# Week 4

## Tutorial A

**What is an abstract class? Give an example.**

* An abstract class is a class that has abstract keyword in the class header.
* They cannot be instantiated. (cannot create objects)
* Such classes are typically used as a parent(base) class for other classes.
* Explain purpose of it using Dog example.

Can we allow Dog objects to be created - No, it’s too generic. We want outside code to use our child classes not, Dog parent class.

We need only Poodle or GermanShepherd objects, not Dog objects.

* Abstract classes may contain one or many abstract methods.
* An abstract method is one that is declared without an implementation i.e. there is no { ... } block. Any concrete subclass of the abstract class must provide an implementation of this method.
* Let's add an abstract void bark() method to the Dog class:
* Benefits
  + There's no need to write a generic and often useless implementation of the method in the abstract class.
  + We also have a guarantee that every concrete subclass has a specific implementation of this method, which improves the use of polymorphism.

**What are Java interfaces?**

* Java interfaces are effectively a collection of abstract methods and we say that classes can implement an interface.
* The interface is a contract that implementing classes agree to follow.

Give an example.

**Why should we use abstract classes?**

* If we need to implement partially abstract structures we can use abstract classes which allows mix of abstract as well as concrete / non abstract methods.

**Why should we use interfaces?**

* If we need a fully abstract structures we should be go for interfaces.

## Tutorial A last question – Hints

* No abstract parent classes or no concrete parent classes
  + Interfaces
    - Ground Unit
    - Air Unit
    - Use Stimpack
    - Use cloak
    - Attack ground
    - Attach Air
  + Classes
    - FireBat
    - Marine
    - Ghost
    - Wraith
    - Squad
    - Test Class with main method
  + Enum
    - Only weapon enum
* Assume each unit/solider has int currentHealth, MAX\_HEALTH, SPEED
* Wraith does not have a weapon
* Marine, FireBat and Ghost has their own weapons as per last week
* Stimpack can only be used by Marines and FireBats
* Ghosts can use cloak
* Squad class can have 2 array lists this time
  + One for Ground Based units
  + One for Air Based units
* In the squad class try implementing
  + Add air unit
  + Add ground unit
  + Int total ground attack Power
  + Activate stimpack for marines
  + Print squad composition