****")
Stars()
```

Visual Basic

```
Module Module1
    Sub Main()
        Stars()
        Console.ReadKey()
    End Sub
    Sub Stars()
        Console.WriteLine("*****")
        Console.WriteLine("*****")
        Console.WriteLine("*****")
    End Sub
End Module
```

Java

```
import java.util.Scanner;
class Activity_8_14_Java
{
    static void Stars()
    {
        System.out.println("*****");
        System.out.println("*****");
        System.out.println("*****");
    }
    public static void main(String args[])
    {
        Stars();
    }
}
```

8.15**Python**

```
def Stars(Number):
    for Counter in range(Number):
        print("*****\n")

Stars(7)
```

Visual Basic

```
Module Module1
    Sub Main()
        Stars(7)
        Console.ReadKey()
    End Sub
    Sub Stars(Number As Integer)
        Dim Counter As Integer
        For Counter = 1 To Number
            Console.WriteLine("*****")
        Next
    End Sub
End Module
```

Java

```
import java.util.Scanner;
class Activity_8_14_Java
{
    static void Stars(int Number)
    {
        for (int Counter = 1; Counter <= Number; Counter++)
        {
            System.out.println("*****");
        }
    }
}
```

```

    }
}
public static void main(String args[])
{
    Stars(7);
}
}

```

8.16

Python

```

def Fahrenheit (Temperature):
    return (1.8 * Temperature + 32)
Answer = Fahrenheit(0)
print (Answer)

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim Answer As Decimal
        Answer = Fahrenheit(0)
        Console.WriteLine(Answer)
        Console.ReadKey()
    End Sub
    Function Fahrenheit(ByVal Temperature As Decimal)
        Return 1.8 * Temperature + 32
    End Function
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_16_Java
{
    static double Fahrenheit (double Temperature)
    {
        return (Temperature * 1.8 + 32);
    }
    public static void main(String args[])
    {
        double Answer = Fahrenheit (0);
        System.out.println(Answer);
    }
}

```

8.17

Python

```

def Test():
    Number1 = 10
    Number2 = 20
    Number3 = 30
    Answer = Number1 + Number2
    print ("Number1 is now ", Number1)
    print ("Number2 is now ", Number2)
    print ("Answer is now ", Answer)

Number1 = 50
Number2 = 100
Answer = Number1 + Number2
print ("Number1 is ", Number1)
print ("Number2 is ", Number2)
print ("Answer is ", Answer)
Test()
print ("Number1 is still ", Number1)
print ("Number2 is still ", Number2)
print ("Answer is still ", Answer)
print ("Number3 is ", Number3)

```

Output from Python:

```

Number1 is 50
Number2 is 100
Answer is 150
Number1 is now 10
Number2 is now 20
Answer is now 30
Number1 is still 50
Number2 is still 100
Answer is still 150
Traceback (most recent call last):
  File "... Hodder/Chapter 8 programs/Activity_8_17_Python.py", line 24, in
<module>
    print ("Number3 is ", Number3)
    NameError: name 'Number3' is not defined

