

# Object Oriented Programming

## 12 - Programming Exercises

### Composition

Program the following task in your C++ compiler. Keep compiling and executing even after writing a single line of code.

#### **ADT: NumDays**

Design a class called **NumDays**. The class's purpose is to store a value that represents several work hours and convert it to several days.

For example, 8 hours would be converted to 1 day, 12 hours would be converted to 1.5 days, and 18 hours would be converted to 2.25 days.

The class should have a constructor that accepts several hours, as well as member functions for storing and retrieving the hours and days.

The class should also have the following overloaded operators:

- **Addition operator (+):** When two (*left-hand-side and right-hand-side*) **NumDays** objects are added together, the overloaded + operator should return the sum of the two objects' hours members.
- **Subtraction operator (-):** When one **NumDays** object is subtracted from another (*right-hand-side from left-hand-side*), the overloaded - operator should return the difference of the two objects' hours members.
- **Prefix and postfix increment operators (++):** These operators should increment the number of **hours** stored in the object. When increased, the number of days should be automatically recalculated.
- **Prefix and postfix decrement operators (--):** These operators should decrease the **number of hours** stored in the object. When decremented, the number of days should be automatically recalculated.

#### **ADT: Time Off**

Design a class named **TimeOff**. The purpose of the class is to track an employee's sick-leave, vacation, and unpaid time off. It should have, as members, the following instances of the **NumDays** class:

<b>maxSickDays</b>	A <b>NumDays</b> object that records the maximum number of days of sick leave the employee may take.
<b>sickTaken</b>	A <b>NumDays</b> object that records the number of days of sick leave the employee has already taken.
<b>maxVacation</b>	A <b>NumDays</b> object that records the maximum number of days of paid vacation the employee may take.
<b>vacTaken</b>	A <b>NumDays</b> object that records the number of days of paid vacation the employee has already taken.
<b>maxUnpaid</b>	A <b>NumDays</b> object that records the maximum number of days of unpaid vacation the employee may take.
<b>unpaidTaken</b>	A <b>NumDays</b> object that records the number of days of unpaid leave the employee has taken.

Additionally, the class should have members for holding the employee's name and identification number. It should have an appropriate constructor and member functions for storing and retrieving data in any of the member objects.

**Input Validation:** Company policy states that an employee may not accumulate more than 240 hours of paid vacation. The class should not allow the **maxVacation** object to store a value greater than this amount.

#### **Personnel Report: A Driver Program**

Write a program (*main function*) that uses an instance of the **TimeOff** class you designed above and perform the following:

- The program should ask the user to enter the number of months an employee has worked for the company.
- It should then use the **TimeOff** object to calculate and display the employee's maximum number of sick leave and vacation days.

**Note:** Employees earn 12 hours of vacation leave and 8 hours of sick leave per month.