# Decision-making Computer Science Lesson
## to Prepare for UIL Computer Science Contest

**Lesson Plan Title:**  Decision-making

**Goal of Lesson:**  To provide students an opportunity to learn how to use if statements and decision-making to solve problems.

**Grade Level/Course:**  Computer Science I – IV

**TEKS Addressed:**

Conditional Knowledge and Skills:

7A. Apply problem-solving strategies such as design specifications, modular top-down design, step-wise refinement, or algorithm development.

7F. Develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined

functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures.

7I. Use control structures such as conditional statements and iterated, pretest, and posttest loops.

7J. Use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input.

## Overview of Lesson:

First class period - the teacher will lead a discussion about if statements and decision-making. The teacher will explain if statements and decision-making and provide concrete definitions and examples.   Next, the teacher will place students in small groups, asking them to work together to develop approaches for using if statements and decision-making as they move from station to station.

Next class period – students will access an online site ( www.codingbat.com ) and complete a practice if statement and decision-making problem.  Next, the teacher will lead a review of if statements and decision-making.  Finally, after being provided with a sample scenario, students will complete an individual assignment to demonstrate mastery of if statements and decision-making.

## Materials Needed:

1.  Glossary of Computer Science Terms (attached)
2.  Worksheet for group assignment (attached)
3.  Access to the internet -  www.codingbat.com
4.  Worksheet for individual assignment (attached)
5.  Access to the internet -  http://csunplugged.org

## Procedures and Activities:

During the first class period, the teacher will –

- provide the students with a glossary of computer science terms related to decision-making (attached).
- describe and discuss the definitions and explain how decision-making works.
- organize students into small groups.
- have students work in groups at stations to complete the decision-making station activities.  A worksheet should be given to each student.  After working with others,

each student should use the group ideas to complete his/her own assignment (attached).

- have students discuss the group activities.

**Independent Practice:**

During the next class period, the teacher will –

- help students complete the decision-making CodingBat activity as a warmup / review.

- review the prior class activities and discuss if statements and decision-making.

- provide each student with an assignment on which he/she will write lines of code.

- actively monitor the classroom and assist individual students with the assignment.

- have each student turn in a completed working program.

**Assessment:**

Evaluation of individual student assignments

# Computer Science Terms

If – a construct that will allow conditions to be evaluated so that decisions can be made within the context of a programming solution.

Function / Method – a container for code statements that allows for code reuse and program organization.

Parameter – a value that allows information to be passed to a function / method.

Variable – a container that stores program values.  A variables value will often change.

**Computer Science - Group Project**

**Name : _____**     **Date : _____**

## If Stations – *rotate stations every 10 minutes*

```
public class One {
  public static boolean go( int num )
  {
    if( num > 10 )
      return true;
    return false;
  }
}

//code in another class
System.out.println( One.go(12) );
System.out.println( One.go(7) );
```

**OUTPUT**
true
false

What is this code trying to determine about the parameter num?

```
public class Two {
  public static boolean tst( int num )
  {
    if( num % 2 == 0)
      return false;
    return true;
  }
}

//code in another class
System.out.println( Two.tst( 75 ) );
System.out.println( Two.tst( 50 ) );
```

**INSTRUCTIONS**
Evaluate the code at left and show the output.

**OUTPUT**

```
public class Three
{
   //method what will return true if
   //num is greater than 100 and less than 200
   //150 and 178  would return true
   //76 and 716  would return false
   public static boolean what( int num )
   {



   }
}
```

**INSTRUCTIONS**
Write out the code needed to complete method what.

# Was it freezing or not?

**Lab Goal:**

This assignment will teach you more about if statements and decision-making.  You will demonstrate mastery of decision-making.

**Lab Description :**

Given daily temperature values, write a program to determine if the provided temperature value is below freezing or not.  32 degrees is considered freezing.

**Output Description :**

Print out "`Below freezing.`" or "`Not below freezing.`" for each value.

