

## **TD2 : Inheritance and Polymorphism**

We want to create a prototype for a game called Polymon. In this completely new and original game, the player travels the world in search of polymons, creatures that love to fight each other. There are several species of polymons. Each species has a name and a special attack. Each polymon belongs to a species, and has a level and a number of health points (hp). A polymon cannot have less than 0hp. If a polymon has 0 hp, it cannot attack anymore. We want to be able to easily access each of this characteristics (but do not forget about encapsulation). We also want to be able to call two methods on each polymon:

toString(): Which should return its species, its level and its number of hp.

attack(Polymon p): Used to attack another polymon p. The number of hp remove from p is calculated by using the level of the polymon and the species of p (see below).

Here are the available species of polymons:

### **Pik'achoo:**

*Starting health:* level\*20.

*Special attack:* Sneeze. Deals level\*10 damages. Is very effective against Hakuna Rattata and not very effective against Mr. Rhyme.

### **Hakuna Rattata:**

*Starting Health:* level\*15.

*Special attack:* Sing. Deals level\*15 damages. Is very effective against Mr. Rhyme and not very effective against Pik'achoo.

### **Mr. Rhyme:**

*Starting Health:* level\*10.

*Special attack:* Poem. Deals level\*20 damages. Is very effective against Pik'achoo and not very effective against Hakuna Rattata.

When an attack is very effective, it deals 10% more damages. When an attack is not very effective, it deals 10% less damages. If a polymon attacks another polymon of the same species, the attack deals a normal amount of damages.

**Question 1:** Think of a way to implement this game. What classes will you create? Which class will inherit from which? Do some classes need to be abstract? Speak with your teacher before moving to the next question.

**Question 2:** Program your version of polymon. Check that everything works as intended, try to create a few polymons, make them attack each other and use toString() to print their characteristics.

**Question 3:** Write a class Polydex that can be used to manipulate multiple polymons. The references to these polymons should be stored in an ArrayList (use google to learn about ArrayLists or ask your teacher). It should have a method for adding a polymon to the polydex, emptying the Polydex, getting the number of polymons that have 0hp, calculating the average of the number of hp and the average number of damages dealt with an attack, getting the number of polymons that belong to a given species and make all the polymons in the polydex attack another polymon. Polydex should also implement toString(). Check that Polydex works as intended.