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim Number1, Number2, Answer As Integer
        Number1 = 50
        Number2 = 100
        Answer = Number1 + Number2
        Console.WriteLine("Number1 is " & Number1)
        Console.WriteLine("Number2 is " & Number2)
        Console.WriteLine("Answer is " & Answer)
        Test()
        Console.WriteLine("Number1 is still " & Number1)
        Console.WriteLine("Number2 is still " & Number2)
        Console.WriteLine("Answer is still " & Answer)
        Console.WriteLine("Number3 is " & Number3)
        Console.ReadKey()
    End Sub
    Sub Test()
        Dim Number1, Number2, Number3, Answer As Integer
        Number1 = 10
        Number2 = 20
        Number3 = 30
        Answer = Number1 + Number2
        Console.WriteLine("Number1 is now " & Number1)
        Console.WriteLine("Number2 is now" & Number2)
        Console.WriteLine("Answer is now " & Answer)
    End Sub
End Module

```

Note – the program will not run, try defining Number3 in the main program instead.



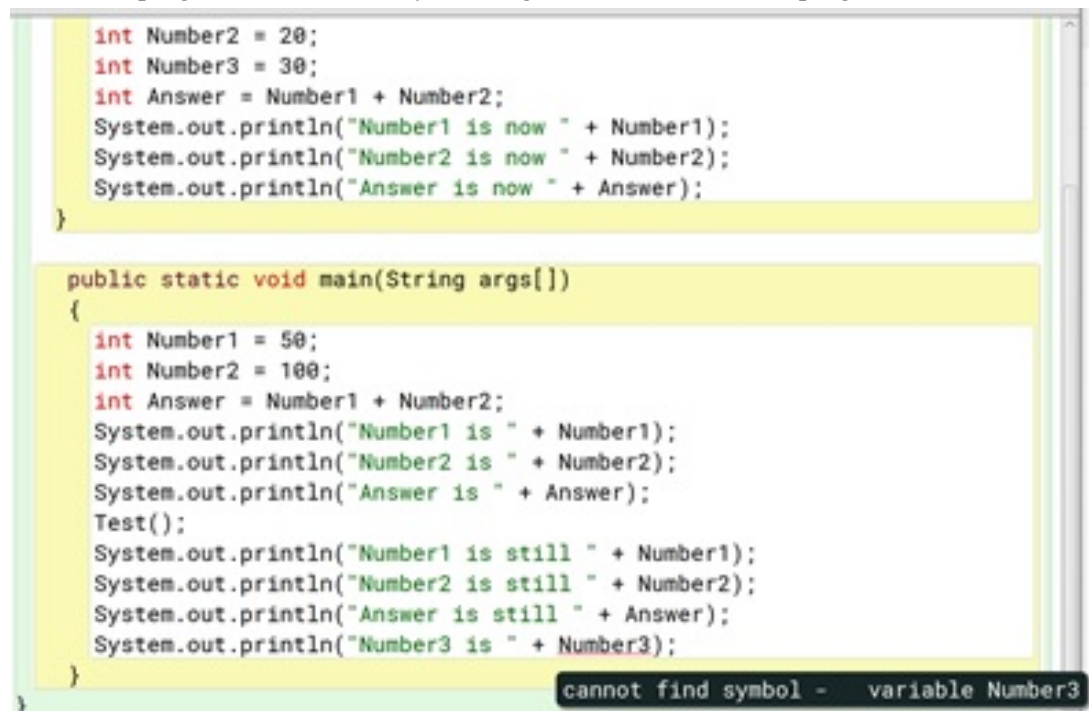
Java

```

import java.util.Scanner;
class Activity_8_17_Java
{
    static void Test()
    {
        int Number1 = 10;
        int Number2 = 20;
        int Number3 = 30;
        int Answer = Number1 + Number2;
        System.out.println("Number1 is now " + Number1);
        System.out.println("Number2 is now " + Number2);
        System.out.println("Answer is now " + Answer);
    }
    public static void main(String args[])
    {
        int Number1 = 50;
        int Number2 = 100;
        int Answer = Number1 + Number2;
        System.out.println("Number1 is " + Number1);
        System.out.println("Number2 is " + Number2);
        System.out.println("Answer is " + Answer);
        Test();
        System.out.println("Number1 is still " + Number1);
        System.out.println("Number2 is still " + Number2);
        System.out.println("Answer is still " + Answer);
        System.out.println("Number3 is " + Number3);
    }
}

```

Note – the program will not run, try defining Number3 in the main program instead.

**8.18**

Subject Procedure local variables:

Test, Mark, SubjectAverage, SubjectTotal

Student Procedure local variables:

Subject, StudentAverage, StudentTotal, SubjectHigh, SubjectLow,

8.19

Value1 is 1
 Value2 is 3
 Value3 is 6.97

8.20**Python**

```
import random
a = int(input("Enter first integer "))
b = int(input("Enter second integer "))
AnswerMod = a%b
AnswerDiv = a//b
print(a, "MOD", b, "is", AnswerMod)
print(a, "DIV", b, "is", AnswerDiv)
c = int(random.random() * 200 + 100)
print(c, "is a random number between 100 and 300")
```

Visual Basic

