Objects and Classes

Workshop 3

In this workshop, you'll learn:

- Design and code a class for a simple object,
- Write code that includes robust user input validation, and
- Write code that includes formatted program output.

1. Molecules

Write a class named Molecule that holds information about a molecule. Place your class declaration and definition in a file named Molecule.java.

Attributes(fields, properties, data, variables):

- **structure**: a String object that holds the molecule's structure. It must contain characters or numbers only.
- **name**: a String object that holds the molecule's name.
- **weight**: a double variable that holds the molecule's weight. It must be positive and less than 100.

Methods (member functions):

- **Default constructor:** no-argument constructor to leave the object in safe empty state.
- **Parameterized constructors:** assign parameters to the attributes.
- **void display()**: displays the molecular information on screen.

Write a class named Main with the main function that accepts information for arbitrarily given numbers of molecules and displays the molecular information in tabular format.

The program output might look something like:

```
Molecular Information:

Enter structure : H2O
Enter name : Water
```

```
Enter weight : 18.015

Enter structure : CO2
Enter full name : Carbon
Enter weight : 44.010

Enter structure : NaCl
Enter full name : Sodium
Enter weight : 58.443

Enter structure : 0

H2O         Water     18.015
CO2         Carbon    44.010
NaCl        Sodium    58.443
```

2. Atoms

Write a class named Atom that holds information about an atom. Place your class declaration and definition in a file named Atom.java.

The Atom class has the following members:

Attributes:

- **number**: an int variable that holds an atom's number.
- **symbol**: a String object that holds an atom's symbol.
- **name:** a String object that holds an atom's name.
- **weight**: a double variable holding an atom's weight.

Methods

- **Default constructor:** leave the object in safe empty state.
- **void accept()**: prompts for and accepts data from standard input
- **void display()**: displays the atomic information on the screen.

Write the class named Main containing the main program that accepts information for up to 10 atomic elements and displays the atomic information in tabular format.

The program output might look something like:

```
Atomic Information:

 Enter atomic number : 3
 Enter symbol : Li
 Enter full name : lithium
 Enter atomic weight : 6.941

 Enter atomic number : 20
 Enter symbol : Ca
 Enter full name : calcium
 Enter atomic weight : 40.078

 Enter atomic number : 30
 Enter symbol : Zn
 Enter full name : zinc
 Enter atomic weight : 65.409

 Enter atomic number : 0

  3  Li  lithium  6.941
  20 Ca  calcium  40.078
  30 Zn  zinc     65.409
```