**Pattern problems:**

**1)**

1 2 3 4 5

6 7 8 9

10 11 12

13 14

15

**2)**

3

6 9

12 15 18

21 24 27 30

**Java is Object Oriented Programming System – (OOPS)**

**Structure:**

* **Class -  A class is**a user defined blueprint or prototype from which objects are created**.**
* **Object – Instances of class**
* **Method – it is member of a class which contains set of java statements. It has a return types, access modifier and can have attributes**
* **Attributes – Parameters passed inside a method are called attributes**

**Principals of OOP**

* **Inheritance**
* **Abstraction**
* **Polymorphism**
* **Encapsulation**

**Inheritance : Acquiring properties from parent**

**Extends keyword is used to get properties from parent to child.**

**Parent class – Vehicle - KTM:**

**petrolEngine**

**desielEngine**

**EV**

**gears**

**braking**

**Child RC extends Vehicle - KTM -**

**Type**

**Colour**

**Style**

**Child Duke**

**Type**

**Colour**

**Style**

**Types of Inheritance:**

1. **Single inheritance – only one parent and one child**
2. **Multilevel inheritance –**
3. **Hierarchical inheritance - one parent class is inherited by more than one child class**
4. **Multiple Inheritance – not possible in java ( Interface helps us to achieve this)**
5. **Hybrid Inheritance - not possible in java (Hierarchical + Multiple) ( is not possible because it leads to diamond problem)**

**Interface:**

1. Class declaration contains Interface keyword
2. All the methods as by default abstract
3. By default the access modifier of all the methods and variables are public
4. Methods should not be private or protected

**Abstraction:**

1. Class declaration contains Abstract keyword
2. Not all methods are abstract/ atleast one methods should be concrete
3. Methods should not be private

Is it possible to extend an abstract class in to a child class without implementing its methods

A: Yes, it is possible but for that we have to make the child class also as abstract

Abstraction: Hiding implementation from the user( only providing him the necessary details like how to use but not how it is happening in backend(implementation/code))