```
Module Module1
    Sub Main()
        Dim a, b, c As Integer
        Dim AnswerMod, AnswerDiv As Integer
        Console.WriteLine("Please enter the first integer ")
        a = Integer.Parse(Console.ReadLine())
        Console.WriteLine("Please enter the second number ")
        b = Integer.Parse(Console.ReadLine())
        AnswerMod = a Mod b
        AnswerDiv = a \ b
        Console.WriteLine(a & " MOD " & b & " is " & AnswerMod)
        Console.WriteLine(a & " DIV " & b & " is " & AnswerDiv)
        c = CInt(Rnd() * 200 + 100)
        Console.WriteLine(c & " is a random integer between 100 and 300")
        Console.ReadKey()
    End Sub
End Module
```

Java

```
import java.util.Scanner;
import java.lang.Math;
import java.util.Random;
class Activity_8_20_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        System.out.println("Please enter first integer ");
        int a = myObj.nextInt();
        System.out.println("Please enter second integer ");
        int b = myObj.nextInt();

        int AnswerMod = a % b;
        int AnswerDiv = a / b;

        System.out.println(a + " MOD " + b + " is " + AnswerMod);
        System.out.println(a + " DIV " + b + " is " + AnswerDiv);

        Random rand = new Random();
        int c = rand.nextInt(200) + 100;

        System.out.println(c + " is a random integer between 100 and 300");
    }
}
```

8.21

Use the list in 8.1.8 to check for any features not used.

8.22

Python

```

MyList=[]
for counter in range(10):
    MyList.append (int(input("Enter next value")))
print (MyList)

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim MyList(9), Counter As Integer
        For Counter = 0 To 9
            Console.Write("Enter next value ")
            MyList(Counter) = Integer.Parse(Console.ReadLine())
        Next
        For Counter = 0 To 9
            Console.Write(MyList(Counter) & " ")
        Next
        Console.ReadKey()
    End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_22_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        int MyList[] = new int[10];
        int Counter;
        for (Counter = 0; Counter <= 9; Counter++) {
            System.out.print("Enter next value ");
            MyList[Counter] = myObj.nextInt();
        }
        for (Counter = 0; Counter <= 9; Counter++) {
            System.out.print(MyList[Counter] + " ");
        }
    }
}

```

8.23

Python

```

MyTable =[]
for ColumnCounter in range(3):
    Column =[]
    for RowCounter in range(10):
        Column.append(int(input("Enter next value ")))
    MyTable.append(Column)
print (MyTable)

```

Visual Basic

```

Module Module1
    Sub Main()
        Dim MyTable(9, 2), ColumnCounter, RowCounter As Integer
        For ColumnCounter = 0 To 2
            For RowCounter = 0 To 9
                Console.Write("Enter next value for Column " & ColumnCounter)
                MyTable(RowCounter, ColumnCounter) =
Integer.Parse(Console.ReadLine())
            Next
        Next
        For RowCounter = 0 To 9
            For ColumnCounter = 0 To 2
                Console.Write(MyTable(RowCounter, ColumnCounter) & " ")
            Next
        Next
    End Sub
End Module

```

```

        Console.WriteLine()
    Next
    Console.ReadKey()
End Sub
End Module

```

Java

```

import java.util.Scanner;
class Activity_8_23_Java
{
    public static void main(String args[])
    {
        Scanner myObj = new Scanner(System.in);
        int MyTable[][] = new int[10][3];
        int ColumnCounter, RowCounter;
        for (ColumnCounter = 0; ColumnCounter <= 2; ColumnCounter++) {
            for (RowCounter = 0; RowCounter <= 9; RowCounter++) {
                System.out.print("Enter next value for column " +
ColumnCounter);
                MyTable[RowCounter][ColumnCounter] = myObj.nextInt();
            }
        }
        for (RowCounter = 0; RowCounter <= 9; RowCounter++) {
            for (ColumnCounter = 0; ColumnCounter <= 2; ColumnCounter++) {
                System.out.print( MyTable[RowCounter][ColumnCounter]+ " ");
            }
            System.out.println();
        }
    }
}

```

8.24

Python