**Sample Input:**

```
90.0
16
34.5
19.0
25.0
101
```

**Sample Output:**

```
Not below freezing.
Below freezing.
Not below freezing.
Below freezing.
Below freezing.
Not below freezing.
```

**The following resources were used as the basis for this Lesson Plan :**

1. CodingBat – www.codingbat.com – an online repository of coding problems.
2. A+ Computer Science – www.apluscompsci.com – computer science curriculum materials
3. CS Unplugged - http://csunplugged.org/ - online repository of computer science resources

Lesson Plan Title:  Strings and While Loops

Goal of Lesson:  To provide students an opportunity to learn how to use strings and while loops to solve problems.

Grade Level/Course:  Computer Science I – IV

TEKS Addressed:

String Manipulation and Looping Knowledge and Skills:

7B. Manipulate data structures using string processing.

7D. Code using various data types.

7F. Develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures.

7I. Use control structures such as conditional statements and iterated, pretest, and posttest loops.

7J. Use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input.

Overview of Lesson:

First class period - the teacher will lead a discussion about strings and while loops.  The teacher will explain arrays and lists and provide concrete definitions and examples.   Next, the teacher will place students in small groups, asking them to work together to develop approaches for using strings and while loops as they move from station to station.

Next class period – students will access an online site ( www.codingbat.com ) and complete a practice string / while loop problem.  Next, the teacher will lead a review of strings and while loops.  Finally, after being provided with a sample scenario, students will complete an individual assignment to demonstrate mastery of strings and while loops.

Materials Needed:

1.  Glossary of Computer Science Terms (attached)

2.  Worksheet for group assignment (attached)

3.  Access to the internet -  www.codingbat.com

4.  Worksheet for individual assignment (attached)

5.  Access to the internet -  http://csunplugged.org

Procedures and Activities:

During the first class period, the teacher will –

- provide the students with a glossary of computer science terms related to strings and while loops (attached).

- describe and discuss the definitions and explain how strings and while loops work and how they are processed.

- organize students into small groups.

- have students work in groups at stations to complete the strings and while loops station activities.  A worksheet should be given to each student.  After working with others, each student should use the group ideas to complete his/her own assignment (attached).

- have students discuss the group activities.

Independent Practice:

During the next class period, the teacher will –

- students will complete a strings / while loop CodingBat activity as a warmup / review.
- review the prior class activities and discuss strings and while loops.
- provide each student with an assignment on which he/she will write lines of code.
- actively monitor the classroom and assist individual students with the assignment.
- have each student turn in a completed working program.

Assessment:

Evaluation of individual student assignments

Computer Science Terms

Array – a fixed size group of values all of the same type.

If – a construct that will allow conditions to be evaluated so that decisions can be made within the context of a programming solution.

Function / Method – a container for code statements that allows for code reuse and program organization.

List – a variable size group of values all of the same type.

Loop – a construct that allows for statements to be executed multiple times.

Parameter – a value that allows information to be passed to a function / method.

String – a group of characters similar to an array.

Variable – a container that stores program values.  A variables value will often change.

**Name :** _____  **Date :** _____

## Strings and While Loops Stations – *rotate stations every 10 minutes*

```
public class One
{
  public static void go( String wrd )
  {
    System.out.println( wrd.substring(0,3) );
    System.out.println( wrd.substring(3) );
  }
}

//code in another class
System.out.println( One.go("piggies") + "\n");
System.out.println( One.go("uilcompsci") + "\n" );
System.out.println( One.go("upandaway") + "\n" );
```

***OUTPUT***
```
pig
gies

uil
compsci

upa
ndaway
```

```
public class Two
{
  public static void go( String wrd )
  {
    int i = 0;
    while( i < wrd.length() )
    {
      System.out.println( wrd.substring(i, i + 1) );
      i++;
    }
  }
}

//code in another class
System.out.println( Two.go("buzz") + "\n");
System.out.println( Two.go("rocket") + "\n" );
```

***INSTRUCTIONS***
Evaluate the code at left and show the output.

***OUTPUT***

```
public class Three
{
  //method wo will return a new String contains all letters from wrd
  //   except the vowels – vowels are a, e, i, o, u
  //the call wo("chicken") would return chckn
  //the call wo("football") would return ftbll
  public static String wo( String wrd )
  {



  }
}
```

***INSTRUCTIONS***
Write out the code needed to complete method wo.

# Flying V

**Lab Goal:**

This assignment will teach you more about strings and while loops.  You will demonstrate mastery of strings / while loops usage.

**Lab Description :**

Given a string, print out the string in the shape of flying V as shown below.
Print out the flying V shape shown below for each data set.

**Sample Input:**

```
dog
foot
it
butter
```

**Sample Output:**

```
d
oo
ggg
oo
d

f
oo
ooo
tttt
ooo
oo
f

i
tt
i

b
uu
ttt
tttt
eeeee
rrrrrr
tttt
ttt
uu
b
```

The following resources were used as the basis for this Lesson Plan :

1. CodingBat – www.codingbat.com – an online repository of coding problems.
2. A+ Computer Science – www.apluscompsci.com – computer science curriculum materials
3. CS Unplugged - http://csunplugged.org/ - online repository of computer science resources

Lesson Plan Title:  Using Scanner

Goal of Lesson:  To provide students an opportunity to learn how to use Scanner to solve problems, including String problems.

Grade Level/Course:  Computer Science I – IV

TEKS Addressed:

Basic Input, String, and Looping Knowledge :

1B. Compare, contrast, and appropriately use the various input, processing, output, and primary/secondary storage devices.

2A. Demonstrate proficiency in the use of a variety of input devices such as the keyboard.

2B. Use digital keyboarding standards for the input of data.

7B. Manipulate data structures using string processing.

7D. Code using various data types.

7F. Develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures.

7I. Use control structures such as conditional statements and iterated, pretest, and posttest loops.

7J. Use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input.

Overview of Lesson:

First class period - the teacher will lead a discussion about scanner.  The teacher will explain how scanner can be used for input and String processing.  The teacher will provide concrete definitions and examples.   Next, the teacher will place students in small groups, asking them to work together to develop approaches for using scanner to solve problems as they move from station to station.

Next class period – students will access an online site ( www.codingbat.com ) and complete a practice scanner or String problem.  Next, the teacher will lead a review of scanner and Strings. Finally, after being provided with a sample scenario, students will complete an individual assignment to demonstrate mastery of scanner and String processing.

Materials Needed:

1.  Glossary of Computer Science Terms (attached)

2.  Worksheet for group assignment (attached)

3.  Access to the internet -  www.codingbat.com

4.  Worksheet for individual assignment (attached)

5.  Access to the internet -  http://csunplugged.org

Procedures and Activities:

During the first class period, the teacher will –

•  provide the students with a glossary of computer science terms related to scanner (attached).

•  describe and discuss the definitions and explain how scanner works and how it can be used to solve problems, including String processing.

- organize students into small groups.
- have students work in groups at stations to complete the scanner station activities.  A worksheet should be given to each student.  After working with others, each student should use the group ideas to complete his/her own assignment ( attached ).
- have students discuss the group activities.

Independent Practice:

During the next class period, the teacher will –

- students will complete a scanner or String CodingBat activity as a warmup / review.
- review the prior class activities and discuss scanner.
- provide each student with an assignment on which he/she will write lines of code.
- actively monitor the classroom and assist individual students with the assignment.
- have each student turn in a completed working program.

Assessment:

Evaluation of individual student assignments

Computer Science Terms

Array – a fixed size group of values all of the same type.

If – a construct that will allow conditions to be evaluated so that decisions can be made within the context of a programming solution.

Function / Method – a container for code statements that allows for code reuse and program organization.

List – a variable size group of values all of the same type.

Loop – a construct that allows for statements to be executed multiple times.

Parameter – a value that allows information to be passed to a function / method.

String – a group of characters that is similar to an array.

Variable – a container that stores program values.  A variables value will often change.

**Name : _____** **Date : _____**

## Scanner and String Stations

```
public class One
{
  public static void go( ) throws IOException
  {
    Scanner in = new Scanner( System.in );
    System.out.println( in.next() );
    System.out.println( in.nextInt() );
    System.out.println( in.next() );
  }
}

//code in another class
System.out.println( One.go() );
```

**_INPUT_**
Fred 7 alive

**_OUTPUT_**
Fred
7
alive

---

```
public class Two
{
  public static void yo( String line )
  {
    Scanner chop = new Scanner( line );
    while( chop.hasNext() ){
      System.out.println( chop.next() );
    }
  }
}

//code in another class
System.out.println( Two.yo("comp sci rocks!") + "\n");
```

**_INSTRUCTIONS_**
Evaluate the code at left and show the output.

**_OUTPUT_**

---

```
public class Three
{
  //method wo will return the sum of all even integers in line
  //the call wo("2 3 8 11 20") would return 30
  //the call wo("6 7 8 9 10") would return 24
  public static int dat( String line )
  {



  }
}
```

**_INSTRUCTIONS_**
Write out the code needed to comlete method dat.

**_Scanner methods_**

next()
nextInt()
nextDouble()

hasNext()
hasNextInt()
hasNextDouble()
next()
nextInt()
nextDouble()

# Which day was hottest?

Lab Goal:

This assignment will teach you more about scanner while reviewing loops and if statements.
You will demonstrate mastery of scanner.

Lab Description :

Given a group of daily temperature values, write a program to determine which day of the week
was the hottest.

Print out "X had the hottest temperature." for each data set.

Sample Input:

```
Mon 90.0 Tue 76 Wed 34.3 Thu 19.0 Fri 25.0
Mon 30.0 Tue 56.5 Wed 94.5 Thu 79.0 Fri 65.0
Mon 10.0 Tue -16 Wed 31.5 Thu 67.0 Fri 33
```

Sample Output:

```
Mon had the hottest temperature.
Wed had the hottest temperature.
Thur had the hottest temperature.
```

The following resources were used as the basis for this Lesson Plan :

1. CodingBat – www.codingbat.com – an online repository of coding problems.
2. A+ Computer Science – www.apluscompsci.com – computer science curriculum materials
3. CS Unplugged - http://csunplugged.org/ - online repository of computer science resources

## For Loops Computer Science Lesson
## to Prepare for UIL Computer Science Contest

Lesson Plan Title:  For Loops

Goal of Lesson:  To provide students an opportunity to learn how to use for loops to solve problems.

Grade Level/Course:  Computer Science I – IV

TEKS Addressed:

Looping Knowledge and Skills:

7D. Code using various data types.

7F. Develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures.

7I. Use control structures such as conditional statements and iterated, pretest, and posttest loops.

7J. Use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input.

Overview of Lesson:

First class period - the teacher will lead a discussion about loops and specifically for loops.  The teacher will explain for loops and provide concrete definitions and looping examples.   Next, the teacher will place students in small groups, asking them to work together to develop approaches for solving problems with for loops as they move from station to station.

Next class period – students will access an online site ( www.codingbat.com ) and complete a practice loop problem.  Next, the teacher will lead a review of for loops.  Finally, after being provided with a sample scenario, students will complete an individual assignment to demonstrate mastery of for loops.

Materials Needed:

1. Glossary of Computer Science Terms (attached)

2. Worksheet for group assignment (attached)

3. Access to the internet -  www.codingbat.com

4. Worksheet for individual assignment (attached)

5. Access to the internet -  http://csunplugged.org

Procedures and Activities:

During the first class period, the teacher will –

- provide the students with a glossary of computer science terms related to for loops (attached).

- describe and discuss the definitions and explain how for loops work and how they are used to solve problems.

- organize students into small groups.

- have students work in groups at stations to complete the for loop station activities.  A worksheet should be given to each student.  After working with others, each student should use the group ideas to complete his/her own assignment (attached).

- have students discuss the group activities .

Independent Practice:

During the next class period, the teacher will –

- students will complete a CodingBat loop activity as a warmup / review.
- review the prior class activities and discuss for loops.
- provide each student with an assignment on which he/she will write lines of code.
- actively monitor the classroom and assist individual students with the assignment.
- have each student turn in a completed working program.

Assessment:

Evaluation of individual student assignments

## Computer Science Terms

Array – a fixed size group of values all of the same type.

If – a construct that will allow conditions to be evaluated so that decisions can be made within the context of a programming solution.

Function / Method – a container for code statements that allows for code reuse and program organization.

List – a variable size group of values all of the same type.

Loop – a construct that allows for statements to be executed multiple times.

Parameter – a value that allows information to be passed to a function / method.

Variable – a container that stores program values.  A variables value will often change.

**Name : _____   Date : _____**

## For Loops Stations

```
public class One
{
  public static boolean go( int num )
  {
    int sum = 0;
    for( int i = 1; i <= num; i++)
      sum += i;
    return sum;
  }
}

//code in another class
System.out.println( One.go(5) );
System.out.println( One.go(6) );
```

```
public class Two
{
  public static int yo( int num )
  {
    int sum = 0;
    for( int i = 1; i <= num; i++ )
      if( num % i == 0)
        sum += i;
    return sum;
  }
}

//code in another class
System.out.println( Two.yo(5) );
System.out.println( Two.yo(10) );
```

*INSTRUCTIONS*
Evaluate the code at left and show the output.

*OUTPUT*

```
public class Three
{
  //method isPrime will return true if num is prime
  //method isPrime will return false if the num is not prime
  //a prime number is any number only divisible by 1 and itself
  //5, 7, 11, and 13 return true
  //4, 6, 8, 10, and 40 return false
  public static boolean isPrime( int num )
  {




  }
}
```

*INSTRUCTIONS*
Write out the code needed to
complete method isPrime.

# How many freezing days?

Lab Goal:

This assignment will teach you more about for loops. You will demonstrate mastery of for loops.

Lab Description :

Given two numbers, print out all odd numbers in between.
Print out all odd numbers between x and y for each data set.

Sample Input:

```
5 12
3 15
1 20
10 27
```

Sample Output:

```
5 7 9 11
3 5 7 9 11 13 15
1 3 5 7 9 11 13 15 17 19
11 13 15 17 19 21 23 25 27
```

The following resources were used as the basis for this Lesson Plan :

1. CodingBat – www.codingbat.com – an online repository of coding problems.
2. A+ Computer Science – www.apluscompsci.com – computer science curriculum materials
3. CS Unplugged - http://csunplugged.org/ - online repository of computer science resources

Array / List Processing Computer Science Lesson
to Prepare for UIL Computer Science Contest

Lesson Plan Title:  Processing Arrays / Lists of Data

Goal of Lesson:  To provide students an opportunity to learn how to process an array / list of data and how to use arrays and lists to solve problems.

Grade Level/Course:  Computer Science I – IV

TEKS Addressed:

Arrays Knowledge and Skills:

7A. Apply problem-solving strategies such as design specifications, modular top-down design, step-wise refinement, or algorithm development.

7C. Develop sequential and iterative algorithms and codes programs in prevailing computer languages to solve practical problems modeled from school and community.

7D. Code using various data types.

7F. Develop coding with correct and efficient use of expressions and assignment statements including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures.

7G. Create and use libraries of generic modular code to be used for efficient programming.

7I. Use control structures such as conditional statements and iterated, pretest, and posttest loops.

7J. Use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input.

7K. Identify and use structured data types of one-dimensional arrays, records, and text files.

Overview of Lesson:

First class period - the teacher will lead a discussion about arrays and lists.  The teacher will explain how to use arrays and lists and provide concrete definitions and examples.   Next, the teacher will place students in small groups, asking them to work together to develop approaches for processing arrays and lists as they move from station to station.

Next class period – students will access an online site ( www.codingbat.com ) and complete a practice array / list processing problem.  Next, the teacher will lead a review of arrays and lists. Finally, after being provided with a sample scenario, students will complete an individual assignment to demonstrate mastery of array / list processing.

