# Object-Oriented Development (CIS1056-N) Worksheet 02: If Conditions

## Before You Start

Remember: You are not expected to complete the entire brief within the allotted two hours, but to make a start and continue outside of the class.

Ensure you have completed all assessment tasks from Worksheet 1 and are comfortable with Java primitive types before beginning this worksheet. Attempt to complete this set of tasks before your next session. Any issues seek help from your tutors.

**Hint:** It is good practice to plan your programs first on paper using pseudocode. When we say pseudocode, we mean code that is halfway between English and a programming language, such as Java.

Read more about it here: <https://en.wikipedia.org/wiki/Pseudocode>

## Introduction

Now we understand the basics of the Java primitive type system, it is time to start experimenting with making decisions (and making our programs a lot more useful).

## 1. Calculate Charge (based on Age)

Create and test a new Java Application called Charge that implements the following algorithm:

Get age from user

Set charge to 20.00 (assume adult)

If age less than 18 then

Set charge to 15.00

End if

Print charge value with appropriate message

## 2. Odd or Even

Design and write a program that asks the user for a number and indicates if the number is “odd” or “even”.

**Hint:** Even numbers have a reminder of 0 (zero) when divided by 2.

## 3. Employee Manager

Create a new java project called EmployeeManager that calculates and displays the weekly wage (without tax) from the number of hours worked and hourly rate.

For the initial version of the program, we will use fixed (literal) value for the variables:

* Hours Worked: **35**
* Hourly Rate: **9.75**

The weekly wage should be: **341.25**.

1. Using the values above, create variables (with appropriate identifiers) to calculate the weekly wage, then print to screen.
2. Update the solution to ask the user for the number of hours worked. The hourly rate should remain fixed at £9.75.
3. Modify your program, to pay staff an additional £4.75 for any hours above the basic 40 hour working week. For example, if an employee work 45 hours, the total payment would be:  
    £450.00 (£9.50 x 45 + £4.50 x 5).
4. Ensure you test your solution rigorously.

## 4. Leap Year

Using a flowchart or pseudocode to design the steps required to find out if a year is a leap year:

1. Prompt the user to input a year, print out a message stating the year was or was not a leap year. Leap years occur if the year is divisible by 4, except for the century years.
2. Only the centuries divisible by 400 are leap years. e.g. 1900 was not a leap year; 2000 was a leap year.
3. Implement your flowchart or pseudocode in Java.

## 5. Extending Calculate Charge

1. Extend the Charge program to calculate the charge (under 18s pay 80%).
2. Change the program to implement the following charges:
   * Adults pay £30
   * Under 18s pay 60% of adult charge
   * Over 65s pay 80% of adult charge

**Hint:** you need to use if - else if:

## 6. Bank Withdrawal

Design and write a program that processes a bank withdrawal. Assume the current balance is £40 and the overdraft limit £50. If the overdraft is exceeded a charge of £5 is added to the account immediately. The table below shows initial test values for amount and the expected output:

|  |  |
| --- | --- |
| Withdrawal Amount | Output produced by the program (must be on a single line). |
| 10 | Withdraw: 10 New Balance: 30 |
| 60 | Withdraw: 60 (Using Overdraft) New Balance: -20 |
| 100 | Withdraw: 100 (Using Overdraft) Charge: 5 New Balance: -65 |

Use the basic form of the if statement (without the else).

**Hint:** Your solution will require a *nested* if.

## 7. Commission

Commission is calculated using the following rules:

* Sales staff are paid 10% commission based on their total sales.
* Staff who have sold more than 50 items receive a Bonus Commission (an additional 25% of the commission amount).

1. Write pseudocode or develop a flowchart for the above:
   * Assume the total sales and number of items will be input by the user (see example below).
   * Use the basic form of the if statement (without the else).
2. Test your pseudocode or flowchart (using pen and paper/digital notes app).
3. Ask your tutor to check your pseudocode or flowchart.
4. Implement the program using Java ensuring you test rigorously.

Examples of the program executing - the inputs are underlined:

**Run 1:**

Enter total sales: 1000

Enter number of items sold: 35

Commission: 100

**Run 2:**

Enter total sales: 1500

Enter number of items sold: 60

Commission: 150

Bonus Commission: 37.5

Total Commission: 187.5

## 8. Temperature Conversion

Design and write a program to convert temperatures between Fahrenheit and Celsius.

The program will require two inputs: type of conversion (**F** for Fahrenheit-to-Celsius and **C** for Celsius- to-Fahrenheit) followed by the current temperature value.

The formulas are:

* **Fahrenheit** Celsius x 9 / 5 + 32
* **Celsius** (Fahrenheit -32) x 5 / 9

## 9. Calculate Postage

1. Write a program that asks the user to enter the weight (in kilograms) of a parcel and displays the postal charge. The postal rates are:

* Less than 1 kilogram: 3.50
* 1 - 2 kilograms: 6.50
* 2 - 3 kilograms: 10.50
* 3 - 4 kilograms: 13.00
* Over 4 kilograms: 20.00

1. Modify your program to use the following postal charges:

* Less than 1 kilogram: 3.50 per kilogram
* 1 - 2 kilograms: 3.00 per kilogram
* 2 - 3 kilograms: 2.50 per kilogram
* 3 - 4 kilograms: 2.00 per kilogram
* Over 4 kilograms: 1.50 per kilogram

## Document History

Revision 0 (25-Sep-22): This is the initial version of the 2022/23 exercise.