```

# writing to and reading a line of text from a file
MyFile = open ("MyText.txt","w") # open file for writing
TextLine = input("Please enter a line of text ") # enter line of text from
keyboard
MyFile.write(TextLine) # write line of text to file
print("The file contains this line of text")
MyFile = open ("MyText.txt","r") # open file for reading
TextLine = MyFile.read() # read line of text from file
print(TextLine) # output line of text from file

```

Visual Basic

```

' writing to and reading from a text file
Imports System.IO
Module Module1
    Sub Main()
        Dim textLn As String
        Dim objMyFileWrite As StreamWriter
        Dim objMyFileRead As StreamReader
        objMyFileWrite = New StreamWriter("textFile.txt") ' setup file for
writing
        Console.Write("Please enter a line of text ")
        textLn = Console.ReadLine() ' enter line of text from keyboard
        objMyFileWrite.WriteLine(textLn) ' write line of text to file
        objMyFileWrite.Close() ' close file after writing line of text
        Console.WriteLine("The line of text is ")
        objMyFileRead = New StreamReader("textFile.txt") ' setup file for
reading
        textLn = objMyFileRead.ReadLine ' read line of text from file
        Console.WriteLine(textLn) ' output line of text from file
        objMyFileRead.Close() ' close file after reading line of text
        Console.ReadLine()
    End Sub
End Module

```

Java

```
//writing to and reading from a text file
import java.util.Scanner;
import java.io.BufferedReader; // library routines for file handling
import java.io.PrintWriter;
import java.io.FileReader;
import java.io.FileWriter;
import java.io.IOException;

class TextFile {

    public static void main(String[] args) {
        Scanner myObj = new Scanner(System.in);
        String textLn;
        try {
            FileWriter myFileWriter = new FileWriter("textFile.txt", false);
            PrintWriter myPrintWriter = new PrintWriter(myFileWriter);
            // setup file for writing

            System.out.println("Please enter a line of text ");
            textLn = myObj.next(); //enter line of text from keyboard
            myPrintWriter.printf("%s" + "%n", textLn); // write line of text
to file
            myPrintWriter.close(); // close file after writing line of text
        } catch (IOException e) {
            e.printStackTrace();
        }

        try { // exception handling
            FileReader myFileReader = new FileReader("textFile.txt");
            BufferedReader myBufferedReader = new BufferedReader(myFileReader);
            // setup file for reading

            textLn = myBufferedReader.readLine(); // read line of text from file
            System.out.println(textLn); // output line of text from file

            myFileReader.close(); // close file after reading line of text

        } catch (IOException e) { // exception handling
            e.printStackTrace();
        }
    }
}
```

8.25

```
DECLARE TextLine : STRING // variables are declared as normal
DECLARE MyFile : STRING
MyFile ← "MyText.txt"
MyOtherFile ← "MyOtherText.txt"
// reading the line of text from the file
OUTPUT "The file contains this line of text:"
OPEN MyFile FOR READ // opens file for reading
    READFILE, TextLine // reads a line of text from the file
CLOSEFILE(MyFile) // closes the file
// writing the line of text to another file
OPEN MyOtherFile FOR WRITE // opens the file for writing
    WRITEFILE, TextLine // writes the line of text to the
file
CLOSEFILE(MyFile) // closes the file
```

Answers to exam-style questions

Answers to question 9 in this section are example answers for past paper questions. The details of the relevant past paper can be found with the corresponding exam-style question in the Student's Book.

- 1 Both types of data store contain values that can be accessed by a program during execution using the name of the data store. Data stores for variables contain data that may be changed during the execution of the program. Whereas data stores for constants contain data that may not be changed during the execution of the program.

- 2
 - Item name: `ItemName` – string
 - Manufacturer: `Manufacturer` – string
 - Description: `Description` – string
 - Number in stock: `NumberInStock` – integer
 - Reorder level: `ReorderLevel` – integer
 - Whether the item is on order or not: `OnOrder` – Boolean

- 3
 - Sequence – the order that steps in a program are executed. For example, these two statements need to be in the correct sequence:

```
INPUT Value
IF Value > 10...
```

- Selection – allowing the selection of different paths through the steps of a program.