Materials Needed:

1.  Glossary of Computer Science Terms (attached)
2.  Worksheet for group assignment (attached)
3.  Access to the internet -  www.codingbat.com
4.  Worksheet for individual assignment (attached)
5.  Access to the internet -  http://csunplugged.org

Procedures and Activities:

During the first class period, the teacher will –

- provide the students with a glossary of computer science terms related to arrays and lists (attached).
- describe and discuss the definitions and explain how arrays and lists can be used to solve problems and how they are processed.

- organize students into small groups.
- have students work in groups at stations to complete the array / list station activities.  A worksheet should be given to each student.  After working with others, each student should use the group ideas to complete his/her own assignment (attached).
- have students discuss the group activities .

Independent Practice:

During the next class period, the teacher will –

- students will complete an array / list processing CodingBat activity as a warmup / review.
- review the prior class activities and discuss arrays and lists.
- provide each student with an assignment on which he/she will write lines of code.
- actively monitor the classroom and assist individual students with the assignment.
- have each student turn in a completed working program.

Assessment:

Evaluation of individual student assignments

Computer Science Terms

Array – a fixed size group of values all of the same type.

If – a construct that will allow conditions to be evaluated so that decisions can be made within the context of a programming solution.

Function / Method – a container for code statements that allows for code reuse and program organization.

List – a variable size group of values all of the same type.

Loop – a construct that allows code statements to be executed multiple times.

Parameter – a value that allows information to be passed to a function / method.

Variable – a container that stores program values.  A variables value will often change.

**Name : _____**     **Date : _____**

## Array Stations – *rotate stations every 10 minutes*

```
public class One {
  public static int go( int[] array )
  {
    int sum = 0;
    for( int i = 0; i < array.length; i++)
      sum = sum + array[i];
    return sum;
  }
}
```

> **OUTPUT**
> 12
> 16

```
//code in another class
System.out.println( One.go( new int[]{3,6,1,2} ) );
System.out.println( One.go( new int[]{2,4,7,0,3} ) );
```

---

```
public class Two {
  public static int yo( int[] array )
  {
    int sum = 0;
    for( int num : array )
      if( num % 2 == 0 )
        sum += num;
    return sum;
  }
}
```

> **INSTRUCTIONS**
> Evaluate the code at left and show the output.
>
> **OUTPUT**

```
//code in another class
System.out.println( Two.yo( new int[]{3,4,5,6,1,10,55,33,12} ) );
System.out.println( Two.yo( new int[]{1,2,22,11,17,13,3,4,5,6,1} ) );
```

---

```
public class Three
{
```

> **INSTRUCTIONS**
> Write out the code needed to complete method `biggerThanX`.

```
  //the call biggerThanX( new int[]{2,14,5,11,4,11,34}, 10) would return 4
  //the call biggerThanX( new int[]{45,64,22,56,78,32}, 30) would return 5
  public static int biggerThanX( int[] nums, int x ) {




  }
}
```

# How many freezing days?

Lab Goal:

This assignment will teach you more about arrays and lists.  You will demonstrate mastery of array / list processing.

Lab Description :

Given an array / list of daily temperature values, write a program to determine how many of the days were below freezing.  32 degrees is considered freezing.

Print out "`There were x days below freezing.`" for each data set.

Sample Input:

```
90.0, 76.5, 34.5, 19.0, 25.0, 100
30.0, 56.5, 94.5, 79.0, 65.0, 102
10.0, -16, 31.5, 67.0
-5.0, 31, 14.5, 19.0, 25.0, 10, 7.9, 23
45, 55, 61.2, 77
```

Sample Output:

```
There were 2 days below freezing.
There were 1 days below freezing.
There were 3 days below freezing.
There were 8 days below freezing.
There were 0 days below freezing.
```

The following resources were used as the basis for this Lesson Plan :

1. CodingBat – www.codingbat.com – an online repository of coding problems.
2. A+ Computer Science – www.apluscompsci.com – computer science curriculum materials
3. CS Unplugged - http://csunplugged.org/ - online repository of computer science resources