```
IF Value > 10 THEN ... ELSE ...
```

- Iteration – a section of programming code can be repeated under certain conditions.

```
FOR Value = 1 TO 10
  OUTPUT "*****"
NEXT
```

- Totalling – keeping a total that values are added to.

```
Total = Total + Value
```

- Counting – keeping a count of the number of times an action is performed.

```
Count = Count + 1
```

- 4 OUTPUT "Please enter password "

```
INPUT Password
IF (LENGTH(Password) = 10) AND (Password = UCASE(Password))
  THEN
    OUTPUT "Password meets the rules"
  ENENDIF
```

- 5 A global variable can be used by any part of a program – its scope covers the whole program. Any variable declared in the main program is a global variable.

A local variable can only be used by the part of the program it has been declared in – its scope is restricted to that part of the program. Any variable declared within a procedure or function is a local variable.

An error will occur if an attempt is made to access a local variable outside of its scope.

- 6 Many programmers find library routines useful because they are fully tested and ready to incorporate into a program. For example, any string handling routines such as conversion to lower or upper case, or routines for rounding a value to a fixed number of decimal places.

- 7 a** DECLARE Name : ARRAY[1:10, 1:2] OF STRING
 // Table for First name in column 1 and Family Name in column 2
 DECLARE Counter :INTEGER
 FOR Index ← 1 TO 10
 OUTPUT ("First name ", Name[Index, 1], " Family name ", Name[Index, 2])
 NEXT Index
- b** DECLARE Name : ARRAY[1:10, 1:2] OF STRING
 // Table for First name in column 1 and Family Name in column 2
 DECLARE Index, First, Last : INTEGER
 DECLARE Swap : Boolean
 DECLARE Temp1, Temp2 : STRING
 First ← 1
 Last ← 10
 REPEAT
 Swap ← FALSE
 FOR Index ← First TO Last - 1
 IF Name[Index, 2] > Name[Index + 1, 2] // Test Family name in column 2
 THEN
 Temp2 ←Name[Index, 2]
 Temp1 ←Name[Index, 1]
 Name[Index, 2] ← Name[Index + 1, 2]
 Name[Index, 1] ← Name[Index + 1, 1]
 Name[Index + 1, 2] ← Temp2
 Name[Index + 1, 1] ← Temp1
 Swap ← TRUE // swap both names
 ENDIF
 NEXT Index
 Last ← Last -1
 UNTIL (NOT Swap) OR Last = 1
 FOR Index ← 1 TO 10
 OUTPUT ("First name ", Name[Index, 1], " Family name ", Name[Index, 2])
 NEXT Index

- ```

8 DECLARE Message : STRING // variables are declared as normal
 DECLARE MessageFile : STRING
 MessageFile ← "Message.txt"
 // reading the line of text from the file
 OUTPUT "The Message is:"
 OPEN MessageFile FOR READ // opens file for reading
 READFILE, Message // reads a line of text from the file
 OUTPUT Message
 CLOSEFILE(MessageFile) // closes the file

```
- 9 a Loop with 300 repetitions, starting at 1, values input are stored in consecutive locations in the array Name at the position in the array indexed by the loop counter I
- b REPEAT ... UNTIL
- c OUTPUT "Please enter a number between 0 and 100 inclusive"
- ```

   INPUT Number
   WHILE Number < 0 OR Number > 100
       OUTPUT "Number out of range. Please enter a number
       between 0 and 100 inclusive"
       INPUT Number
   ENDWHILE

```

10–12

Important points to note when writing your program:

- There is not one 'correct' solution to this problem. Any solution is acceptable but your program must:
 - perform all the tasks set out in the question.
 - use a range of appropriate programming techniques that cover all the tasks set out in the question. These tasks must be executed by your program in a logical order.
 - use appropriate data structures, that have been given meaningful names, to store all the data mentioned in the question. If any data structures are named in the question, then those names must be used in your program.
 - be fully commented to ensure that it can be understood.

For example, in 10, see the following sample of code:

